Section: Biochemistry

Research

SERUM ADROPIN, INSULIN AND URINARY MICROALBUMIN IN DIABETIC NEPHROPATHY: A TEACHING HOSPITAL BASED STUDY

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Abstract

Background: Diabetic nephropathy is one of the microvascular complications seen in chronic cases of diabetes mellitus. Around 20-40% cases of diabetes mellitus become the victim of diabetes nephropathy. It is expressed in liver and encoded by Energy Homeostasis Associated (Enho) gene consist of 76 amino acid residues. The study is aimed to study the serum adropin, insulin and urinary microalbumin in diabetic nephropathy patients. **Materials and Methods:** This was the hospital-based cross-sectional study conducted in the Rama Medical College after getting the ethical approval from the institutional ethics board of the Department of Biochemistry. One hundred and three (103) diabetic nephropathy and 101healthy controls were enrolled in the study. Serum adropin and insulin levels were estimated using Enzyme Linked Immunoassay (ELISA) method. The urinary microalbumin was measured using immunoturbidimetric method. **Result:** Comparison of variables between the groups revealed the significant difference in serum adropin, insulin, and urinary microalbumin (P value: <0.05) between diabetic nephropathy and healthy controls. Serum adropin was significantly correlated with serum insulin level in the nephropathy group (r=0.85, P value: 0.03). However, no significant correlation was seen with urinary microalbumin level (r=0.67, P value: 0.45) in the diabetic nephropathy group. **Conclusion:** Serum adropin was decreased in diabetic nephropathy in comparison to healthy subjects. Urinary microalbumin level was not significantly correlated with serum adropin level. The positive correlation of serum adropin with insulin showed that adropin may fluctuate in serum along with serum insulin levels.

INTRODUCTION

Diabetes mellitus is one of the endocrine disorders associated with hyperglycemia and disturbances in carbohydrate, fat, and protein metabolism.[1] Diabetic nephropathy is one of the microvascular complications seen in chronic cases of diabetes mellitus. Around 20-40% of cases of diabetes mellitus become the victim of diabetes nephropathy.[2] Moreover, hypertension and hyperglycemia may contribute to renal injury in Diabetic patients.[3]

Adropin is a protein hormone, identified inthe liver of mice. It is expressed in the liver and encoded by Energy Homeostasis Associated (Enho) gene consists of 76 amino acid residues.[4] Adropin is involved in glucose homeostasis, increased adiposity, and insulin sensitivity.[4] Some studies have shown the reduction of serum adropin levels in Type 2 Diabetes Mellitus (T2DM) patients.[5] The serum adropin was elevated in rats that are induced diabetes mellitus by Streptozotocin in comparison to the control rats.[6]

T2DM is characterized by insulin resistance and beta cell failure. Obesity also plays the role in insulin resistance, which leads to hyperinsulinemia and finally T2DM.[7,8]Firstly, the serum insulin level is found to be increased in obese patients before they become diabetic. Measurement of serum insulin mirrors the status of insulin resistance, the therapeutic application of insulin, and future complications in diabetic patients.[9]

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Diabetic Nephropathy (DN) reduces the life expectancy of diabetic patients and Microalbuminuria is an early biomarker of diabetic nephropathy.[10] Microalbuminuria is considered positive when the albumin to creatinine ratio (ACR) is 30-300mg/g creatinine in two of three tests within a three to six months period in a spot urine sample.[11,12]

The current study aimed to find out the comparison of adropin, insulin, and urinary microalbumin between healthy controls and diabetic nephropathy patients. In addition, the correlation of serum adropin level with serum insulin level, urinary microalbumin, and other parameters of sugar profile was carried out.

MATERIALS AND METHODS

This was the hospital-based cross-sectional study conducted in the Rama Medical College after getting ethical approval from the institutional ethics board of the Department of Biochemistry. One hundred and three (103)diabetic nephropathy and 101healthy controls were enrolled for the study after taking verbal and written consent. Serum adropin and insulin levels were estimated using Enzyme-Linked Immunoassay (ELISA) method. The urinary microalbumin was measured using the immunoturbidimetric method.

All the data were entered in Microsoft Excel version 2010 and converted into Statistical Package of Social Sciences (SPSS) version 22. The Chi-square test was used to compare the categorical data. An Independent t-test was used to compare the mean between the two groups. Pearson correlation was used to find out the correlation between the variables. A p value of less than 0.05 and a 95% confidence interval were considered statistically significant.

RESULTS

The current study investigated the serum adropin, insulin, and urinary microalbumin in diabetic nephropathy population and healthy controls. We had 103 diabetic nephropathy populations out of which 48 were female and 55 were male. Similarly, in healthy controls 44 were female and 57 were male patients as illustrated in [Figure 1].

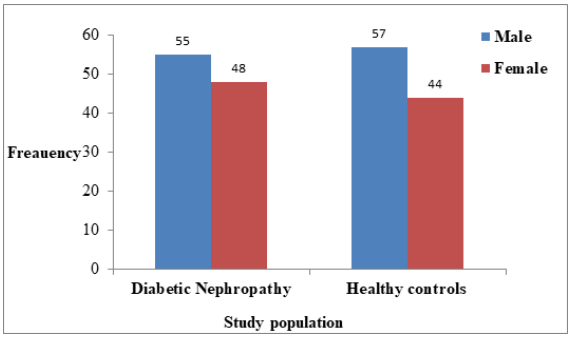

Figure 1: Distribution of population based on gender

Comparison of variables between the groups revealed the significant difference in serum adropin, insulin, and urinary microalbumin (P value: <0.05) between diabetic nephropathy and healthy controls as illustrated in [Table 1].

[Table 2] illustrates the correlation of serum adropin with insulin, microalbumin, and other variables in the Diabetic nephropathy population. Serum adropin was significantly correlated with serum insulin level in the nephropathy group (P value: 0.03). However, no significant correlation was seen with urinary microalbumin level (P value:0.45).

Table 1: Comparison of variables between diabetic nephropathy and healthy controls

S.No.	Variables	Diabetic nephropathy (n=103)	Healthy controls (n=101)	P value*
1.	Age (years)	51.340±11.47	54.34±8.42	0.02*
2.	Adropin (ng/mL)	5.93±3.018	12.75±3.92	0.00*
3.	BSF (mg/dL)	189.47 ± 74.08	83.75 ± 15.52	0.00*
4.	BSPP (mg/dL)	317.17±82.57	131.34±23.36	0.00*
5.	HbA1C (%)	10.71±7.41	5.27±0.51	0.00*
6.	Insulin (ng/mL)	30.71±11.21	10.43±20.36	0.02*
7.	Microalbumin (mg/g Creatinine)	61.463±24.0183	18.27±4.50	0.00*

Table 2: Correlation of variables with serum adropin level in the Diabetic nephropathy population

S.no.	Variables	r	P* value
1.	BSF	-0.08	0.5
2.	BSPP	-0.20	0.16
3.	HbA1C	-0.10	0.48
4.	Insulin	0.85	0.03*
6.	Microalbumin	0.67	0.45

Table 3: Correlation of serum adropin with other variables

S.no.	Variables	r	P value
1.	BSF	0.25	0.00*
2.	BSPP	-0.07	0.47
3.	HbA1C	0.25	0.01*
4.	Insulin	0.01	0.89
5.	Microalbumin	0.06	0.50

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The correlation analysis was also done in healthy controls to reveal the correlation of serum adropin with different variables as illustrated in [Table 3]. The correlation analysis revealed the significant correlation of serum adropin with fasting blood glucose (r=0.25, P value:0.00), and glycated hemoglobin (r=0.25, P value: 0.01). However, there was no significant correlation of serum adropin with serum insulin level (r=0.01, P value: 0.89) and urinary microalbumin (r= 0.06, P value: 0.50).

DISCUSSION

The current study revealed a significant reduction of serum adropin in diabetic nephropathy patients in comparison to the healthy controls. Zang H et al also revealed a similar type of results; they reported the median serum adropin 5.5 and 3.8 respectively in healthy controls and diabetic nephropathy group.[13]From the animal model studies, adropin has been reported as a regulator of insulin sensitivity and glucose tolerance.[4,14]

Our study also reported asignificant positive correlation of serum adropin with insulin in the diabetic nephropathy group (r=0.85, P value: 0.03). There was no significant correlation betweenserum adropin with urinary microalbumin (r=0.67, P value: 0.45).A study by Hu W and Chen Li reported a significant negative correlation between serum adropin with albumin creatinine ratio, which contradicts our study.[15]

The precise role of adropin in the pathogenesis of diabetic nephropathy is unknown.Akcilar R et al reported that adropin decreases the expression of tumor necrosis factor-alpha (TNFα) and interleukin 6 (IL6) in the pancreas of diabetic rats.[16] Our study revealed a significantly increased serum insulin level in the diabetic nephropathy population. It has been reported that insulin resistance may occur which leads to an elevation of serum insulin levels. Mack R reported the importance of the estimation of insulin in diabetic patients.[9]

CONCLUSION

From our study, serum adropin was decreased in diabetic nephropathy in comparison to healthy subjects. Urinary microalbumin level was not significantly correlated with serum adropin level. The positive correlation of serum adropin with insulin showed that adropin may fluctuate in serum along with serum insulin levels.

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Research

RENAL ARTERY VARIATIONS: A CADAVERIC STUDY WITH CLINICAL RELEVANCE

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Abstract

Background: The renal arteries are two of the largest branches of the abdominal aorta and arise laterally just below the origin of the superior mesenteric artery at the level of the L1 vertebral body. The right ostium is often higher than the left ostium when the arteries occur at different craniocaudal levels. The right renal artery is longer and runs behind the inferior vena cava, the right renal vein, the head of the pancreas, and the second part of the duodenum. The left renal artery passes behind the body of the pancreas, the left renal vein and the splenic vein. **Materials and Methods:** The study was conducted on formalin-fixed 50 cadavers (100 Kidneys) of both sexes during routine abdominal dissection for medical undergraduates with their arteries were explored, and the morphological variations of renal arteries were noted. During the course of dissection various abdominal viscera were removed and preserved as specimen for teaching purposes. over two years in GSVM medical college and Naraina Medical college Kanpur (UP). **Result:** We observed that One accessory artery was seen in 2/50 kidneys in which one is lies 4 cm above the lowerpole. And another is lie at 3.5 cm above the lower pole of the kidney In our current study, we observed that The presence of accessory renal artery was found only in 2 specimens (4%). **Conclusion:** The results of the present study are discussed and indicate common variations in renal arteries. Most variations involved the origin, branching, and presence of the adrenal artery. accessory renal arteryalso vary significantly in number, origin, route, and branching. Knowledge of variability in renal artery supply has far-reaching clinical, surgical, and academic implications.

INTRODUCTION

The renal arteries are two of the largest branches of the abdominal aorta and arise laterally just below the origin of the superior mesenteric artery at the level of the L1 vertebral body.[1] The right ostium is often higher than the left ostium when the arteries occur at different craniocaudal levels. The right renal artery is longer and runs behind the inferior vena cava, the right renal vein, the head of the pancreas, and the second part of the duodenum.[2] The left renal artery passes behind the body of the pancreas, the left renal vein and the splenic vein. Variations in renal arteries have been called aberrant, supernumerary, supplementary, accessory, among other terms. It is therefore necessary that the morphology and the nomenclature of these vessels are standardized.[3] Variation in the number, origin, pathway and branching pattern of renal arteries is common. Before reaching the kidney, each renal artery divides into five segmental arteries that supply blood to different areas of the kidney.[4] The renal artery enters the renal hilum, branches within the renal sinus and sends out interlobar arteries, which are situated between the renal pyramids in the cortex and take an arched course along the base of the pyramid, between the medulla and the cortex. Here, the interlobar arteries are designated arcuate arteries. Interlobular arteries branch from the arcuate arteries and ascend through the cortex towards the renal capsule. As they travel to the renal capsule, the interlobular arteries give off branches, the afferent arterioles, to each glomerulus.[5] From the arcuate artery, several branches known as interlobular arteries divide at right angles and extend through the renal cortex to the outside of the kidney. Each interlobular artery forms multiple afferent arterioles

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and terminates ina capillary bed known as the glomerulus, where blood is filtered to create urine.
The accessory renal artery (ARA) is a vestigial structure formed during renal ascension from the pelvis to the lumbar region. As the kidney ascends, it is nourished by higher vessels branching off the aorta, developing the main renal artery at the second lumbar vertebra. At the same time, the lower primitive branches curl up and disappear. Failure of these lower embryonic vessels to degenerate results in ARA.[6]

MATERIALS AND METHODS

The study was conducted on formalin-fixed50 cadavers (100 Kidneys) of both sexes during routine abdominal dissection for medical undergraduates with their arteries were explored, and the morphological variations of renal arteries were noted. During the course of dissection various abdominal viscera were removed and preserved as specimen for teaching purposes. over two years in GSVM medical college and Naraina Medical college Kanpur (UP).

The following parameters were observed
The presence of an accessory renal artery.

RESULTS

All accessory arteries were arising from the abdominal Aorta below the normal renalartery. One accessory artery was seen in 2/50 kidneysin which one is lies 4 cm above the lowerpole. and another is lie at 3.5 cm above the lower pole of the kidney In our current study, we observed that The presence of accessory renal artery was found only in 2 specimens (4%).

Figure 1: Age distribution of the study subjects

DISCUSSION

Knowledge of changes in renal vascular anatomy is essential in managing renal trauma, renal transplantation, renal vascular hypertension, renal artery embolisation, angioplasty, or revascularisation of congenital and acquired lesions. Abnormalities of the renal arteries are probably more common than in other major arterial systems.
Accessory renal arteryabnormalities are clinically significant in that they can cause

a) Hydronephrosis due to obstruction or compression of the ureter by the inferior artery,
b) Arterial hypertension due to stenosis of the renal artery and subsequent renal ischemia,
c) The risk of renal infarction during urological or oncological surgical procedures and kidney transplantation. Since the polar artery is a segmental artery, improper ligation or division is dangerous and leads to renal tissue necrosis.[5] Knowledge of the wide variations in the arterial supply to the kidney is of the utmost importance for surgery, as it helps one understand the danger of too violent a pull on the vascular pedicle, which may cause rupture of the anomalous vessel and fatal hemorrhage. This statement has significant relevance today as the definition of renal arterial anatomy affects kidney transplant surgery, vascular surgery for renal artery stenosis, renovascular hypertension, Takayasu disease, renal trauma, and uroradiological procedures.

Most of the abnormalities of renal artery are due to changing position of kidney as a part of its normal development and ascent. The kidney begins their development in pelviccavity. During further development they ascend to lumber region which is their final position. When they are in pelvic cavity they are supplied by internal iliac artery or common iliac artery. While the kidney ascends to lumber region their arterial supply also shifts from common iliac to abdominal aorta6 Embryological explanation of these variations has been presented and discussed by Felix (1912) In an 18 mm fetus, the developing mesonephros, metanephros, suprarenal glands and gonads are supplied by nine pairs of lateral mesonephric arteries arising from the dorsal aorta. Felix divided these arteries into three groups as follows: the 1st and 2nd arteries as the cranial group, the 3rd to 5th arteries as the middle group and 6th to 9th arteries as the caudal group.[7] In our current study, we observed that The presence of accessory renal artery was found only in 2 specimens (4%). While comparing our study, Uğur Ozkanet al found that Additional renal arteries on the right side were found in 16% and on the left side in 13% of cases. Of all the extra renal arteries, the percentage of accessory and aberrant renal arteries were 49% and 51%. Another study by Vrinda Ankolekar et al who observed the presence of accessory renal artery (ARA): ARA was found in 15 specimens (25%), eight on the right side. Seven specimens on the left side. Another study by Satyapal et al observed 27.7%, Ronald et al. observed 17%, Avneesh Gupta et al observed 24%.[8,9]

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CONCLUSION

The results of the present study are discussed and indicate common variations in renal arteries. Most variations involved the accessory renal arteryorigin, branching, and presence. accessory renal arteryalso vary significantly in number, origin, route, and branching. Knowledge of variability in renal artery supply has far-reaching clinical, surgical, and academic implications. Recognising possible changes is essential for surgeons dealing with kidney harvesting and transplantation, various endoscopic procedures, and different surgical techniques.

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The Effect of Balance and Co-Ordination Training on Agility in Young and Adults College Level Players

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Abstract: BACKGROUND: Balance Training are often implemented for optimizing performance, Preventing injury, or providing rehabilitation. Neuromuscular training programs that include balance training in reducing sport-related injury risk as well as in enhancing functional performance after sport injury. Balance is required in the performance of a large number of motor tasks. In order to ensure successful performance in sports activities. Agility is defined as the ability to change direction quickly, maintaining balance without loss of speed. The effects of balance and coordination training on agility in young and adults in college level players is less described so this study focuses on the effect of balance and coordination training to improve the agility in college level players

METHODOLOGY: Total 60 male subjects with an age group 12-16 years and 18-30 year was recruited for the study. They was randomly assigned to two groups with 30 subjects in each group. In Group A- young age group. group B- adult age group.

RESULT: The 2-t Confidence level of all tests shows significant change observed i.e. null hypothesis is rejected and alternate hypothesis is accepted, so that we observed significant improvement in balance & coordination training on agility in young and adult college level players, agility training program under strict prescribed technical norms.

CONCLUSION: Hence we concluded that Overall, based on results of this study and previous research, it can be said that the effect of balance and coordination exercises on agility in young and adults college level payers is well observed so the null hypothesis is rejected and alternate hypothesis is accepted.

Keywords: CO-co-ordination, CLP- college level players.

INTRODUCTION

In order to ensure successful performance in sports activities, it is necessary to maintain high level motor performance, and to maintained sustain static and dynamic balance[11].

Neuromuscular training programs that include balance Training are often implemented for optimizing performance, Preventing injury, or providing rehabilitation. Emery CA, Cassidy JD and other authors[1-2-3] have shown the effectiveness of neuromuscular training programs that include balance training in reducing sport-related injury risk as well as in enhancing functional performance after sport injury [4].Physical activity guidelines for older people mirror these findings incorporating the training of endurance, balance, strength and flexibility [5].Few studies[30]have assessed the effects of a neuromuscular and performance enhancement training program in adolescent tennis players, especially those who participate in school or local tournaments, but are not on an elite or national level. The majority of investigations related to tennis either assessed physiological profiles, analysed the results of one training session[31].

Balance is the base of all movements. There is a constant loss and recovery of balance during movement [6]. Balance is required in the performance of a large number of motor tasks [7]. In order to ensure successful performance in sports activities, it is necessary to maintain high level motor performance, and to maintain and sustain static and dynamic balance [8]. Fear of falling can lead to activity restriction that is self-imposed rather than due to actual physical impairments Plyometric training involves exercises that generate quick, powerful movements involving explosive concentric muscle contraction preceded by an eccentric muscle action[28].In a different study male professionals were trained for 7 weeks and it was found that PT combined with strength training improved various dynamic measures, but not vertical jump performance [29].In a sporting situation, changes of direction may be initiated to either pursuer evade an opponent or react to a moving ball. There-fore, it has

been recognized that a component of agility performance is the response to a stimulus[33].

The studies show that agility is an important measure of performance in the soccer. Generally, agility is defined as the ability to change direction quickly. In addition, agility includes explosive acceleration, deceleration, and maintaining postural control during the sudden change of direction, gathering speed fast by reducing the decrease in running speed[9]. In short, agility is defined as the ability to change direction quickly, maintaining balance without loss of speed[10].This ability is a determinant of sport performance in field and court sports, evidenced by time-motion analysis, validation of testing batteries for elite and none lite performers, and coaching analyses for various team sports[25]Running at high speed is component of children's play, and have been shown to promote development of the muscular system and to stimulate to the long-term effect on higher bone density in the skeletal system [32].

Poor motor proficiency has been researched extensively, particularly in those diagnosed with Developmental Coordination Disorder (DCD), a condition characterized by the inability to execute movement skills at an age appropriate Level[12].They must maintain their center of gravity within the base of support while performing very rapid and asymmetrical upper limb movements[13]. Eye–hand coordination is the ability of the central nervous system to coordinate the information received from the eyes to control, guide, and direct the hands in the accomplishment of a given task such as catching a ball[14].Investigations on the effects of a coordination training as balance training on strength gain have rarely been performed. When done, it was usually in connection with complicated Injuries, during which coordination training was normally coupled with a strength training program[24].Although coordination abilities are essential learning requirements in order to perform well and to develop optimal tennis strokes and movement technique [27].

The effects of balance and coordination training on agility in young and adults in college level players is less described so this study focuses on the effect of balance and coordination training to improve the agility in college level players.

HYPOTHESIS

NULL HYPOTHESIS [Ho]:

To effects of balance and coordination training on agility in young and adults college level players is not observed.

ALTERNATE HYPOTHESIS [H1]:

The effects of balance and coordination training on agility in young and adults college level players is observed.

METHODOLOGY

SUBJECT-

Total 60 subjects will be taken according to the Inclusion and Exclusion criteria, those who satisfy the criteria will allow to perform study.

SPACE AND LOCATION-

All subjects are taken from Saii college of medical science and technology, Kanpur

SELECTION CRITERIA-

Inclusion criteria:

- Young and adults male players within age group of 12-16 years and 18 -30 years.
- Players who have no previous musculoskeletal injury.
- Gender- Male only
- College level players
- Participants agreed with the study.

Exclusion criteria:

- Players who had ankle sprain /injury last 3months.
- Fractures in the lower limb.
- Pain in lower limb.
- Recent injury
- Trauma of lower limb
- Ligament reconstruction

Equipment:

- Subject assessment and consent form
- Inch tape
- Cones
- Weighting machine
- Whistle
- Stopwatch

PROCEDURE

- In total 60 players were subjected to the training programme,30 players of age (12-16 years) are to be taken from the school level players and other 30 players are taken from the college level players.

- The training session is about 6-weeks of balance and coordination exercises on the agility in the players. So the training session includes 3 days a week, and for 40 minutes a day. We also includes warm up for 2 minutes.

Outcome measures:-

- 1.T agility test
- 2.Hexagonal agility test
- 3.Single limb stance test
- Multidirectional reach test

Four-week Balancing and Coordination training program:

(1-2 Week)

Exercise	Sets	Repetitions
Standing in tandem and passing ball	3	20
Walking in tandem	3 minutes	N.A
Square locomotion	3	10
Sprint and collect	3	10
Figure-8	3	10
High knees	3	10

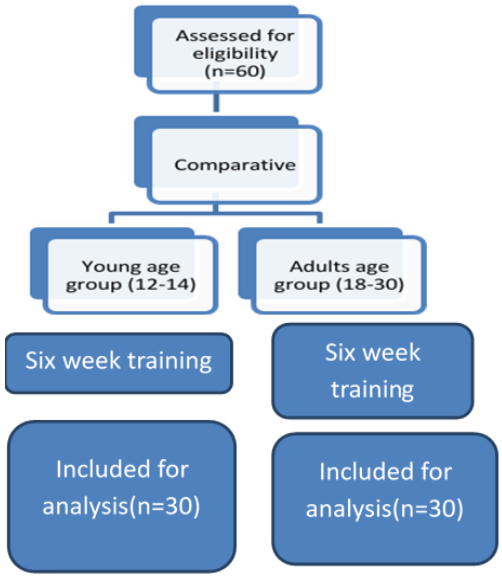
(3-4Week)

Exercise	Sets	Repetition
Standing in tandem and passing the ball	3	20
Walking in tandem	3 minutes	N.A
Square locomotion	3	10
Sprint and collect	3	10
Forward and backward Shuffling	3	10
High Knees	3	10
Zig-Zag Forward and Backward sprint	3	10

(5-6 Week)

Exercise	Sets	Repetition
Standing on in tandem	3 minutes	N.A
Single limb stance	3 minutes	N.A
Heel raises	3	20
High knee	3	10
Sprint and collect	3	10
Figure 8	3	10
Zig-Zag sprint	3	10
Forward and backward shuffling	3	10

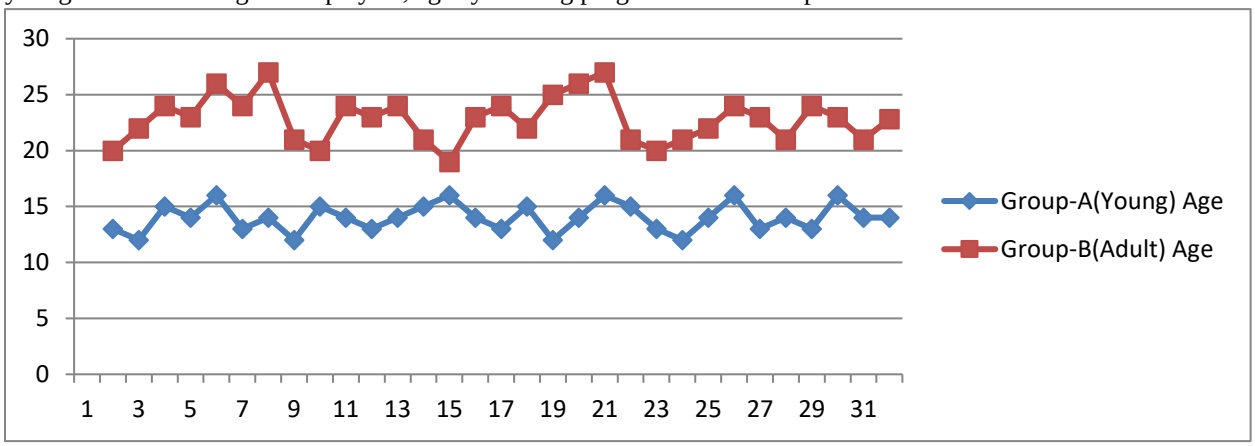
PROTOCOL



RESULT

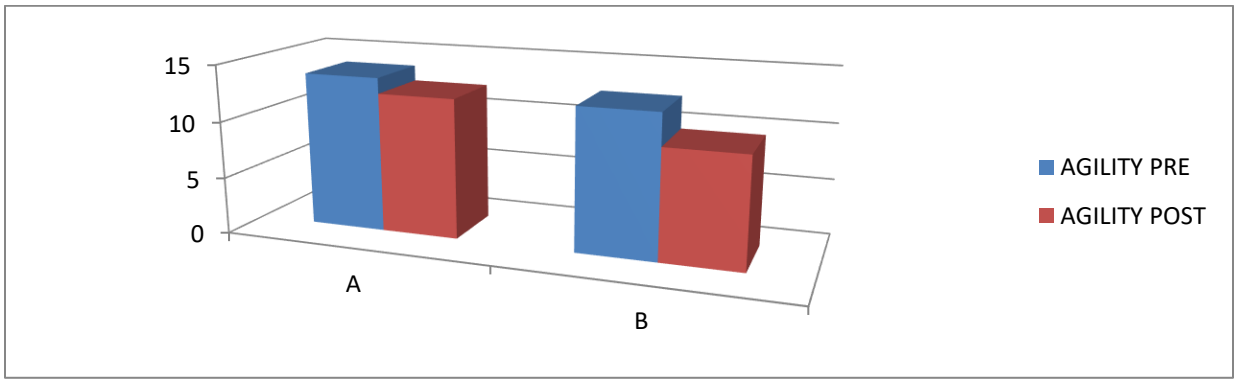
TEST	SD	T	DOF	2-t Confidence Level
AGILITY TEST (A&B)	0.140185	31.9868	8	100%
HEXAGONAL AGILITY (A&B)	8.698	4.2375	8	99.72%
MDR TEST	10.31236	7.5478	8	99.99%

The 2-t Confidence level of all tests shows significant change observed i.e. null hypothesis is rejected and alternate hypothesis is accepted, so that we observed significant improvement in balance & coordination training on agility in young and adult college level players, agility training program under strict prescribed technical norms.



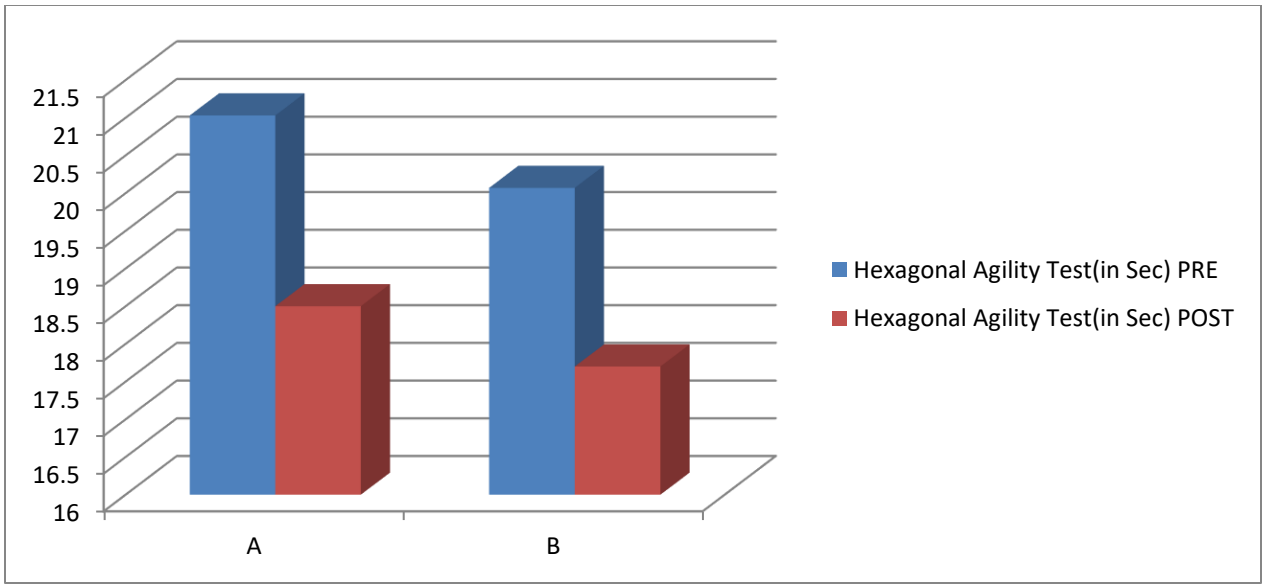
Graph-1: Represents the Age wise distribution of all study subjects, A finding shows mean age (±SD) is 21.23 (±4.64) years, which represents young aged & adult participants.

	AGILITY	
	PRE	POST
A	13.73	12.36
B	12.53	9.7



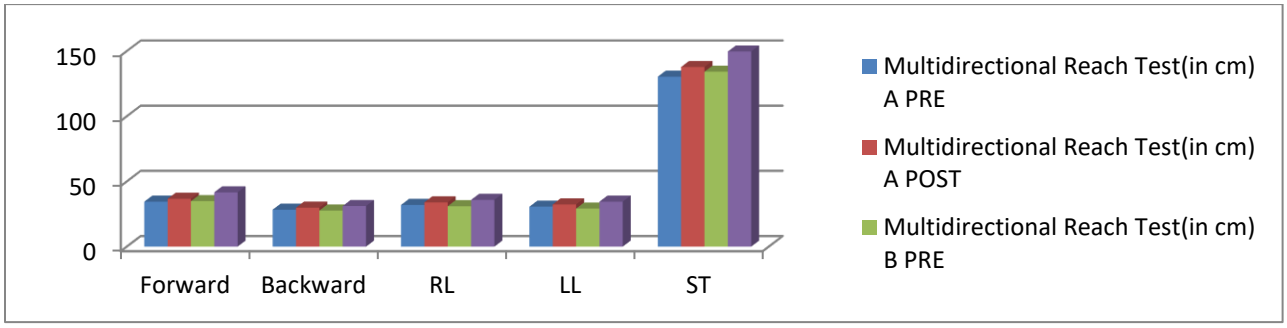
Graph-2: Represents the Agility wise distribution of all study subjects of both group.

	Hexagonal Agility Test(in Sec)	
	PRE	POST
A	21.03	18.5
B	20.07	17.7



Graph-3: Represents the Hexagonal agility test wise distribution of all study subjects.

Multidirectional Reach Test(in cm)				
	A	A	B	B
	PRE	POST	PRE	POST
Forward	34.5	36.7	34.91	41.63
Backward	28.33	29.9	27.67	31.16
RL	32	33.97	31	35.87
LL	30.67	32.4	29.22	34.5
ST	130.4	137.8	134.2	149.7



Graph-4: Represents the duration of Pre & Post multidirectional reach test wise distribution of all study subjects, which represents significant improvement in Pre to post reading in all participants.

DISCUSSION

Total 60 subjects were taken according to the inclusion & exclusion criteria, those who satisfied the criteria were allowed to perform the study, total 60 subjects successfully completed the study. All the subjects were taken from Kanpur sports academy, Kanpur on inclusion criteria such as gender male, young aged between 19 to 24 years with no existing musculoskeletal problems. We excluded the subjects with recent fracture/sprain/strain at beginning or during study, we cant allowed any nutritional supplements in diet & participants also not allowed to take anabolic-androgenic steroids or any other drugs that might affect their physical performance or hormonal imbalance prior/during the study. Zahoor Ahmad Bhat et al (2018) conducted that the result of the study revealed that the training group has significant improvement in cricket batting ability among college level men cricket players after the

cricket specific training protocol. It was also concluded that this cricket specific training is one of the best training methods for increasing the cricket batting ability and as well as the physical fitness of cricket players; as we found in our study too.

We found as Eric Lichtenstein et al in their study also concluded that we compared the adaptation to two exercise based interventions in older adults and found similar change in both groups. The agility training might lead to favourable adaptation in explosive power of the muscle groups .the long -term investigation of this integrative multi-model exercise –training program also with regard to cognitive performance ,control of locomotion , muscle architecture and "hard" endpoints like falls or institutionalization should be considered in future research .the agility training approach could be regarded as a time efficient alternative for exercise training in older adults as a relevant aspects of human performance in ageing are trained simultaneously.

Zoran Milanovic et al (2013) i n their study concluded that the seven different phases of a specific speed and agility (SAQ) training programme (Pearson, 2001) contributed to a statistically significant improvement in performance in different agility tests with and without the ball U19 soccer players. Whilst is impossible to determine which any individual components had significant and non- significant contributions the overall effect led to an improvement in agility. These findings support the contention that the SAQ programme should be a part of routine soccer training. The extent to which SAQ training needs to be further investigated as it appears anecdotally that agility training, form any teams, is not undertaken to the extent that it should be. Research suggests that appropriate SAQ training will improve soccer players' agility and condition them to cope with actual demands of the game; we also concluded the same conclusion in our study.

We also support that Agility testing is generally confined to tests of physical components such as change of direction, speed, or cognitive components such as anticipation and pattern recognation. Agility training is thought to be a reinforcement of motor programming through neuromuscular conditioning and neural adaptation and muscle spindle , golgi tendon organs [GTO] and joint proprioceptors . Performance is often dependent on the athelete's jumping ability during offensive and defensive skills, so its shows significant improvement in flexibility & fitness level.

CLINICAL IMPLICATIONS

These data suggest that young cricketer participants who successfully completed the 6 weeks SAQ agility program have significant improvement in balance and co-ordination training on agility in young and adults college level players shows significant outcome.

FUTURE RESEARCH

This study was conducted for a short period only, future research involving a longer time period & comparing the effects of the two intervention program is possible, not only in specific area of sports but other sports specifications.

LIMITATION OF THE STUDY

A small sample size was one of the major limitations of the study. Many participants injured during study due to other activities as its difficult to restrict other physical sports activities for 6wks long duration.

CONCLUSION

Hence we concluded that Overall, based on results of this study and previous research, it can be said that the effect of balance and coordination exercises on agility in young and adults college level payers is well observed so the null hypothesis is rejected and alternate hypothesis is accepted.

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Physiotherapy Treatment of Tennis Elbow: A Review

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Abstract- *Tennis elbow is a chronic condition that can be challenging to treat. Physiotherapy is often a treatment of choice, but previous reviews have failed to draw any conclusions as to which is the most effective therapeutic modality in the management of this condition.*

Key messages of this review best available evidence are for active exercise approaches, possibly supplemented by manual therapy and taping treatments. There is insufficient evidence to recommend the use of passive modalities such as electrotherapy or acupuncture at present. Physiotherapy is a cost-effective form of treatment

I. INTRODUCTION

Tennis elbow is one of the most commonlyupper limb conditions [1]. Its incidence in general practice is 4 –8 per 1100 per year [2], with as many as 18% of workers in highly repetitive jobs reporting the condition [3 –5]. Its incidence peaks in the 35 –50-year-old age group [6].

Tennis elbow is seen in non- tennis players [7]: however, elbow pain is encountered in up to 50% of tennis players, with 75 –90% of these cases being attributable to tennis elbow [8, 9].

The disorder is characterized by pain over the lateral aspect of the elbowassociated with resisted wrist and finger extension and gripping activities.

This condition substantially on society and health care systems, with between 20 and 40% of individuals with tennis elbow, taking a leave of absence of an average duration of 14 weeks [2].It also has a huge economic impact in terms of workers' compensation claims and even early retirement [10]. However, longitudinal studies have shown that a large proportion of patients improve over time with spontaneous recovery seen in 70 –90% of patients within 2 years [11 –13].

The aetiology of tennis elbow is poorly understood. Kraushaar & Nirschl's [14] microscopic study demonstrated the presence of fibroblastic tissue and vascular invasion of the common extensor tendon, described as angiofibroblastic tendonosis, implying a degenerative tendinopathy. However, recent studies [15, 16] demonstrated the presence of the neuropeptides, substance P and calcitonin related gene peptide (CRGP) in sensory nerve fibres supplying the extensor carpi radialis brevis (ECRB) [15, 16].

This lack of understanding regarding its aetiology has led to a large number of treatments, including physiotherapy, being advocated. As up to 40% of all patients seen in primary care with tennis elbow are referred to physiotherapy [2], the aim of this review is to examine the evidence of effectiveness of frequently used physiotherapy management of tennis elbow. For the purpose of this review, that modalities were classified as electrotherapeutic or physical interventions.

II. SEARCH STRATEGY

Computerized searches were performed using Medline, Embase, and the Physiotherapy Evidence Database. Randomized controlled trials were reviewed using the terms tennis elbow, lateral elbow pain, lateral epicondylagia and physiotherapy, either individually or in various combinations. Other references identified from existing reviews or from papers cited in previous publications were also reviewed.

ELECTROTHERAPY INTERVENTIONS

Modalities reviewed include ultrasound, laser therapy or electromagnetic field therapy, Heat therapy. For the purpose of this review extracorporeal shock wave therapy (ESWT) was not included as it is not commonly utilized by Indian physiotherapists. Laser therapyThis is used infrequently by physiotherapists in India, in the management of tennis elbow [6]. In the short term the efficacy of this treatment modality is questionable as is demonstrated by the differing results seen in previous studies. There is, at present, no evidence of long-term effect using laser when compared with placebo treatment [18 –22].

Pulsed short wave diathermy

This was used by just under 20% of physiotherapists in Greenfield & Webster's study [6], despite there being no conclusive evidence regarding its effectiveness in the management of tennis elbow. Only one small study examined its effectiveness vs a placebo, concluding there were no

differences between groups at final review, following 10 weeks of treatment [23].

Ultrasound

Pulsed and continuous ultrasound is used by just under half of physiotherapists treating tennis elbow [6],the overall efficacy of the treatment for musculoskeletal disorders is in debate. Varying effects are seen in trials comparing pulsed ultrasound with placebo [24, 25], using a range of outcome measures. When compared with other modalities, such as injections or transcutaneous electrical nerve stimulation [26, 27], there were no significant differences in outcomes between groups, with weak evidence for its effectiveness. One of the studies which is ultrasound used with a steroid coupling gel was used. Following nine sessions of treatment, there were no additional benefits in using a steroid coupling gel, compared with using ultrasound alone.

PHYSICAL INTERVENTIONS

Treatments reviewed include acupuncture, ice therapy, the use of orthotic devices, manual therapy, massage, and manual exercise therapy.

Acupuncture

Acupuncture is frequently used by physiotherapists in the management of tennis elbow [6]. very few acupuncture studies to date have failed to prove conclusively that the short-term relief in pain seen gives rise to long term functional improvement [29 –32]. No trials to date have assessed, concentrated or commented on the potential adverse effects of this particular form of treatment. [33] concludes there is insufficient evidence to support or refute the use of acupuncture. Further trials utilizing appropriate methodology and adequate sample sizes are needed before firm conclusions can be drawn regarding this treatment modality.

Ice

One study was identified that investigated the effect of ice therapy on tennis elbow. Manias & Stasinopoulos's parallel group study [34]Compared an exercise and ice group with exercise alone, with the ice being applied for 15 minutes after each exercise session. At 4 months follow-up no significant differences were seen between the two groups, indicating that ice may be ineffective as a treatment in the management of tennis elbow.

Manual therapy and massage

Abbot, Patla & Jensen's small study [35] demonstrated a favourable initial response to a manual therapy technique, a mobilization with movement (MWM), in terms of pain free grip strength and maximum grip strength. However, these results were only generalizable to a single treatment session and not an episode of care. Vicenzino & Wright [36] utilized a single subject design and found four treatment sessions of MWM, a home programme inclouding MWM, and taping to replicate MWM improved all measures of pain and function. This included pain free grip strength at the end of 6 weeks post-treatment assessment phase, but as follow-up time was short, recurrence rates following this regime are unknown. Kochar & Dogra's small study [37] compared a 3-week trial of ultrasound and MWM compared with ultrasound alone. Both groups then underwent a10-week programme of progressive upper limb rehabilitation, including the use of weights. Findings were a significant improvement in the MWM group in terms of pain and the weight test, but no difference in grip strength. The MWM group also had a faster recovery time compared with the ultrasound group. Again though, follow-up time was short. These studies echo the results seen in previous studies with only immediate or short-term effects seen, after the application of manual therapy techniques at the elbow and cervical spine [38], with only Struijset al. [39] reporting outcomes at the end of a 6-week programme. However, there does appear to be some evidence in favour of positive initial effects of mobilization, including MWM, which warrants further investigation.

Deep transverse frictional

massage, which was initially advocated by Cyriax[40]. Verhar et al.'s [41] randomized controlled trial compared a corticosteroid injection with 12 sessions of transverse frictions over a 4-week treatment period. At 6 weeks subjective and objective markers were better in the steroid group, but no differences were found between groups at 12 months follow-up. The authors concluded that friction massage was no better than an injection in the management of tennis elbow. Despite the limited evidence to endorse or refute the effects of frictional massage, it was used as a form of treatment always or frequently by over two thirds of respondents in Greenfield & Webster's [6] study.

Orthotic devices and taping

Braces or epicondylar clasps are prescribed in up to 25% of cases of tennis elbow [42, 43] Biomechanical studies have shown that forearm bracing has a direct effect on reducing stresses on the origin of ERCB, but clinical studies are more equivocal. Struijs et al. [44] have proposed the use of a new clinical test, the extensor grip test, where a clinician

manually replicates the effect of a brace, as a predictive factor for the effectiveness of bracing, as a treatment for tennis elbow in the short term.

Jensen et al. [45] compared the use of an off the shelf orthotic with a corticosteroid injection over a 6-week period. Both groups showed significant improvements from baseline measurements, but no differences were found between groups. However, given that bracing would appear to have the lesser risk of side effects, Jensen et al. advocated its use. Wuori [46]compared an off the shelf orthotic with two different types of placebo brace, as well as a control group, and found no significant differences between the brace and the placebo device on any ofthe outcome measures used. Faes et al. [47] in a randomized controlled trial compared a new dynamic extensor brace worn for 3 months, with a control group. This study found a significant improvement in pain reduction and pain free grip strength in the bracing group, which was maintained at 6 months follow-up. The most recent Cochrane review [48] concluded that with respect to bracing, there were only a limited number of trials, using too few outcome measures, with limited long-term results. Therefore, no definite conclusions could be drawn concerning the effectiveness of orthotic devices. In conclusion, more well designed and well conducted randomized controlled trials are warranted.

Struijs et al. [49], in a large randomized controlled trial, examined the cost effectiveness of a brace compared with a physiotherapy regime comprising of ultrasound, friction massage and exercises. At 12 months follow-up there was little difference clinically between groups, but physiotherapy was found to be the most cost-effective treatment. Direct health care costs were higher in the physiotherapy group, but indirect costs such as work absence were substantially higher in the brace group. This study may suggest that the direct cost of physiotherapy is worthwhile, as cost is often a decisive factor in current medical practice, as to whether an intervention is implemented.

Many therapists use taping as an adjunct to exercise, in order to relieve pain and allow functional restoration of movement patterns. Vicenzino et al's [50] small study demonstrated that taping may be useful as an adjunct to exercise. When comparing specific diamond taping over the elbow, compared with placebo taping and a control group, diamond taping had a positive effect of the order of 10% on pain free grip strength and pain pressure threshold, which was maintained for up to 30 minutes after the removal of the tape. However, further research is required before firm conclusions regarding the effectiveness of taping can be drawn.

Exercise is one of the most commonly used treatments in tennis elbow management by physiotherapists, especially progressive stretching exercises [6].

In a small study Pienimaki et al. [52] compared a 6 –8-week trial of exercises including stretches, with ultrasound. This showed a favourable effect on pain but not maximal grip strength, with the authors concluding that progressive exercise therapy was more effective than ultrasound. In a 3 year follow up study [53] of the same group of patients, the exercise group had significantly less pain and significantly less co-interventions, such as physiotherapy or medical consultations. The exercise group also reported less sickness absence days due to their elbow condition.

Bisset et al. [12] in a sufficiently powered, well-executed trial, compared eight sessions of community-based physiotherapy, with a steroid injection or a wait and see approach. The initial results were more favourable in the injection group, but this group had a higher recurrence rate and significantly poorer outcomes at 12 months follow-up in comparison with the physiotherapy group. There were no significant differences between the physiotherapy and the wait and see group, but less co-interventions were sought by the physiotherapy group, echoing the results of previous studies. The physiotherapy group also experienced quicker pain relief than the wait and see group. The authors questioned whether it was it worth the time and cost associated with physiotherapy to gain faster relief and perhaps avoid other treatment, in the knowledge that over the course of the next few months, the outcomes were probably similar. They also queried the use of corticosteroid injections in the use of chronic tennis elbow, with the conclusion being to demedicalize this condition, allow the elbow to recover and consider referral for physiotherapy. This study confirms the finding of a previous study, which found physiotherapy in a primary care randomized controlled trial, gave no added benefit over a wait and see approach [13]. The conclusion drawn from this study was that given appropriate advice, tennis elbow is a self-limiting condition, in most cases. It should be noted, however, that the physiotherapy regime used in the above study consisted of friction massage, ultrasound and exercise, which may not reflect the approach taken by many physiotherapists today.

Eccentric training programmes with patients with tennis elbow. Eccentric strength training programmes are a key element of rehabilitation [54 –56], with literature supporting their use in other chronic tendinopathies[57 –59], as well as tennis elbow.

Eccentric exercise

Exercise program

It is claimed that eccentric training results in tendon strengthening stimulating mechanoreceptors in tenocytes to produce collagen, which is probably the key cellular mechanism that determines recovery from tendon injury [60 – 62].In addition, eccentric training may induce a response that normalizes the high concentrations of glycosaminogly cans. It may also improve alignment of collagen within the tendon and stimulate collagen cross linkage formation, both of which improve the tensile strength of tendons and tendon remodelling [60 –65], which is supported by animal studies [66]. However, as the basic pathophysiology of tendinopathy is poorly understood, the mechanisms by which eccentric exercise may help resolve tendinopathy is also poorly understood [67].

Martinez-Silvestrini et al.'s [68] study compared eccentric exercise plus stretches, concentric exercise plus stretches and a stretching alone group. There were no significant differences in outcome between groups; however, the programme of exercise undertaken was of short duration, with only a short-term follow- up. Other studies involving longer exercise programmes have shown more favourable results. Svenlov & Adolfsons [69] small randomized controlled trial of 3 months of eccentric exercise compared with daily stretches, found that the eccentric training programme produced significant improvements in grip strength, with complete resolution of symptoms in 86% of this group. A more recent study comparing isokinetic eccentric work with a standard rehabilitation programme, demonstrated a reduction in pain and an absence of grip deficit in individuals, following the eccentric programme. The study also showed normalization of ultrasound findings in 48% of the eccentric group compared with 28% in the other treatment group [70]. However, this study used specialized equipment for the isokinetic group, which is not freely available to most patients. Finestone & Rabinovitch [71] suggested that a free weight programme may produce equally beneficial results, but there are no data available to support this.

In conclusion, there is some evidence to support the use of eccentric training programmes in tennis elbow, but further investigation is warranted with more rigorous methodological design. The most common failings in the studies above were short follow-up time, inadequate therapist, assessor and subject blinding, lack of intention to treat analysis and the use of poor outcome measures. Very few studies failed to use pain free grip strength as a primary outcome measure, although its use has been recommended in the literature.

Outcome measures

Grip dynamometry is an established outcome measure used in tennis elbow research studies, as it has shown to have excellent inter-observer reliability [72]. Greenfield & Webster's [6] study of physiotherapy practice showed that testing grip strength with a dynamometer was undertaken by over 60% of physiotherapists, but there was little consensus on testing position. However, standardized testing positions need to be undertaken, as previous studies have shown significant differences in grip strength with different position[73,74]. Also,most physiotherapists recorded maximal grip strength, although this has been shown to be less valid than pain free grip strength. Stratford et al. showed maximal grip strength demonstrated a greater responsiveness to change during a single intervention, but it had poor validity as a measurement of clinically important change over time [75]. Pain free grip strength has been shown to be more sensitive in measuring change over time, with a strong correlation between levels of disability and deficits in pain free grip strength. This responsiveness to change coupled with its high reliability, has promoted its use as an outcome measure in both the research and clinical setting.

III. DISCUSSION

There is a paucity of evidence for physiotherapy in the management of chronic tennis elbow especially that of long-term effect, which may be due to methodological differences in the research reported to date. Two previous reviews concluded more research was needed to investigate the effectiveness of physiotherapy in the management of tennis elbow [76, 77]. Also, many previous studies have been undertaken in the secondary care setting. Future research should also address the fact that results from hospital-based studies are not generalizable to the primary care setting. Patients recruited is Secondary care represent an unknown group of individuals who probably have more severe, persistent complaints. Also, many systematic reviews concerning physiotherapy have failed to address the issue of adequate treatment procedures and the optimal doses of treatment needed to produce significant treatment effects [78 – 81]. It is no longer valid to include trials in systematic reviews with non-optimal treatment doses. This is in order to ensure adequate methodology under equal terms to balance evidence of effects for both physical and medical interventions.

The best available evidence to date would appear to support the use of exercise, supplemented by manual therapy techniques and taping. However, the tape and manual therapy studies only show evidence of a moderate to large initial effect, with lack of long-term follow-up data. Therefore, these preliminary findings would appear to warrant further investigation. Currently, there is insufficient evidence to

recommend the use of passive modalities such as Electrotherapy and acupuncture in the management of tennis elbow. Treatment should be directed to improve the limited function of the upper limb, and not merely be aimed at symptomatic relief.

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The Comparative Effect of Kinesio Tape and Mulligan Tape in Grip Strength in College Level Athletes

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ABSTRACT

BACKGROUND: Taping is widely used in the field of rehabilitation as both a means of treatment and prevention of sports-related injuries. taping method originated from the hypothesis that an external component could aid the functions of muscles and other tissues. Improves communication with mechanoreceptors and increases the number of motor units recruited. Mulligan taping are modern techniques developed by Mulligan for treating LE. Grip strength indicates the ability of hand muscles to grip, and has been used for risk stratification to predict future health problems in individuals. OBJECTIVE: To examine the effect of kinesio taping and mulligan taping in grip strength in college level athlete.

METHODOLOGY: Total 40 male subjects with an age group 20-25 years was recruited for the study. They was randomly assigned to two groups with 20 subjects in each group. In Group A- Receive Kinesio tape with hand grip exercise. group B- receive Mulligan Tape with hand grip exercise.

RESULT: In kinesiotaping the T value is 0.02312319 in mulligan taping the T value is 0.084255174 in kinesio taping the P value is 0.481716012 in mulligan taping the P value is 0.433453082. Calculation chart for final result **.**The 2t Confidence level of all tests shows significant change observed i.e. null hypothesis is rejected and alternate hypothesis is accepted, so that we observed significant improvement along with effectiveness of group Kinesio taping in compare to group Mulligan taping in training program under strict prescribed technical norms on grip strength in the college level athletes.

CONCLUSION: Hence we concluded that Overall, based on results of this study and previous research, it can be said that the study to find out an effect of MT techniques shows significant improvement in compare with RT technique among the male college level athletes is observed so the null hypothesis is rejected and alternate hypothesis is accepted.

KEYWORDS: *KT- kinesiotape, MT- mulligan tape, DM- dynamometer.*

INTRODUCTION

Taping is widely used in the field of rehabilitation as both a means of treatment and prevention of sports-related injuries [1-4].The essential function of most types of tape serves to enhance proprioception and, therefore, to reduce the occurrence of injuries [2-4].

The most commonly used tape applications are done with no stretch tape. The rationale is to provide protection and support to a joint or a muscle [1, 3-8].

Kinesio tape (KT) with elastic properties was developed by Kenzo Kase in 1973[9-11], and the taping method originated from the hypothesis that an external component could aid the functions of muscles and other tissues [11]. The stretch applied on the tape provides a pulling force on the skin and creates more space by lifting the fascia and soft tissue[10] , which improves communication with mechanoreceptors and increases the number of motor units recruited[11].KT can be applied to virtually any muscle or joint in the body. KT and its strength-enhancing properties have been the focus of recent research based on the neuromuscular facilitator theory. The application of KT could increase eccentric isokinetic peak torque in healthy normal collage level male athletes upon the application of tape on hand muscle .[12]

Mulligan taping are modern techniques developed by Mulligan for treating LE. MWM is a form of manual therapy that includes a sustained lateral glide to the elbow joint with concurrent physiological movement[13].

Grip strength indicates the ability of hand muscles to grip, and has been used for risk stratification to predict future health problems in individuals [14], to assess upper limb impairment, or to develop a suitable treatment plan [15]. A decrease in grip strength makes it difficult for subjects to use their hands for many daily activities, and recovery from this muscle weakness is a major goal of rehabilitation [16].

HYPOTHESIS

NULL HYPOTHESIS [H^0]:
The comparative effect of kinesio and mulligan tape in grip strength in college level male Athletes are NOT OBSERVED.

ALTERNATE HYPOTHESIS [H1]:
The comparative effect of kinesio and mulligan tape in grip strength in college level male Athletes are OBSERVED.

METHODOLOGY

SUBJECTS

Total of 40 Subjects were taken according to the Inclusion and Exclusion criteria, Those who satisfy the criteria were allow to perform study.

SPACE AND LOCATION

All Subjects were taken from Saaii College of Medical Science and Technology, Chaubepur ,Kanpur nagar.

SELECTION CRITERIA

INCLUSION CRITERIA

- Male collage level athletes
- Group A: clinical trial of k taping
- Group B: clinical trial of mulligan tape

EXCLUSION CRITERIA

- Female college level athletes
- Injured athletes
- Muscular atrophy
- Muscular imbalance Nerve injury

VARIABLES:
DEPENDENT VARIABLES:

- BMI
- WEIGHT
- HEIGHT
- STRENGTH

INDEPENDENT VARIABLES:

- AGE
- GENDER
- MULLIGAN TAPE
- KINESIO TAPE

EQUIPMENTS:

- MULLIGAN TAPE
- KINESIO TAPE
- HAND GRIP DYANAMO METER

PROCEDURE

Total 40 male subjects with an age group 20-25 years were recruited for the study. They were recruited from various department of SCMAT, Kanpur nagar . The subject signed an informed AConsent form following which they were randomly assigned to two groups with 20 subjects inGroup A- Kinesio tape and 20 subjects in group B-Mulligan Tape. Group A comprising of 20 subjectreceived Kinesio tape and Hand grip exercise.

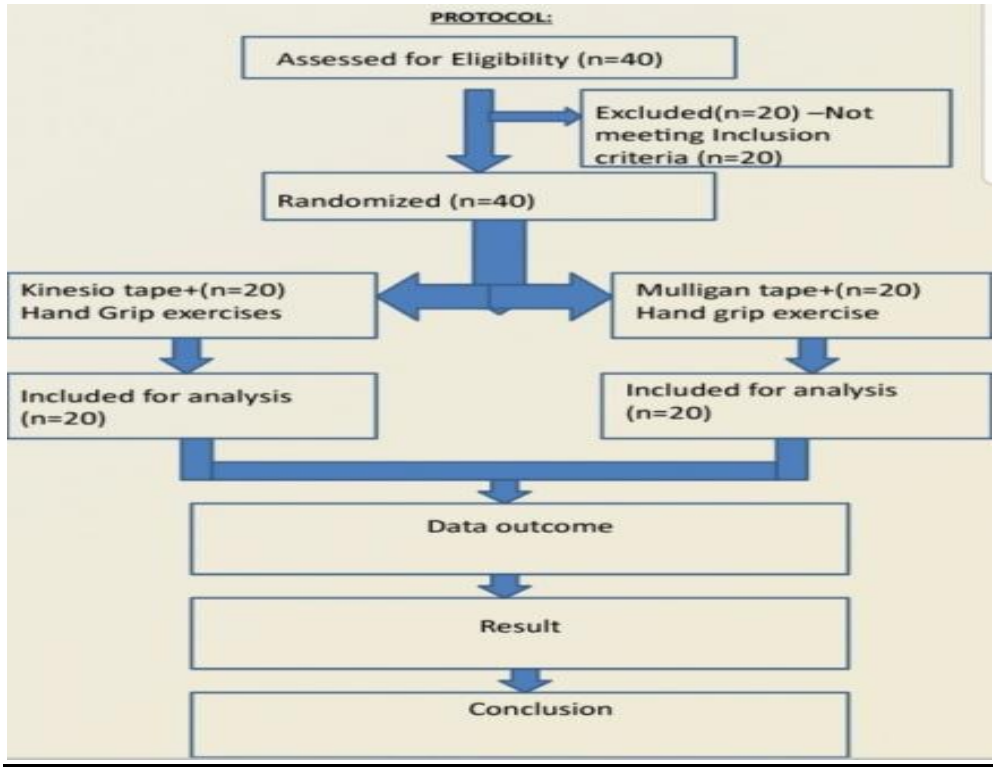
Patient is in sitting position with wrist; forearm and elbow should be maintained in full flexion. An I Shaped K-tape (a single strip) is applied forFacilitation technique with rounded edges. The tape will be applied on extensors

musclegroup from origin to insertion. Followed use of Hand grip exercise for 10-15 repetitions of eachexercise with progression. Measurement were taken before applying tape and post three weeksaccording to visual analogue scale (VAS) and hand grip dynamometer. Followed by alone use of Hand grip exercise. Three sessions per week for three week of hand grip.

The MWM were followed by taping which were applied on extensor muscle group when elbow is in slight flexion andforearm in pronation. At the beginning of taping there should be lateral gliding of extensor muscle group, the putting the mulligan tape firmly over it.

Both groups had three treatment sessions per week for three weeks and the total time for every session was about 30 to 45 minutes.

PROTOCOL

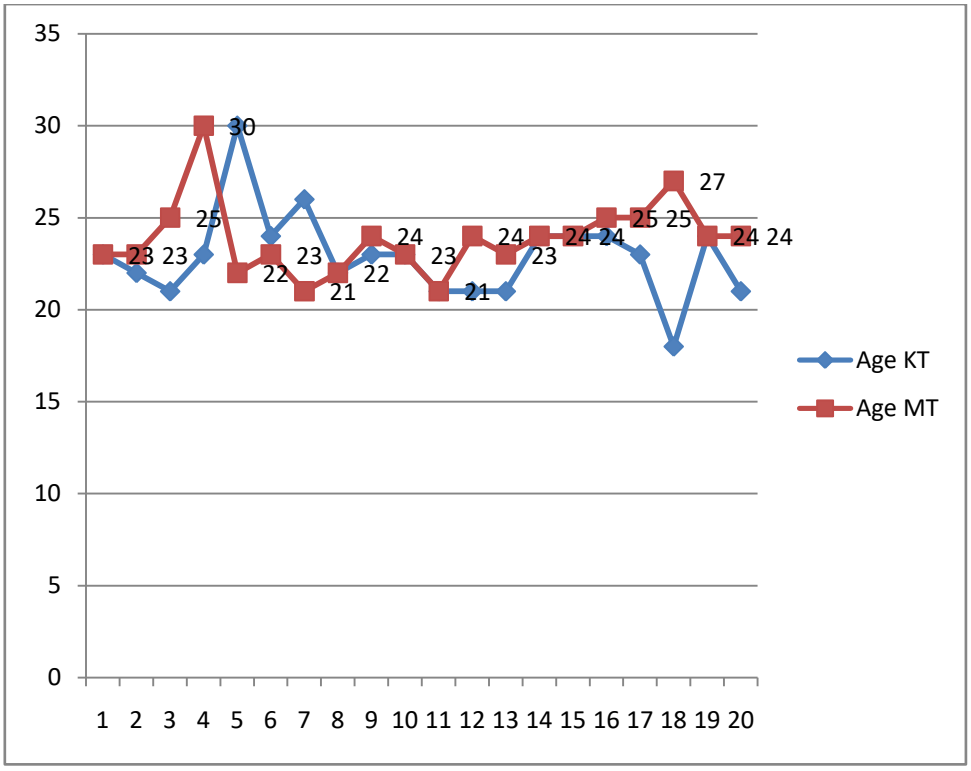


RESULT

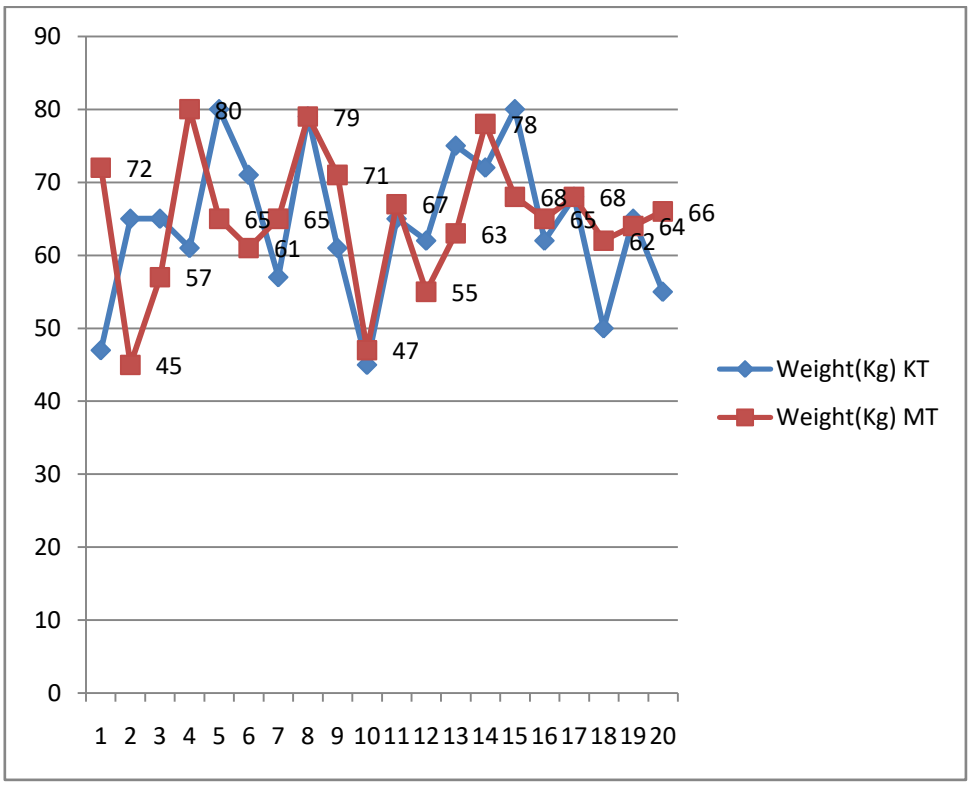
	KT	MT
Mean difference	0.34	0.07
A=(SD^2)/No.of n	7.589926667	0.619380829
B=(SD^2)/No.of n	7.113926667	0.211428686
C= A+B	14.70385333	0.830809515
D =SQRT ©	3.834560383	0.911487529
DF	**28**	**28**
t-value	**0.02312319**	**0.084255174**
p-value	**0.481716012**	**0.433453082**

Table-5: Calculation chart for final result

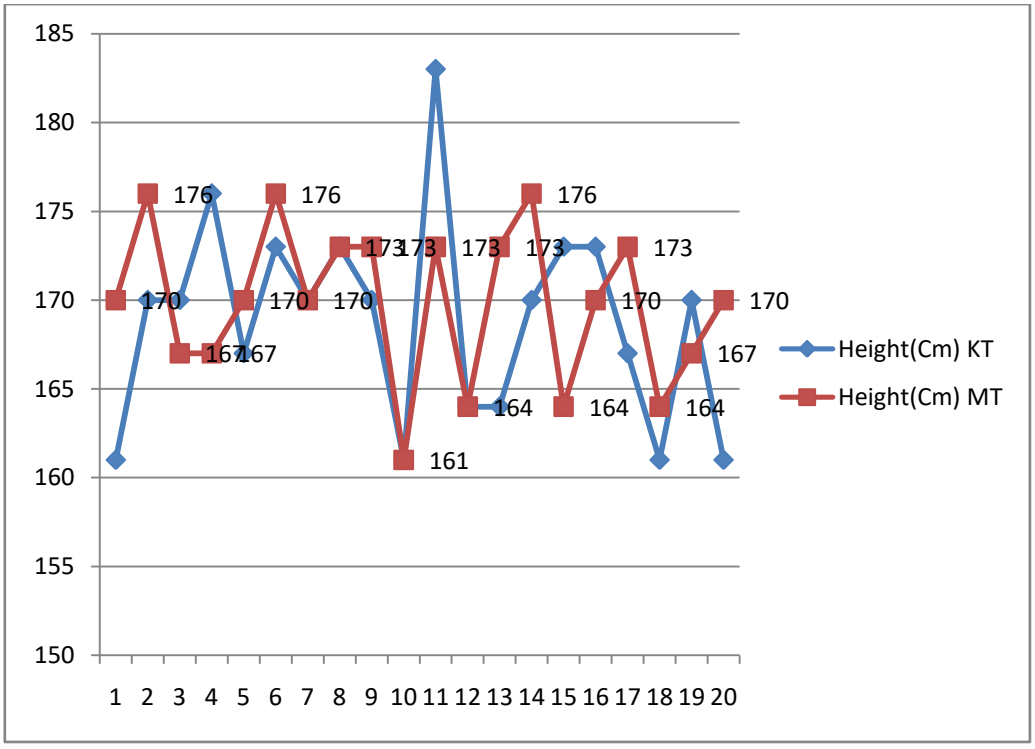
The 2t Confidence level of all tests shows significant change observed i.e. null hypothesis is rejected and alternate hypothesis is accepted, so that we observed significant improvement along with effectiveness of group Kinesio taping in compare to group Mulligan taping intraining program under strict prescribed technical norms on grip strength in the college level athletes.



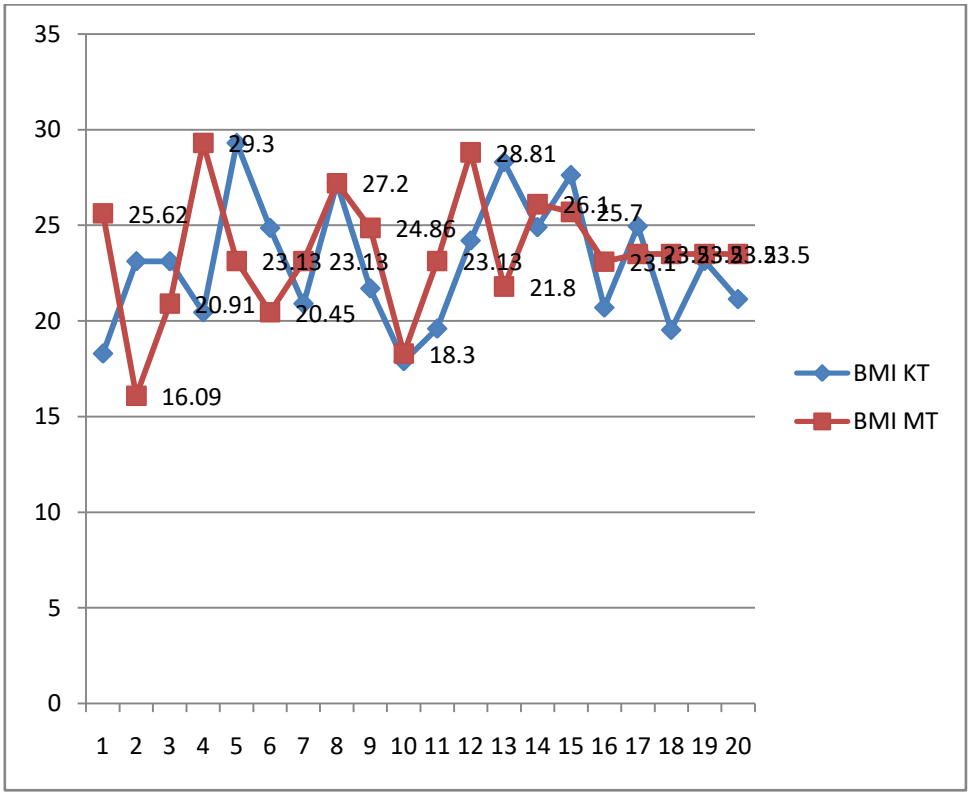
Graph-1: Represents the Age wise distribution of all study subjects of both groups i.e. KT & MT, A finding shows mean age (±SD) is 22.9 (±4.64) years for KT&,mean age (±SD) is 23.85 (±4.11) years for MT, which represents young aged participants.



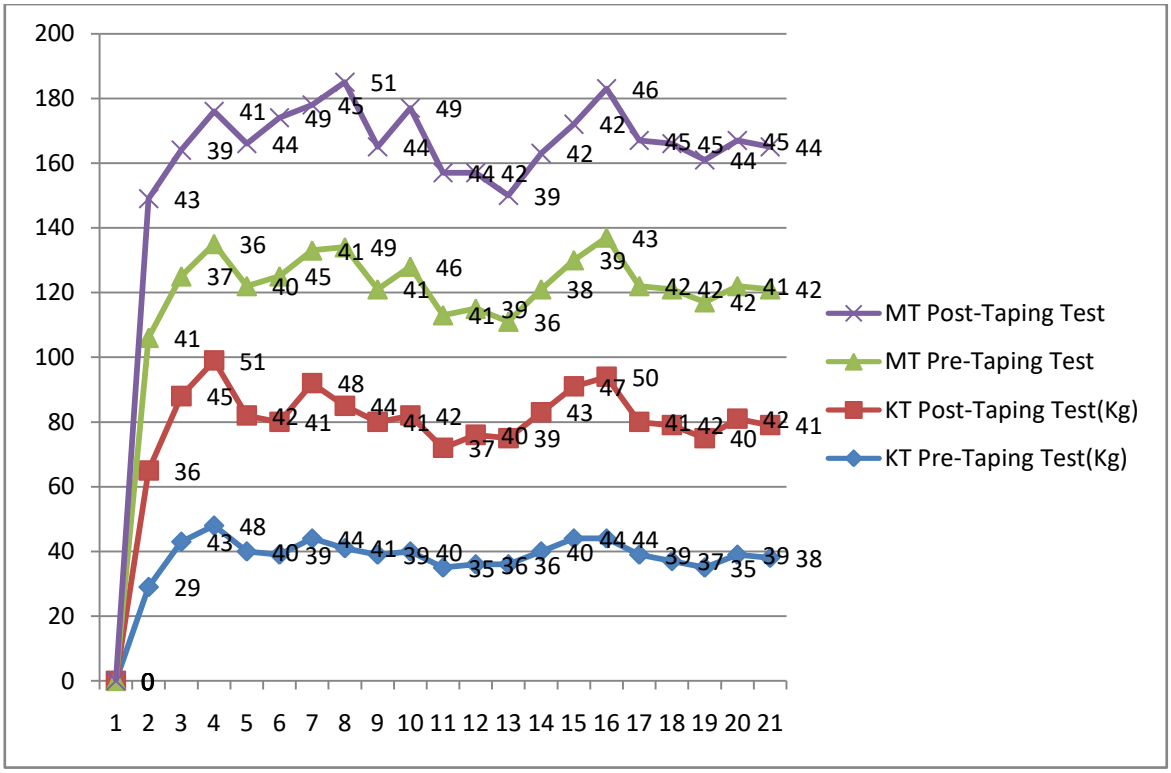
Graph-2: Represents the weight wise distribution of all study subjects of both groups i.e. KT & MT, A finding shows mean weight (±SD) is 64.25 (±4.17) kg. for KT &, mean weight (±SD) is 64.9 (±3.19) kg. for MT, which represents participants are average in weight.



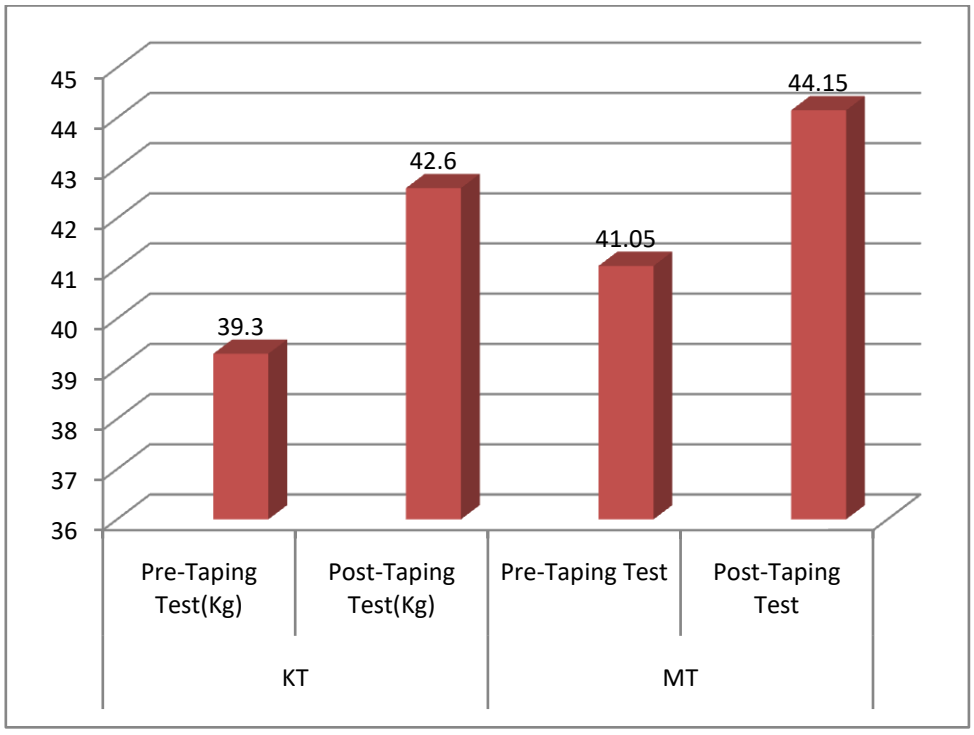
Graph-3: Represents the height wise distribution of all study subjects of both groups i.e. KT & MT, A finding shows mean height (±SD) is 168.85 (±2.77) cm. for KT &, mean height (±SD) is 169.85 (±2.77) cm. for MT, which represents participants are average in height.



Graph-4: Represents the BMI wise distribution of all study subjects of both groups i.e. KT & MT, A finding shows mean BMI (±SD) is 23.5 (±3.54) cm. for KT &, mean BMI (±SD) is 23.58 (±3.49) cm. for MT, which represents participants are average BMI in both groups..



Graph-5: Represents the pre/post wise distribution of all study subjects of both groups i.e. KT & MT, A finding shows mean pre (±SD) is 39.3(±2.34) cm. for KT &, mean post(±SD) is 42.6(±3.56) cm. for KT, while mean pre (±SD) is 41.05(±2.63) cm. for MT &, mean post(±SD) is 44.15(±3.97) cm. for MT,which represents participants significant in MT in compare with KT.



Graph-6: Represents the comparative KT vsMT wise distribution of all study subjects of both groups i.e. KT & MT, A finding shows mean pre (±SD) is 39.3(±2.34) cm. for KT &, mean post(±SD) is 42.6(±3.56) cm. for KT, while mean pre (±SD) is 41.05(±2.63) cm. for MT &, mean post(±SD) is 44.15(±3.97) cm. for MT, which represents participants significant in MT in compare with KT.

DISCUSSION

Total 40 subjects (20 subjects in each two groups) were taken according to the inclusion & exclusion criteria, those who satisfied the criteria were allowed to perform the study, total 40 subjects successfully completed the study.

All Subjects will be taken from Saaii College of Medical Science and Technology, chaubepur ,kanpur nagar on inclusion criteria such as gender Male only, young aged with collage level athletes.

We excluded the subjects Female college level athletes, Injured athletes, Muscular atrophy&Muscular imbalance Nerve injurybeginning or during study, we cant allowed any nutritional supplements in diet & participants also not allowed to take anabolic-androgenic steroids or any other drugs that might affect their physical performance or hormonal imbalance prior/during the study.

We also found same conclusion same as Arthur C. Rettig,* MD, Keith S. Stube, MD, and K. DonaldShelbourne, MD in their study that Effects that the results of these clinical measurements of grip strength showed that, contrary to the perceptions of professional and major college football players, taping of the fingers or wrists or both the fingers and wrists does not improve grip strength.

we also found thatsame conclusion that Jung-hoon lee, Won-gyuyoo, Kyung-soon that these results suggest that the muscle strength of the upper extremity in subjects with upper extremity muscle weakness may be improved by clinical application of kinesio taping as a supplementary measure.

CLINICAL-IMPLICATIONS

These data suggest that the study is to compare the effectiveness of technique KT and MT, shows significant betterment through RT in compare to MT, so it will improve the treatment outcome.

FUTURE RESEARCH

This study was conducted for a short period only, future research involving a longer time period & comparing the effects of the two intervention program is possible.

LIMITATION OF THE STUDY

A small sample size was one of the major limitations of the study. Many participants quit during study due to multiple sessions follow-up.

CONCLUSION

Hence we concluded thatOverall, based on results of this study and previous research, it can be said that the study to find out an effect of MT techniques shows significant improvement in compare with RT technique among the male college level athletes is observed so the null hypothesis is rejected and alternate hypothesis is accepted.

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"REVERBERATIONS OF COVID 19 ON PHYSIOTHERAPIST IN INDIA"*

BY

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Abstract:
The purpose of this study is to find out the Reverberations of Corona Virus on physiotherapist in India. As we all know that Covid is a novel illness declared as a pandemic by the World Health Organization (WHO) in March 2020.1 It has severely impacted the lives of people across the world. In India, the impact of the COVID-19 pandemic has been worse due to underlying issues of fragmented health infrastructure in semi-urban and rural parts of the country and due to weak public health governance. In the present COVID-19 induced pandemic, patients who need medical treatment for chronic illnesses or need supervision and consultation for therapy treatments have been affected severely. The public regulation has stipulated that medical support shall be provided on priority basis to urgent and critical patients only, leaving behind the other patients who need physical therapy and rehabilitation services in the limbo. However, the benefits of physical therapy have also been accepted widely for the rehabilitation of the patients recovering from COVID-19. Physiotherapy being a domain of health care practice dealing with rehabilitation of musculoskeletal, cardiopulmonary, neurological conditions have an objective to improve patients' muscle and joint functions, enhancing functional mobility and overall conditioning. Moreover, the risk is further enhanced if the physiotherapist health care provider is dealing with asymptomatic patients – who are found to be transmitting the infection. So, to find out impact we coined the 150 therapists from different areas of India and send them self-design questionnaire containing demographic and questions related to their practicing physiotherapy by the help of social media like Facebook, Instagram and WhatsApp, etc. by the end of decided date we get total 97 responses out of 150 selected candidates. After analyze the data we found that most of the physiotherapist is the age between 20-30, male and single, registered with IAP. Maximum number of the therapist tested negative for COVID 19 and the condition of COVID 19 in their area is remain same. So, the conclusion of this study shows that the Reverberations of COVID 19 on the practice of mostly physiotherapist in INDIA is almost null. In this way null hypothesis is rejected. Physiotherapist are the backbone of the rehabilitation team for covid 19 and carry on the responsibility to rehabilitate the patient suffering from COVID 19 knowing that there are chances of getting infected.

Keywords: *Reverberations, COVID – 19, Pandemic, Physiotherapist, Healthcare and Rehabilitation.*

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I – Introduction

COVID-19 pandemic on March 3, 2020. Over the next two months, the country responded to a rapidly spreading pandemic with an unprecedented shutdown that affected schools, business, sporting events, and more. On March 17, APTA's Board of Directors issued a statement encouraging physical therapists to "use their professional judgment to determine when, where, and how to provide care, with the understanding this is not the optimal environment for care, for anyone involved."

Throughout the pandemic, physical therapy services have been treated as essential by federal, state, and local guidance, although many physical therapists have proactively stopped nonessential in-person care to flatten the curve of the pandemicBetween April 24 and May 11, APTA surveyed a representative sample of 5,400 physical therapists and 1,100 physical therapist assistants to gauge the impact of the COVID-19 pandemic on the physical therapy profession.

Coronavirus disease 2019 (COVID-19) caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) is a novel illness declared as a pandemic by the World Health Organization (WHO) in March 2020.1 It has severely impacted the lives of people across the world. In India, the impact of the COVID-19 pandemic has been worse due to underlying issues of fragmented health infrastructure in semi-urban and rural parts of the country and due to weak public health governance. The Government of India has opted various measures to control the spread of COVID-19 and is responding to the needs of both COVID-19 patients and common people. Among other strategies, lockdown and social isolation are one of the most popular methods adopted by the government to control the viral spread. However, prolonged social isolation can also have severe impacts on people's physical and mental health and these impacts have already been started to be visible in general discourse.

In the present COVID-19 induced pandemic, patients who need medical treatment for chronic illnesses or need supervision and consultation for therapy treatments have been affected severely. The public regulation has stipulated that medical support shall be provided on priority basis to urgent and critical patients only, leaving behind the other patients who need physical therapy and rehabilitation services in the limbo. However, the benefits of physical therapy have also been accepted widely for the rehabilitation of the patients recovering from COVID-19.

Physiotherapy and Other Out-Patient Services in CoronaVirus Pandemic in India, the COVID-19 pandemic has knocked the health institutions, at all levels of its machinery, like never before. In several countries, including India, the secondary and tertiary care centers – which were earlier delivering services on an average to millions of out-patients, required critical transformation. The secondary and tertiary care center has now been turned into facilities of temporary COVID-19 hospitals for treating patients with moderate to severe symptoms of the disease.

Physiotherapy being a domain of health care practice dealing with rehabilitation of musculoskeletal, cardiopulmonary, neurological conditions have an objective to improve patients' muscle and joint functions, enhancing functional mobility and overall conditioning. Unavailability of in-person

supervision of physical therapies due to social restrictions has increased the vulnerability of patients. Variety of patient population extending from pediatric, geriatric, neuropsychiatric, differently abled among others who were undergoing routine sessions of outpatient or home-based rehabilitation therapies requiring continuous supervision of physiotherapist for assessment, treatment and follow-ups are the most affected groups of patients. Physiotherapists, as health care providers, are also at higher risk of exposed to infection due to the usual nature of practice requiring close proximity for assessing the patients along with implementing various manual techniques which have to be done passively by the therapists themselves. Moreover, the risk is further enhanced if the physiotherapist health care provider is dealing with asymptomatic patients – who are found to be transmitting the infection.

II -Methodology

2.1. Ethical statement

The web-based open E-survey research is submitted and Approved by the ethics committee of RAMA University, Kanpur. we ensured that the study was performed according to the principles laid by, declaration of Helsinki (Revised 2013), Council for International Organizations of Medical Sciences (CIOMS) guidelines, International ethical guidelines for health-related research involving humans (2016) and National guidelines for biomedical and health research involving human participants (2017). The purpose of the survey, introduction and about the length of the survey was added within the web-based open E-survey. A separate statement of consent was asked before starting the survey questionnaire.

2.2. Sample and design

A cross-sectional online survey was sent to physiotherapy professionals and students during COVID-19 lockdown period in the month of March 2021 and April 2021. Students who are pursuing Physiotherapy course (Undergraduate, Interns, Postgraduate and Doctorate in physiotherapy)were included in the study. Clinicians, academicians and researchers were also included in the study by a simple random sampling method. Physiotherapist students and professionals who are notwilling to spare time for filling survey questionnaires, who do not have an account in social networking sites such as Facebook, WhatsApp, and Instagram and who do not have smartphone were excluded from the web-based open E-survey.

2.3. Survey development

A series of questionnaires were created for the survey. The Survey contained three sections.
The first section includes a series of demographic questions, the second section of survey comprised professional questions, and the third section of survey comprised of related to covid – 19.Demographic related questions included in the survey were age, gender, marital status and subjective statements which includes, knowledge about COVID-19.

2.4. Administration of survey

Thestudy was executed by sending the online link (https://forms.gle/7DrKpayrXkY9wSou8) to Physiotherapy students and professionals through social networking sites such as Facebook, WhatsApp, and Instagram. 150 potential participants were identified and E-survey link was sent to them through the messaging services. The Survey was administered using the online survey portal, Google forms. As people are mostly active on social networking sites and messengers when compared to frequent checking e-mails, social networking sites were used for circulating the survey questionnaire. The reminder survey link was sent to them, ifresponse was not received within a period of two weeks. Web-based open E-survey is cost-effective, eco-friendly, time-saving and practically feasible during the COVID-19 period.

2.5. Sample size

The required sample size for this cross-sectional study was estimated by finding the 150 participants and sending the link of questionnaire through various platform of social media. In which we get only 97 responses in the given time period. The incomplete submission of survey questionnaire was not possible due to the function in Google Forms which prevent submission of partially answered or filled Questions.

III - Data Analysis

Data analysis was done using IBMSPSS Statistics (software package used for statistical analysis 2019 version-Rev.) Descriptive statistics was done to determine the demographic characteristics of the subjects recruited in this study.

Total Consent for Participation=97
Total Successful Participants in Survey=97
Total Unsuccessful Participants in Survey=00

Table-1: Age wise distribution of the Participants

Age group (In Yrs)	Number of Participants	Participants %
Under 21	32	32.99
22-30	57	58.76
31-40	8	8.25
Total	97	

Table-2: Gender wise distribution of the Participants

Gender	Number of Participants	Participants %
Male	52	53.61
Female	45	46.39
Other	0	0
Total	97	

Table-3: Marital Status wise distribution of the Participants

Marital Status	Number of Participants	Participants %
Single	87	89.69
Married	10	10.31
Total	97	

Table-4: In which state of India do you live in?

State Name	Number of Participants	Participants %
Uttar Pradesh	92	94.85
Bihar	2	2.06
Rajasthan	1	1.03
Delhi	1	1.03
Haryana	1	1.03
Other	0	0
No Response	0	0
Total	97	

Table-5: How many years of experience do you have?

Experience	Number of Participants	Participants %

more than two yrs	39	40.21
less than two yrs	58	59.79
Total	97	

Table-6: Were you ever tested positive for COVID - 19?

COVID19 Positive	Number of Participants	Participants %
Yes	3	3.09
No	94	96.91
Total	97	

Table-7: If tested positive then how many days you were quarantine?

Quarantine Period	Number of Participants	Participants %
Less than fourteen days	7	7.22
Fourteen days	26	26.8
More than fourteen days	17	17.53
No Response	47	48.45
Total	97	

Table-8: If tested negative, have you ever felt symptoms of COVID - 19?

Symptomatic	Number of Participants	Participants %
Yes	30	30.93
No	67	69.07
Total	97	

Table-9: What was the scenario of COVID - 19 in your area during and after lockdown?

Locality Severity	Number of Participants	Participants %
Slightly decrease	18	18.56
Moderately decrease	18	18.56
Remain same	29	29.89
Slight increase	21	21.65
Moderate increase	11	11.34

Total	97	

Table-10: Are you a registered physiotherapist?

Registered Physiotherapist	Number of Participants	Participants %
Yes	60	61.86
No	37	38.14
Total	97	

Table-11: Registered with which association?

Association	Number of Participants	Participants %
UPSMF	32	32.99
IAP	16	16.49
Both	34	35.05
Student	14	14.43
None	1	1.03
other	0	0
Total	97	

Table-12: If register with state council please specify the name.

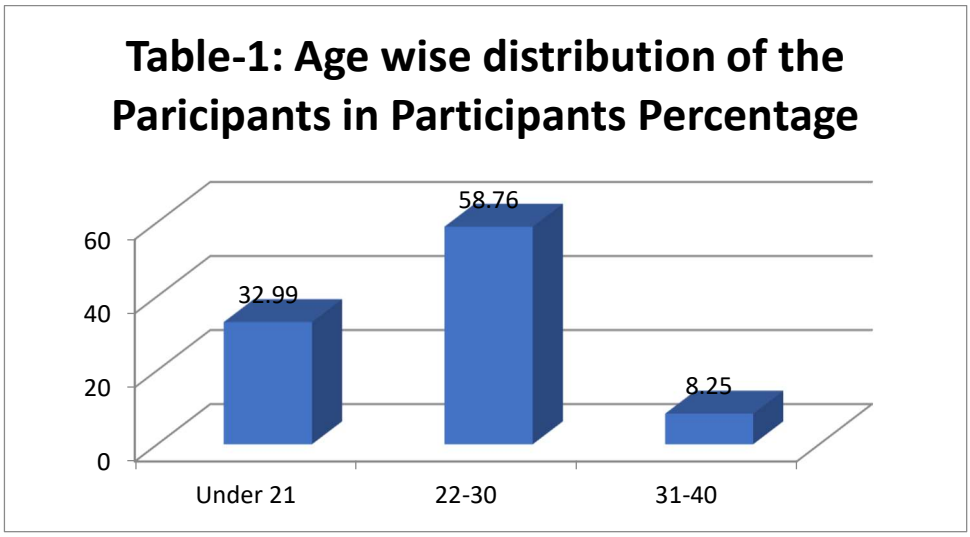
State Council	Number of Participants	Participants %
UPSMF	34	35.05
Other	0	0
No Response	63	64.95
Total	97	

Table-13: Where you practice?

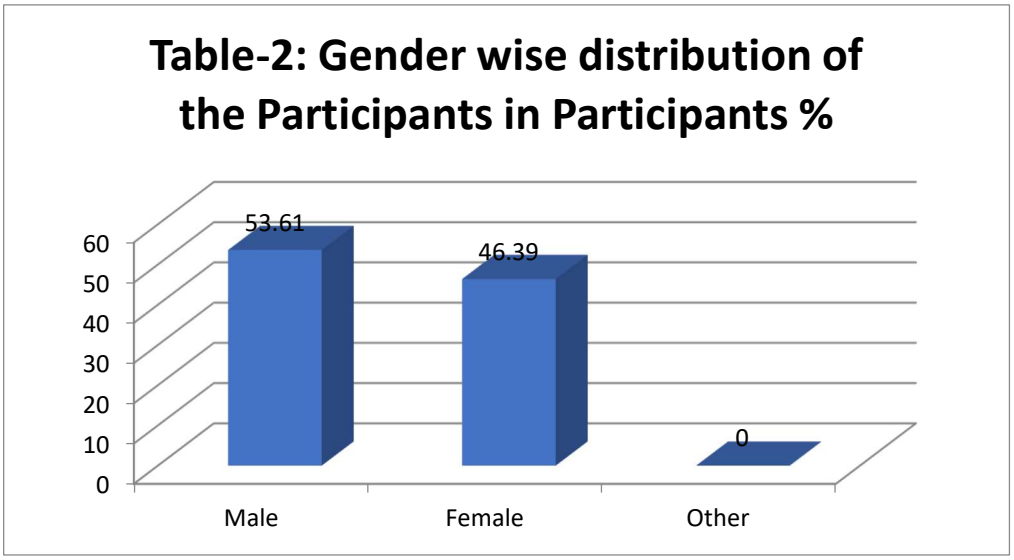
Area of Practice	Number of Participants	Participants %
Academic	8	8.25
Hospital	12	12.37
Student	64	65.97
Clinician	7	7.22

Researcher	1	1.03
Home Care	3	3.09
Freelance	2	2.06
No Response	0	0
Total	97	

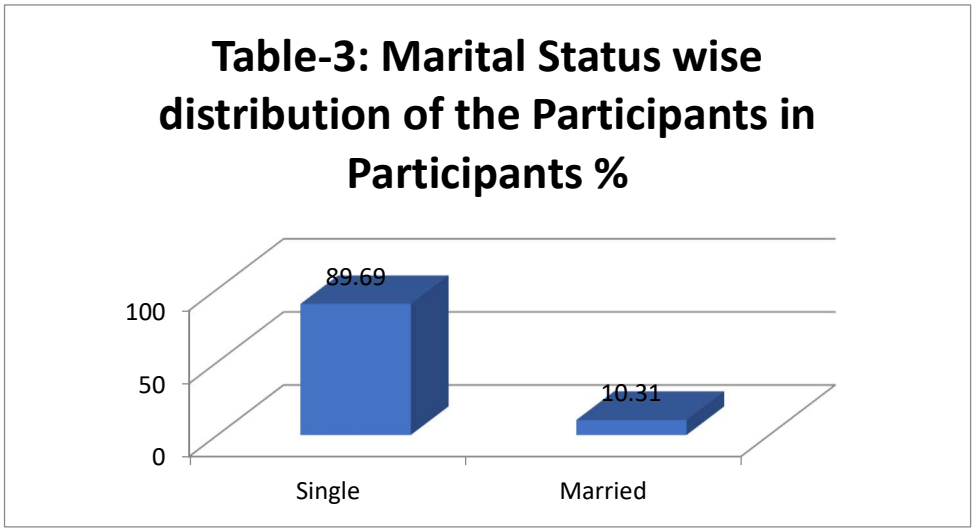
IV - RESULT



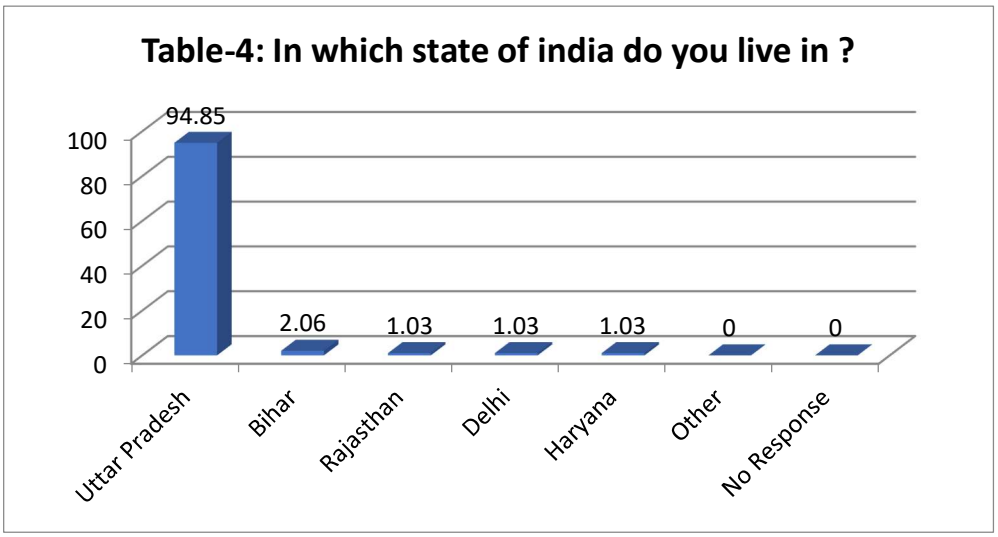
Graph-1: Represents the Age wise distribution of all97 participants, all age groups are mentioned in years, the result suggest 58.76% of participants (57 out of 97 participants) are belongs to age group 22-30 years, 32.99% of the participants (32 out of 97 participants) are belongs to age group under 21 years, while rest 8.25% of the participants (8 out of 97 participants) are belongs to age group 31-40 years, which reflect those maximum participants belong to age group 22-30 years.



Graph-2: Represents the Gender wise distribution of the all 97 participants, the result suggests that 53.61% of participants are Male (52 out of 97 participants), 46.39% of participants are female (45 out of 97 participants) & 0% of participants are other (No participants out of 97 participants), Which reflect that maximum participant are male.

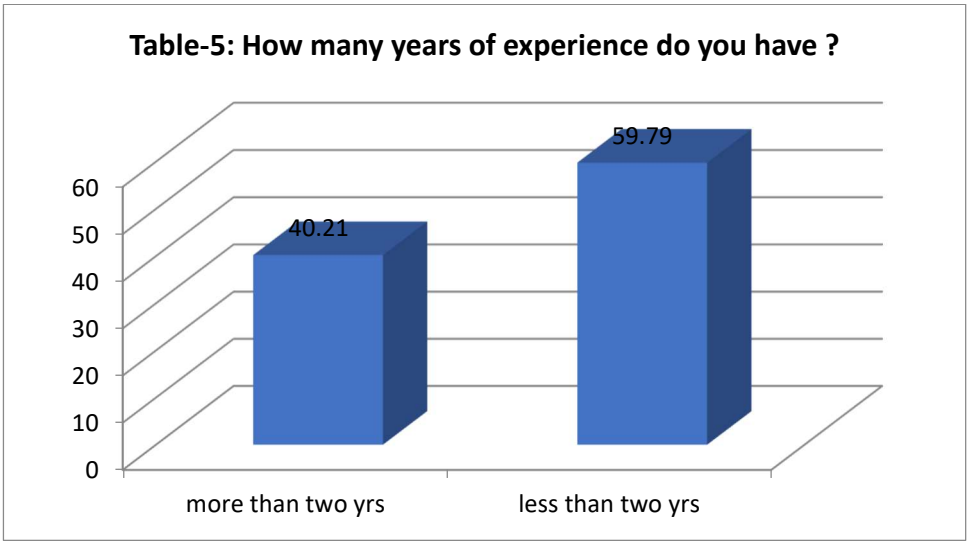


Graph-3: Represents the Marital status wise distribution of all 97 participants, the result suggests that 89.69% of participants are single (87 out of 97 participants) & 10.31% of participants are married (10 out of 97 participants), which reflect that maximum participant are single.

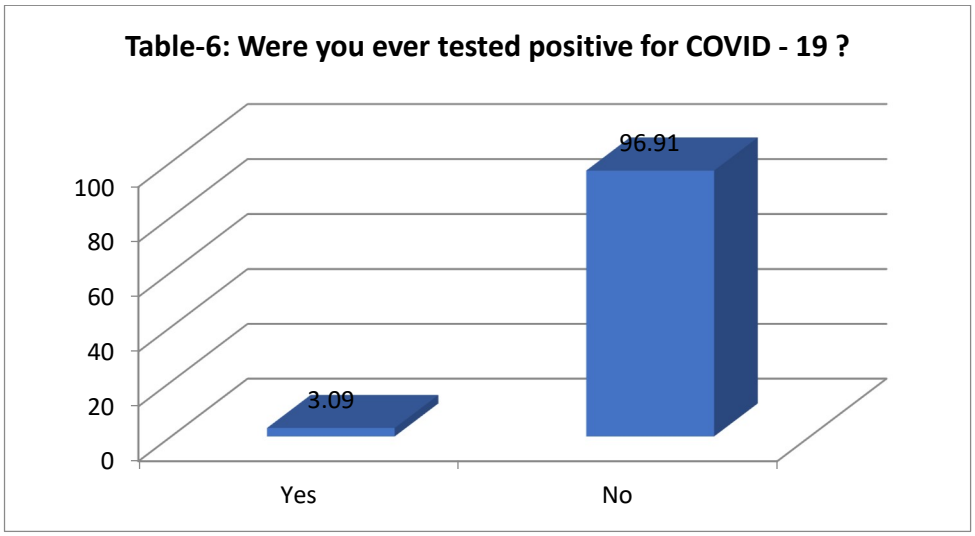


Graph-4: Represents the participants belongs to which state of India, the result suggests that 94.85% of the participants belongs to State of Uttar Pradesh (92 out of 97 participants), 2.06% of participants are belongs to Bihar state (2 out of 97 participants), 1.03% each from state of Delhi & Haryana (1

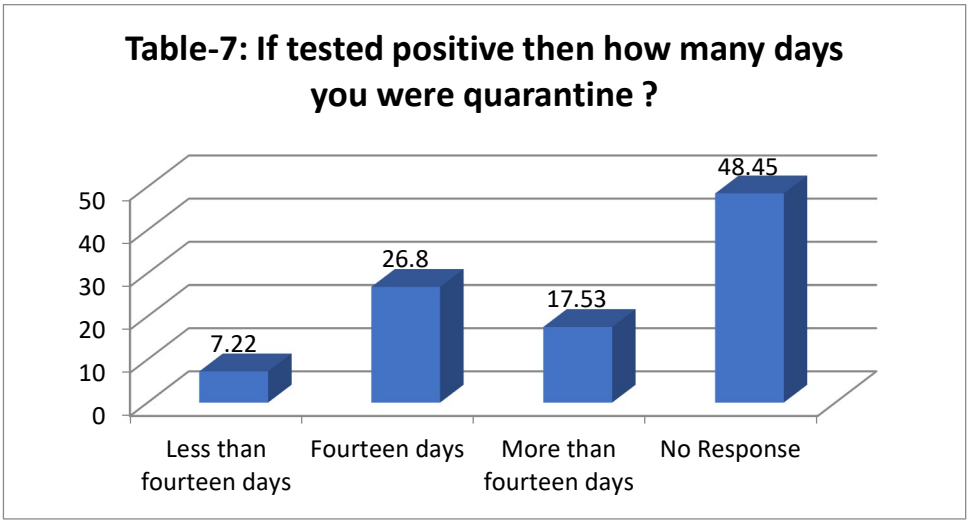
participant each out of 97 participants), while no participation from any other location, so maximum number of participants belongs to Uttar Pradesh itself.



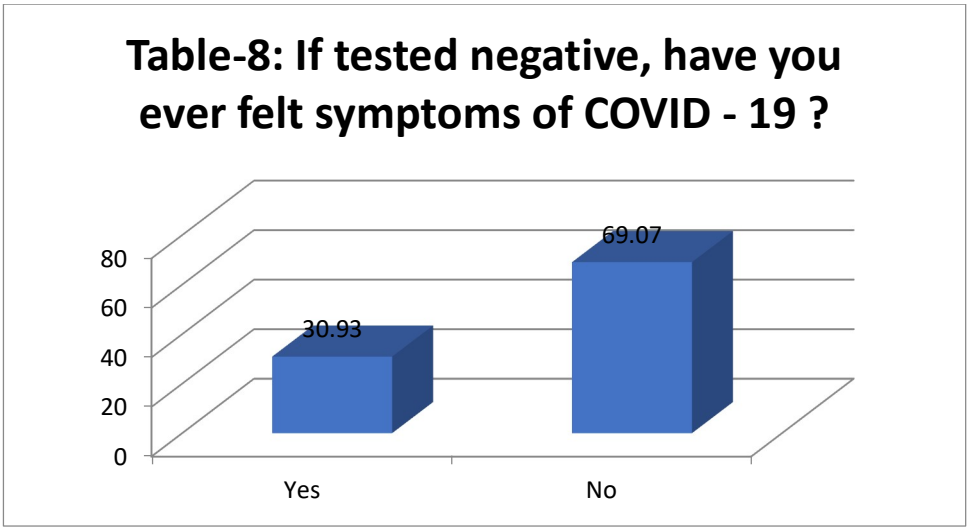
Graph-5: Represents experience wise distribution of all 97 participants, the result suggests that 40.21% of participants are having more than two years' experience (39 out of 97 participants) & 59.79% of participants are less than two year of experiences (58 out of 97 participants), which reflect that maximum participant are having less than two years of experiences in the field of physiotherapy.



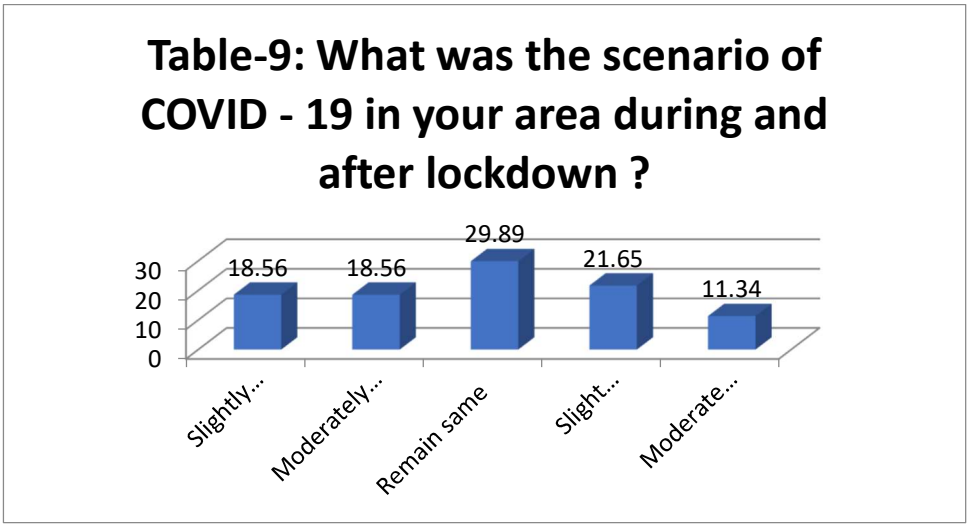
Graph-6: Represent positive COVID19 participants wise distribution of all 97 participants, the result suggests that only 3.09% of participants are tested positive for COVID19 (3 out of 97 participants) & 96.91% of participants are tested negative for COVID19 (94 out of 97 participants), which reflect that maximum participant are tested negative for COVID19.



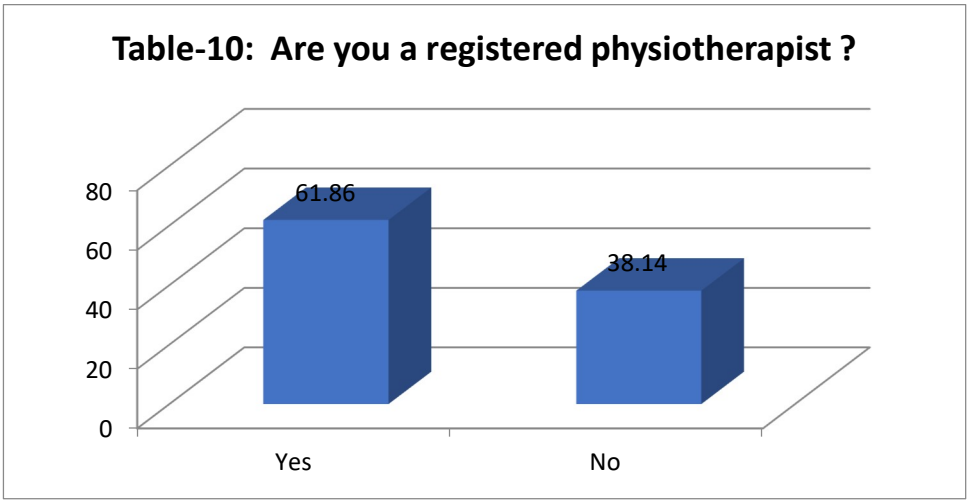
Graph-7: Represents the quarantine period of all positive COVID19 cases, the result suggests that 48.45% of the participants show no response, 26.8% of participants follow fourteen-day quarantine period, 17.53 % participants go for quarantine period more than fourteen days, so maximum number of participants show no response about quarantine period.



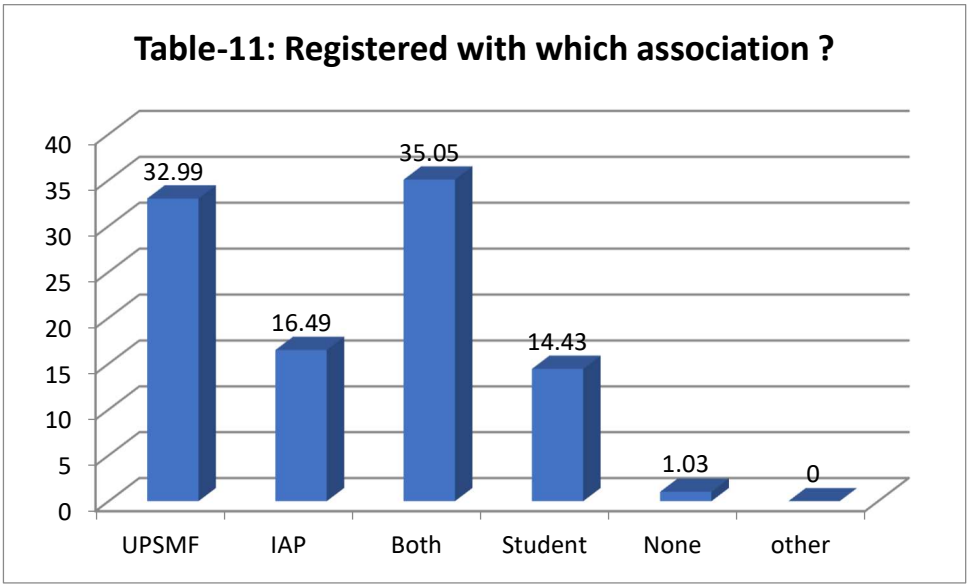
Graph-8: Represent negative COVID19 participants wise distribution of all participants, the result suggests that only 30.93% of participants are tested negative for COVID19 still having symptoms (30 participants) & 69.07% of participants are tested negative for COVID19 with no symptomatic (67 participants), which reflect that maximum participant are tested negative for COVID19 are asymptomatic.



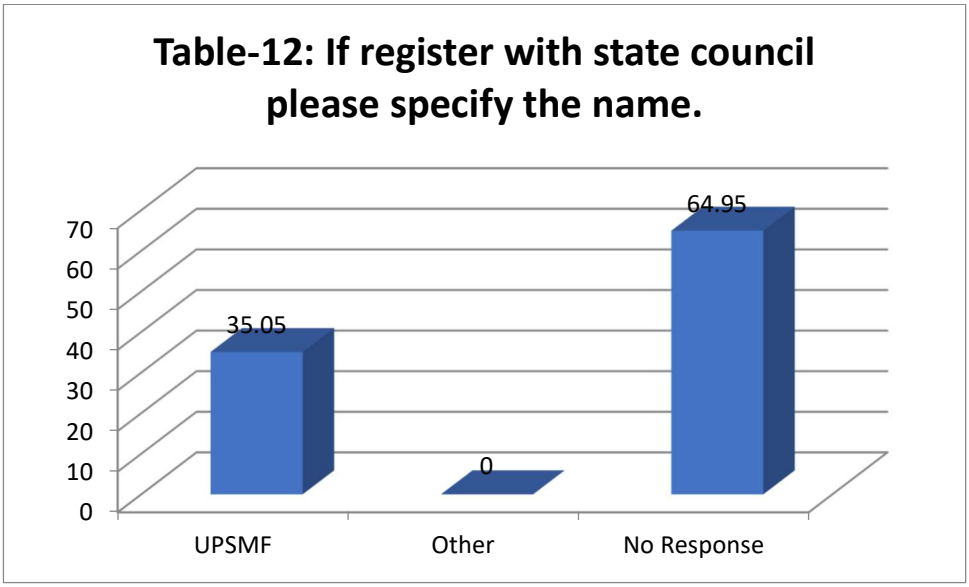
Graph-9: Represent COVID19 scenario wise distribution of all 97 participants, the result suggest that 18.86% of participants said that COVID19 slightly decreased in their area (18 out of 97 participants), 18.86% of participants said that COVID19 moderately decreased in their area (18 out of 97 participants), 29.89% of participants said that COVID19 remain same in their area (29 out of 97 participants),21.65% of participants said that COVID19 slightly increased in their area (21 out of 97 participants), & 11.34% of participants said that COVID19 moderately increased in their area (11 out of 97 participants). Which reflect that maximum participants said that COVID19 is remain same in their area.



Graph-10: Represent registered physiotherapist participants wise distribution of all 97 participants, the result suggests that 61.86% of participants (60 out of 97 participants) are registered physiotherapists& 38.14% of participants are not registered physiotherapist (37 out of 97 participants), which reflect that maximum participant are working as registered physiotherapist.

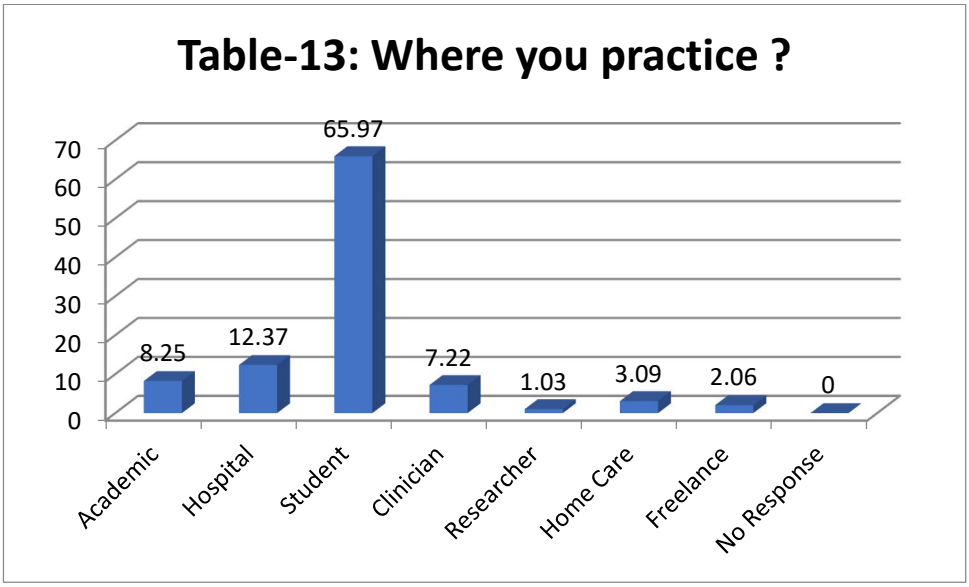


Graph-11: Represent name of the association wise distribution from where physiotherapist was registered, the result suggests that 32.99% Participants are with UPSMF (32 participants), 16.49% participants are with IAP (16 participants), 35.05% participants are with both UPSMF and IAP (34 participants), 14.43% participants are students of various colleges (14 participants), 1.03% participants are with no association (1 participants) & 0% participants are with any others (no participants), which reflect maximum participants are associated with UPSMF&IAP both.



Graph-12: Represent specific name of association participants wise distribution of all participants, the result suggests that only 35.05% of participants are registered to UPSMF (34 out of 97 participants), 0% of participants mentioned that they are associated with other council (none of 97 participants) &

64.95% participants can't prefer to show their preferences (63 out of 97 participants), which reflect that maximum participant mentioned no response.



Graph-13: Represents the area of practice wise distribution of all participants, the result suggest that 8.25% of participants practice in the field of academics (8 out of 97 participants), 12.37% of participants practice in the field of hospital (12 out of 97 participants), 65.97% of participants are physiotherapy students (64 out of 97 participants), 7.22% of participants are clinician (7 out of 97 participants), 1.03% of participants are researcher (1 out of 97 participants), 3.09% of participants practice in the field of home care physiotherapy (3 out of 97 participants), 2.06% of participants practice as a freelance (2 out of 97 participants) & 0% of participants don't specified his/her practice area (None out of 97 participants). Which reflect those maximum participants are physiotherapy final year students.

V – DISCUSSION

To determine the Impact of COVID19 on physiotherapy practice in India we conducted Cross sectional simple randomized online survey among the physiotherapy professionals & students. We received 97 feedback with consent based on inclusion & exclusion criteria.

In question 1 we asked age of participants, we found that maximum participants belong to age group 22-30 years which represents the Age wise distribution of all 97 participants, all age groups are mentioned in years, the result suggest 58.76% of participants (57 out of 97 participants) are belongs to age group 22-30 years, 32.99% of the participants (32 out of 97 participants) are belongs to age group under 21 years, while rest 8.25% of the participants (8 out of 97 participants) are belongs to age group 31-40 years .

In question 2 we asked about gender of the participants, we found that maximum participants were male, which represents the Gender wise distribution of the all 97 participants, the result suggest that

53.61% of participants are Male (52 out of 97 participants), 46.39% of participants are female (45 out of 97 participants) & 0% of participants are other (No participants out of 97 participants).
In question 3 we asked about marital status of the participants, we found that maximum participants were single, which represents the Marital status wise distribution of all 97 participants, the result suggest that 89.69% of participants are single (87 out of 97 participants) & 10.31% of participants are married (10 out of 97 participants) .

In question 4 we asked about state they belong, which represents that maximum participant belongs to Uttar Pradesh, the result suggests that 94.85% of the participants belongs to State of Uttar Pradesh (92 out of 97 participants), 2.06% of participants are belongs to Bihar state (2 out of 97 participants), 1.03% each from state of Delhi & Haryana (1 participant each out of 97 participants), while no participation from any other location .

In question 5 we asked about physiotherapy professional experience of participants, we found that maximum participants having less than two-year experience, the result suggest that 40.21% of participants are having more than two years' experience (39 out of 97 participants) & 59.79% of participants are less than two year of experiences (58 out of 97 participants) .

Question 6 represent positive COVID19 participants wise distribution of all 97 participants, the result suggests that only 3.09% of participants are tested positive for COVID19 (3 out of 97 participants) & 96.91% of participants are tested negative for COVID19 (94 out of 97 participants), which reflect that maximum participant are tested negative for COVID19 .

Question 7 represents the quarantine period of all positive COVID19 cases, the result suggests that 48.45% of the participants show no response, 26.8% of participants follow fourteen-day quarantine period, 17.53 % participants go for quarantine period more than fourteen days, so maximum number of participants show no response about quarantine period .

Question 8 represent negative COVID19 participants wise distribution of all participants, the result suggests that only 30.93% of participants are tested negative for COVID19 still having symptoms (30 participants) & 69.07% of participants are tested negative for COVID19 with no symptomatic (67 participants), which reflect that maximum participant are tested negative for COVID19 are asymptomatic.

Question 9 represent COVID19 scenario wise distribution of all 97 participants, the result suggest that 18.86% of participants said that COVID19 slightly decreased in their area (18 out of 97 participants), 18.86% of participants said that COVID19 moderately decreased in their area (18 out of 97 participants), 29.89% of participants said that COVID19 remain same in their area (29 out of 97

participants),21.65% of participants said that COVID19 slightly increased in their area (21 out of 97 participants), & 11.34% of participants said that COVID19 moderately increased in their area (11 out of 97 participants). Which reflect that maximum participant said that COVID19 is remain same in their area.

Question 10 represent registered physiotherapist participants wise distribution of all 97 participants, the result suggests that 61.86% of participants (60 out of 97 participants) are registered physiotherapist & 38.14% of participants are not registered physiotherapist (37 out of 97 participants), which reflect that maximum participant are working as registered physiotherapist .

Question 11 represent name of the association wise distribution from where physiotherapist was registered, the result suggests that 32.99% Participants are with UPSMF (32 participants), 16.49% participants are with IAP (16 participants), 35.05% participants are with both UPSMF and IAP (34 participants), 14.43% participants are students of various colleges (14 participants), 1.03% participants are with no association (1 participants) & 0% participants are with any others (no participants), which reflect maximum participants are associated with UPSMF&IAP both .

Question 12 represent specific name of association participants wise distribution of all participants, the result suggests that only 35.05% of participants are registered to UPSMF (34 out of 97 participants), 0% of participants mentioned that they are associated with other council (none of 97 participants) & 64.95% participants can't prefer to show their preferences (63 out of 97 participants), which reflect that maximum participants mentioned no response .

At last Question 13 represents the area of practice wise distribution of all participants, the result suggest that 8.25% of participants practice in the field of academics (8 out of 97 participants), 12.37% of participants practice in the field of hospital (12 out of 97 participants), 65.97% of participants are physiotherapy students (64 out of 97 participants), 7.22% of participants are clinician (7 out of 97 participants), 1.03% of participants are researcher (1 out of 97 participants), 3.09% of participants practice in the field of home care physiotherapy (3 out of 97 participants), 2.06% of participants practice as a freelance (2 out of 97 participants) & 0% of participants don't specified his/her practice area (None out of 97 participants). Which reflect that maximum participants are physiotherapy final year students.

VI - CONCLUSION

Hence, we concluded that Overall, based on results of this study and previous research, it can be said that the study to find out significant impact of COVID19 on physiotherapy professionals & students in India as we concluded that-

1-Maximum participants belong to age group 22-30 years.
2-Maximum participants are male.
3-Maximum participants are single.

4-Maximum number of participants belongs to Uttar Pradesh itself.
5-Maximum participants are having less than two years of experiences in the field of physiotherapy..
6-Maximum participants are tested negative for COVID19
7-Maximum number of participants show no response about quarantine period.
8- Maximum participants are tested negative for COVID19 are asymptomatic.
9- Maximum participants said that COVID19 is remain same in their area.
10- Maximum participants are working as registered physiotherapist.
11- Maximum participants are associated with UPSMF&IAP both
12- Maximum participants cant prefer to show their preferences about physiotherapy professional association they are associated.
13- Maximum participants of this survey are physiotherapy final year students.

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An Observational study of Active Cycle of Breathing Technique in Asthmatic Patients

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Abstract
Background: *Asthma is an inflammatory disease of the airways of the lungs. Symptoms include episodes of wheezing, coughing, chest tightness and shortness of breath. The inside walls of airways are swollen or inflamed.* ***Material and Method:*** *In this study, six patients were included of both genders with mild to moderate asthma and the mean age 40.020±13.600. Each patients received multiple sessions i.e. 3times/week for one month of active cycle of breathing technique. Pre and post treatment measures were recorded for functional capacity and health-related quality of life in the form of six-minute walk test and standardized airway questionnaire. All six patients were stable during study period.* ***Results:*** *The health related quality of life and functional capacity of patient significantly improved post-treatment sessions with means [104.3±82.4 for first week, 137.6±111.8 for second week, 205.318±130.5 for third week, 234.3±123.3 for fourth week], The mean difference and six-minute wall test 3.12±1.2SD for standardized airway questionnaire with p-value [0.00] significant upon paired t-test.* ***Conclusion:*** *It is concluded that the active cycle of breathing technique is very beneficial for improving quality of life and functional capacity of patients with mild to moderate asthma.*

Keywords: *Active cycle of breathing technique, Asthma, functional capacity, health-related quality of life, airway.*

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I. INTRODUCTION

Asthma is a common long-term inflammatory disease of the airways of the lungs.[1] It is characterized by variable and recurring symptoms, reversible airflow obstruction, and easily triggered bronchospasms.[2][3] Symptoms include episodes of wheezing, coughing, chest tightness, and shortness of breath.[4] These may occur a few times a day or a few times per week.[3] Depending on the person, asthma symptoms may become worse at night or with exercise.[3]

Asthma is thought to be caused by a combination of genetic and environmental factors.[5] Environmental factors include exposure to air pollution and allergens.[3] Other potential triggers include medications such as aspirin and beta blockers.[3] Diagnosis is usually based on the pattern of symptoms, response to therapy over time, and spirometry lung function testing.[6] Asthma is classified according to the frequency of symptoms, forced expiratory volume in one second (FEV1), and peak expiratory flow rate.[7] It may also be classified as atopic or non-atopic, where atopy refers to a predisposition toward developing a type 1 hypersensitivity reaction.[8][9]

In 2015, 358 million people globally had asthma, up from 183 million in 1990.[10][11] It caused about 397,100 deaths in 2015,[12] most of which occurred in the developing world.[1] Asthma often begins in childhood, [1] and the rates have increased significantly since the 1960s.[13] Asthma was recognized as early as Ancient Egypt.[14] The word "asthma" is from the Greek ἅσθμα, *ásthma*, which means "panting".[15]

Asthma is characterized by recurrent episodes of wheezing, shortness of breath, chest tightness, and coughing.[16] Sputum may be produced from the lung by coughing but is often hard to bring up.[17] During recovery from an asthma attack (exacerbation), it may appear pus-like due to high levels of white blood cells called eosinophils.[18] Symptoms are usually worse at night and in the early morning or in response to exercise or cold air.[19] Some people with asthma rarely experience symptoms, usually in response to triggers, whereas others may react frequently and readily and experience persistent symptoms. A number of other health conditions occur more frequently in people with asthma, including gastro-esophageal reflux disease (GERD), rhinosinusitis, and obstructive sleep apnea.[20] Psychological disorders are also more common,[21] with anxiety disorders occurring in between 16–52% and mood disorders in 14–41%.[22] It is not known whether asthma causes psychological problems or psychological problems lead to asthma.[23] Those with asthma, especially if it is poorly controlled, are at increased risk for radiocontrast reactions.[24] Cavities occur more often in people with asthma.[25] This may be related to the effect of beta 2 agonists decreasing saliva.[26]

Asthma is caused by a combination of complex and incompletely understood environmental and genetic interactions.[27] These influence both its severity and its responsiveness to treatment.[28] It is believed that the recent increased rates of asthma are due to changing epigenetic (heritable factors other than those related to the DNA sequence) and a changing living environment.[29] Asthma that starts before the age of 12 years old is more likely due to genetic influence, while onset after age 12 is more likely due to environmental influence.[30]

Many environmental factors have been associated with asthma's development and exacerbation, including, allergens, air pollution, and other environmental chemicals.[31] Smoking during pregnancy and after delivery is associated with a greater risk of asthma-like symptoms.[32] Low air quality from environmental factors such as traffic pollution or high ozone levels [33] has been associated with both asthma development and increased asthma severity.[34] Exposure to indoor volatile organic compounds may be a trigger for asthma; formaldehyde exposure, for example, has a positive association.[35] Phthalates in certain types of PVC are associated with asthma in both children and adults.[36][37] While exposure to pesticides is linked to the development of asthma, a cause and effect relationship has yet to be established.[38][39]

Asthma is associated with exposure to indoor allergens.[40] Common indoor allergens include dust mites, cockroaches, animal dander (fragments of fur or feathers), and mold.[41][42] Efforts to decrease dust mites have been found to be ineffective on symptoms in sensitized subjects.[43][44]

II. MATERIAL AND METHODS

In this study, total of six patients with mild to moderate asthma. The age of the patients is between 17-60 years. Moderate asthma was defined as forced expiratory volume 1 [FEV1] and forced vital capacity greater than 75%. Functional abilities referred to the capability of asthmatic patients to carry out activities of daily living without alleviation of symptoms. The basic interventions to assess functional lung capacity and treat patients with asthma were active cycle of breathing [ACBT] along with six-minute walk test and airway questionnaire [AQ]. Active cycle breathing technique is used to clear airways and mobilize pulmonary excess secretions from lung. Its consist of thoracic expansion, breathing control exercises followed by forced expiratory technique with an open glottis and control breathing.

Active cycle breathing technique had been given to each patient according to standard protocol. The treatment included a session of about twenty-five minutes that consisted of chest expansion exercises, breathing control exercises and forced expiratory technique. Each patient received multiple sessions three times/week for one month of active cycle of breathing technique. To determine the effect of active cycle breathing technique, functional capacity of lungs and health related quality of life and the airway questionnaire was developed to asses QOL. The questionnaire consists of total twenty items with scoring range from 0-20 and high score indicates poor quality of life. To measure the health-related quality of life in this study, a standardized airway questionnaire [AQ20] was used. [45] The patient filled the questionnaire on the day one first session and on the last day of the last session after four weeks.

The six-minute walk test was conducted according to standard protocol and in temperature controlled environment. Patients were instructed to walk in 30 meters marked corridor with starting point and finishing line. Patients were advised to stop in emergency situations like chest pain, chest tightness, dyspnoea, calf cramps. The six-minute walk test was used as a measurement tool to test the functional capacity of the patient. [23] The test was performed by the patient twice during each session, pre-treatment and post-treatment distance was recorded in meters. The comparison pre-treatment and post-treatment levels were done using the paired t-test.

III. RESULTS

In this study, six adult asthmatic patients, three females and three were males. The patients were treated with active cycle breathing technique as treatment. The age of patients was between 17-60 years.

Total patients: 6
Mean: 40.020
Standard Deviation: 13.600
Minimum Age: 17
Maximum Age: 60

It showed that mean age of patients was 40.020±13.600. The patient's functional capacity was measure to define mild to moderate asthma, the value of forced vital capacity [FVC] along with forced expiratory volume [FEV1] are 67.6 and 67.3 respectively. Further results showed that the quality of life of asthmatic patient was significantly improved and paired t-test results. Comparison of pre-treatment and post-treatment AQ20 scores:

	Mean	SD	Std. Error mean	95%CI	T	Df	Sig. [2-tail]
AQ20 score for pre and post treatment	3.20	1.2	.27	2.4.4.0	10.2	36	.000

This table shows pre-treatment and post-treatment score of AQ20. The result shows that p-value for comparison of AQ20vscore is 0.000. The result indicates significant improvement in post-treatment health-related quality of life. Active cycle breathing techniques employed to asthmatic patient were also assessed by six-minute walk test. The pre and post value of six-minute walk test for four weeks in one month is discussed below:

Comparison of six minute walk test	**Week 1**		**Week 2**		**Week 3**		**Week 4**	
	Pre-test	**Post-test**	**Pre-test**	**Post-test**	**Pre-test**	**Post-test**	**Pre-test**	**Post-test**
	100.0	104.3	132.2	137.6	176.3	205.3	220.5	234.3

That means for post-treatment 6MWT were 104.3±82.4 for first week, 137.6±111.8 for second week, 205.3±130.5 for third week, 234.3±123.3 for fourth week. The result showed improvement in the distances walked by patients during their four-week treatment.

IV. DISCUSSION

The present study was aimed to determine the effects of active cycle of breathing technique in mild to moderate asthmatic patients. The study was assessed by airway questionnaire 20 and six-minute walk test for both pre and post treatment. A total of six patients who had mild to moderate asthma were treated with active cycle of breathing technique, three times per week for one month in improving the health-related quality of life and functional capacity. Results showed that there is a significant improvement in the score of airway questionnaire and six-minute walk test. Many studies agreed with results of this study and reported improvement in six-minute walk with functional capacity. Comparative study done on patients with cystic fibrosis found active cycle of breathing technique as effective as postural drainage. The increase in functional capacity was observed after active cycle of breathing technique. [46] A study conducted on patient with bronchiectasis also reported similar effectiveness of postural drainage and ACBT equally. The efficacy of active cycle of breathing technique has been reported in comparative studies. A research compared the efficacy of conventional treatment with active cycle of breathing technique in patients with bronchiectasis with variable aetiology.

Beside active cycle of breathing technique many other physiotherapy techniques are reported and used for pulmonary rehabilitation. There are other studies that compared active cycle of breathing technique with autogenic drainage but there few evidences which prefer active cycle of breathing technique over any other airway clearance technique. The analysis of means of distance walked among groups in meters showed significant improvement. The post-treatment mean of six-minute walk test for week one was 101.3±82.4 while the post-treatment mean of six-minute walk test for week four was 234.3±123.3. So, there is a significant improvement in the functional capacity of patients during a first, second, third and fourth week of treatment. This study used only two measurement tools such as airway questionnaire and six-minute walk test.

The effectiveness of the intervention was measured through improvement in FEV1/FVC, FEV1, and FVC. This study showed that there was an equal level of improvement in FEV1, FVC and modified Borg scales. But FEV1/FVC levels have shown more improvement in a group of patients receiving active cycle of breathing technique than those who were performing the diaphragmatic technique with postural drainage. A systemic review found evidence for the effectiveness of active cycle of breathing technique in patients with chronic obstructive pulmonary disease and cystic fibrosis. The results showed increased sputum production during and up to one hour post active cycle of breathing technique in comparison with conventional chest physiotherapy.

V. CONCLUSION

This study concludes that the active cycle of breathing technique is very beneficial as an adjunct treatment for improving health-related quality of life and functional capacity of asthmatic patients. Recommendations are active cycle of breathing technique can be useful during cardio-pulmonary rehabilitation.

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An Observational Study of Active Cycle of Breathing Technique in Pneumonitic Patients

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Abstract-

Background*- A lung inflammation known as pneumonia primarily affects the tiny air sacs known as alveoli. Common symptoms include a combination of dry or productive cough, chest pain, fever, and breathing difficulties.*

Material and Method*: Six individuals of both sexes with mild to moderate pneumonia and a mean age of 40.020 13.600 were included in this study. Every patient underwent many sessions, or three times each week for a month-long active breathing cycle. The six-minute walk test and standardized airway questionnaire were used to collect data on functional ability and health-related quality of life before and after therapy. All six patients remained stable during the research.*

Results*: Following treatment sessions, the patient's functional capacity and health-related quality of life significantly improved, with means [104.382.4 for the first week, 137.6111.8 for the second week, 205.318130.5 for the third week, and 234.3123.3 for the fourth week], and the mean difference and six-minute wall test 3.121.2SD for the standardized airway questionnaire with a p-value [0.00] significant upon paired t-test.*

Conclusion*: Conclusion: Patients with mild to moderate pneumonia benefit greatly from the active cycle of breathing approach in terms of quality of life and functional capacity.*

I. INTRODUCTION

A lung inflammation known as pneumonia primarily affects the tiny air sacs known as alveoli[1]. There are a lot of different circumstances. The most prevalent causes of pneumonia are infections brought on by bacteria, viruses, and occasionally other microorganisms[2]. It is quite challenging to pinpoint the pathogen that is to blame. Chest X-rays, blood tests, and sputum culture may help confirm the diagnosis[2], but symptoms and physical examination are frequently the main determinants of the diagnosis[2]. According on how it was obtained, the illness might be categorized, such as community, hospital, or healthcare-associated pneumonia[3]. There are vaccines available to prevent specific types of pneumonia, including those brought on by the Streptococcus pneumoniae bacteria, linked to influenza, or associated to COVID-19[4]. Hand washing is one of the other preventative strategies.

Cystic fibrosis, chronic obstructive pulmonary disease (COPD), sickle cell disease, asthma, diabetes, heart failure, a history of smoking, a bad cough reflex (such as after a stroke), and a weakened immune system are among the risk factors for pneumonia[5,6,7].

Pneumonia has more than 30 different causes, which are categorized by the cause. The most common kinds of pneumonia include: Pneumonia has more than 30 different causes, which are categorized by the cause. The most common kinds of pneumonia include:

Bacterial pneumonia: - Many bacteria cause this kind. Streptococcus pneumoniae is the most prevalent. It typically happens when the body is compromised in some way, such as through disease, inadequate nutrition, ageing, or decreased immunity and the germs are able to enter the lungs. All ages can be affected by bacterial pneumonia, but if you misuse alcohol, smoke cigarettes, are physically weak, have just had surgery, have a respiratory condition or viral infection, or have a compromised immune system, your risk increases.

Viral pneumonia: - This type accounts for around one-third of all occurrences of pneumonia and is brought on by a variety of viruses, including the flu (influenza). If you have viral pneumonia, you can be more susceptible to developing bacterial pneumonia.

Mycoplasma pneumonia: - Atypical pneumonia is the name given to this variety, which has slightly different symptoms and physical indicators. Mycoplasma pneumoniae is the bacterium that causes it. It typically results in a broad, moderate pneumonia that affects people of all ages.

Other pneumonias: - Other, less frequent pneumonias may be brought on by different pathogens, like fungus.

The underlying reason determines the course of treatment. Antibiotics are used to treat pneumonia that is

thought to be caused by bacteria. The patient is typically hospitalized if the pneumonia is severe. If oxygen levels are low, oxygen treatment may be utilized[8].

Over 4 million people worldwide per year pass away from pneumonia, which affects roughly 450 million people worldwide[9] (7% of the population). The 20th century saw the development of antibiotics and vaccinations, which dramatically increased survival. Nonetheless, pneumonia continues to be the biggest cause of death in underdeveloped nations, as well as among the very young, the very old, and the chronically ill. The term "old man's friend" refers to pneumonia since it frequently reduces the amount of agony experienced by people who are already near to passing away.
A productive cough, fever with shaking chills, shortness of breath, a sharp or stabbing chest discomfort during deep breathes, and an accelerated pace of breathing are all common symptoms of infectious pneumonia. Confusion may be the most obvious symptom in older adults.

Fever, cough, and rapid or laboured breathing are the common signs and symptoms in children under five. Fever is not a highly specific symptom because it might be missing in old people, people with severe sickness, malnutrition, and many other common ailments. Moreover, toddlers under 2 months old typically lack a cough. Children may exhibit more severe signs and symptoms such as blue-tinged skin, a lack of thirst, convulsions, persistent vomiting, temperature extremes, or a diminished degree of consciousness.

Similar symptoms are frequently seen in pneumonia caused by viruses and bacteria. There are some causes that are linked to recognizable but general clinical traits. Abdominal pain, diarrhea, and confusion can accompany Legionella-related pneumonia. Rust-colored sputum is a symptom of Streptococcus pneumoniae pneumonia. Bloody sputum, frequently referred to as "currant jelly," can accompany pneumonia brought on by Klebsiella. Hemoptysis, or bloody sputum, can also be a symptom of lung abscesses, gram-negative pneumonia, tuberculosis, and acute bronchitis, which is more common. Mycoplasma pneumoniae-related pneumonia may coexist with joint pain, swollen lymph nodes in the neck, or an ear infection in the middle ear. Compared to bacterial pneumonia, viral pneumonia more frequently manifests as wheezing. Based on the notion that the way pneumonia presented foretold its underlying etiology, it was historically separated into "typical" and "atypical" forms. It is no longer stressed because the evidence does not support this distinction.

Infections primarily brought on by bacteria or viruses, and less frequently by fungi and parasites, result in pneumonia. Despite the fact that there are more than 100 different strains of infectious organisms, most instances are caused by a small number of these. Almost 45% of infections in children and 15% of illnesses in adults may be mixed infections with both viruses and bacteria[10]. Despite rigorous testing, a causal substance may not be identified in roughly 50% of instances. From January 2010 to June 2012, 2259 patients were identified in five hospitals in Chicago and Nashville who had radiographic evidence of pneumonia and specimens that could be tested for the pathogen responsible. This was part of an active population-based surveillance for community-acquired pneumonia requiring hospitalization. Respiratory viruses were unexpectedly found to be more frequently detected than bacteria in samples from the majority of patients (62%) than bacteria. To be more precise, 23% of people had one or more viruses, 11% had one or more bacteria, 3% had both bacterial and viral pathogens, and 1% had a fungal or mycobacterial infection. Streptococcus pneumoniae (in 5% of patients), influenza virus (in 6% of patients), and human rhinovirus were the most prevalent pathogens.

Allergens, air pollution, and other environmental pollutants are only a few of the environmental factors that have been linked to the onset and worsening of asthma[11]. Smoking is linked to a higher risk of asthma-like symptoms both during pregnancy and after birth. Both the onset of asthma and an increase in the severity of the condition have been linked to poor air quality brought on by environmental variables like ozone or traffic pollution[12]. Exposure to indoor volatile organic compounds may be an asthma trigger; exposure to formaldehyde, for instance, has a favorable connection[13]. PVC products that include phthalates have been linked to asthma in children and adults[14, 15]. Although being exposed to pesticides is associated with the onset of asthma, a cause and effect connection has not yet been proven[16, 17].

The presence of indoor allergens is linked to asthma[18]. Dust mites, cockroaches, animal dander (particles of fur or feathers), and mould are a few of the most prevalent indoor allergies[19, 20]. Dust mite reduction initiatives have been proven to have no effect on symptoms in sensitive individuals.

II. MATERIAL AND METHODS

Twenty individuals in all with mild to moderate pneumonia were included in this study. The patients range in age from 20 to 60. Forced vital capacity (FVC) more than 75% and forced expiratory volume 1 (FEV1) were used to classify moderate pneumonia. Functional abilities refer to a patient's capacity to carry out activities of daily living even when their symptoms are not improving. Active cycle

breathing (ACBT), the six-minute walk test, and the airway questionnaire (AQ) were the fundamental treatments used to diagnose and treat asthma patients. Airways are cleared using the active cycle breathing technique, which also helps to move pulmonary secretions from the lungs. Thoracic expansion, breathing control drills, forced expiratory technique with an open glottis, and control breathing is all part of it.

Each patient had received active cycle breathing technique in accordance with established procedure. The twenty-five minute treatment session included forced expiratory method, breathing control exercises, and chest expansion exercises. Each patient had a number of sessions, three times each week, for a breathing method active cycle. The airway questionnaire was created to measure quality of life in relation to health in order to assess the impact of active cycle breathing technique on lung function and QOL. A high score on the questionnaire, which has a total of twenty items with a scoring range of 0 to 20, indicates a low quality of life. A standardized airway questionnaire [AQ20] was utilized in this study to assess health-related quality of life. On the first day of the first session and on the last day of the final session after four weeks, the patient completed the questionnaire.

The conventional technique and a climate-controlled setting were used to conduct the six-minute walk test. Patients were told to walk down a 30 meter long, clearly designated hallway with a starting and ending point. Patients were instructed to stop if they experienced an emergency, such as chest pain, pressure in the chest, dyspnea, or calf cramps. The patient's functional capacity was evaluated using a testing technique called the six-minute walk test. The patient underwent the test twice during each session, and the pre- and post-treatment distances were measured in meters. The paired t-test was used to compare the levels before and after therapy.

III. RESULTS

In this study, six adult asthmatic patients, three females and three were males. The patients were treated with active cycle breathing technique as treatment. The age of patients was between 17-60 years.

In this study there is 6 patients have been taken and mean value is about 40.020 and the standard deviation-13.600 and all the patients' age group between 17 to 60 years.

It showed that mean age of patients was 40.020±13.600. The patient's functional capacity was measure to define mild to moderate pneumonia, the value of forced vital capacity [FVC] along with forced expiratory volume [FEV1] are 67.6 and 67.3 respectively. Further results showed that the quality of life of asthmatic patient was significantly improved and paired t-test results. Comparison of pre-treatment and post-treatment AQ20 scores:

AQ20Score for pre and post treatment	Mean	SD	Std. Error Mean	95% CI	T Value	D F	Sig.[tail]
	5.24	3.2	.21	2.4	12.5	38	00

This table shows pre-treatment and post-treatment score of AQ20. The result shows that p-value for comparison of AQ20vscore is 0.000. The result indicates significant improvement in post-treatment health- related quality of life. Active cycle breathing techniques employed to pneumonia patient were also assessed by six-minute walk test. The pre and post value of six-minute walk test for four weeks in one month is discussed below:

Comparison of Six minute walk test	Week 1		Week 2		Week 3		Week 4	
	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
	105.0	110.8	143.5	147.7	187.6	210.5	228.8	244.6

That means for post-treatment 6MWT were 104.3±82.4 for first week, 137.6±111.8 for second week, 205.3±130.5 for third week, 234.3±123.3 for fourth week. The result showed improvement in the distances walked by patients during their four-week treatment.

IV. DISCUSSION

The purpose of the current study was to ascertain how individuals with mild to moderate asthma responded to the active cycle of breathing approach. Pre- and post-treatment evaluation of the study included the six-minute walk test and the Airway Questionnaire 20. Six patients with mild to moderate asthma received treatment using the active cycle breathing technique three times per week for one month in an effort to enhance their functional ability and quality of life. . The results demonstrated a notable improvement in the six-minute walk test and airway questionnaire scores. Many studies that demonstrated improvements in six-minute walks with functional capacity concurred with the findings of this investigation. Active cycle breathing technique was found in a comparative investigation on cystic fibrosis patients to be just as effective as postural drainage. After an active breathing cycle, an increase in functional capacity was noted. [46] Postural drainage and ACBT both showed comparable effectiveness in a trial on patients with Bronchiactesis. In comparison studies, the effectiveness of the active cycle of breathing approach has been reported. In a study, individuals with Bronchiactesis of diverse origin were compared to the effectiveness of standard treatment with the active cycle of breathing approach. The examination of the average walking

distance between groups in meters revealed a noticeable improvement. Many different physiotherapy approaches are documented and used for pulmonary rehabilitation in addition to the active cycle of breathing technique. Several studies have contrasted active cycle breathing with autogenic drainage, although there are little indications that active cycle breathing is preferable to any other method of clearing the airways. The six-minute walk test post-treatment mean for week one was 101.382.4 whereas the post-treatment mean for week four was 234.3123.3. So, during the first, second, third, and fourth weeks of treatment, there is a noticeable increase in the functional capacity of patients. Only two measuring methods, the airway questionnaire and the six-minute walk test, were used in this investigation**.**

Improvement in FEV1/FVC, FEV1, and FVC were used to gauge how effective the intervention was. According to this study, the FEV1, FVC, and modified Borg scales all improved to the same degree. However, compared to patients who used the diaphragmatic technique with postural drainage, the FEV1/FVC values in a group of patients receiving active cycle breathing technique improved more. Evidence supporting the use of the active cycle of breathing technique in people with cystic fibrosis and chronic obstructive lung disease was discovered in a systemic evaluation. In comparison to traditional chest physiotherapy, the results showed that the active cycle of breathing approach enhanced sputum production during and for up to an hour after.

V. CONCLUSION

The active cycle of breathing technique is extremely helpful as an auxiliary treatment for enhancing the health-related quality of life and functional capacity of asthmatic patients, according to this study's findings. The active breathing cycle approach is advised for usage during cardiopulmonary rehabilitation.

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Physiotherapy Rehabilitation in Bell's palsy due to hemorrhagic stroke: A Case Study

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Abstract

The objective of this study was to define the role of physiotherapy in facial palsy due to hemorrhagic stroke. A case of Bell's palsy is presented, included the patient had grade III spasticity of facial muscles due to hemorrhagic stroke. She was successfully treated with combined physical therapy treatment including electrical muscular stimulus and KOBAT techniques. With therapy spasticity grade is improved. Facial muscles exercises help to gain the strength in muscles of facial expression, which are effected after hemorrhagic stroke.

Keywords: Bell's Palsy, spasticity, hemorrhagic stroke.

Introduction

Bell's palsy is a type of facial paralysis that results in an inability to control the facial muscles on the affected side.[1] It is characterized by paralysis of the lower half of one side of the face due to damage of upper motor neurons of the facial nerve. It affects all the muscles supplied by the facial nerve. They may include muscle twitching, weakness, or total loss of the ability to move one or rarely both sides of the face.[1] Other symptoms include drooping of the eyelid, a change in taste, pain around the ear, and increased sensitivity to sound. Typically symptoms come on over 48 hours. The cause of Bell's palsy is unknown.[1] It results from a dysfunction of cranial nerve VII (the facial nerve). The facial nerve controls a number of functions, such as blinking and closing the eyes, smiling, frowning, lacrimation, salivation, flaring nostrils and raising eyebrows. It also carries taste sensations from the anterior two-thirds of the tongue, via the chorda tympani nerve (a branch of the facial nerve). Because of this, people with Bell's palsy may present with loss of taste sensation in the anterior 2/3 of the tongue on the affected side.[2] Bell's palsy is the most common cause of one-sided facial nerve paralysis (70%).[2,3] It occurs in 1 to 4 per 10,000 people per year.[3] About 1.5% of people are affected at some point in their life.[4] It most commonly occurs in people between ages 15 and 60. Males and females are affected equally.

Material and Method

In this study, a patient with Bell's palsy due to hemorrhagic stroke. Patient with facial paralysis due to infection or malignancy were excluded from the study. In initial days, electrical muscular stimulus and KOBAT techniques was given two times a week, as a physiotherapy treatment. After two weeks, patient was examined by on the basis of signs and symptoms and by modified Ashword's scale. Assess the spasticity grade also. Facial muscles exercises such as air blow, chew the bubble gum, facial massage and facial exercises such as gently raise the eyebrow with the help of fingers, draw the eyebrows together, frown, gently try and move corners of mouth outwards, keep the movement the same on each side of face, lift one corner of mouth etc. Exercises which help close the eye, i.e. look down, and gently place the back of index finger on eyelid, to keep the eye closed. With opposite hand gently stretch the eyebrow up and working along the eyebrow line. This will help relax the eyelid and stop it from becoming stiff. Gently press the eyelids together. Narrow the eyes, if looking into the sun. These facial and eye exercises were helped her in the treatment protocol.

Results

In this study, the patient was female had left sided facial palsy. Spasticity grade was III. Before treatment the frequency of grade of spasticity is 38.0%. After treatment the percentage of spasticity grade was improved. Facial muscles exercises help to gain the strength in muscles of facial expression, which are effected after hemorrhagic stroke. Air blow exercises and chew the bubble gum is also beneficial in this patient, because lower muscles are not working previously and the patient feels that something if filled in lower jaw muscles.

Discussion

This study showed that physiotherapy treatment improved the facial muscles after Bell's palsy. It also showed the efficacy of massage, KOBAT techniques and different exercises. It has been recommended to use heat therapy like hot packs and infra red rays for facial muscles prior to electrical stimulations, massage and exercises.[5] There is evidence that feedback training and rehabilitation program is a clinically successful treatment option for patients with facial nerve paresis. Active exercises by patient, in front of mirror improve facial muscles function[6] A study concluded that electrical stimulation appeared to speed up the recovery,[7] some suggest use of electrical stimulation for its interference with re-innervations and also due to its cost.[8] Further, it was found that electrical stimulation of muscles increased muscle neutrophin-4 that stimulates sprouting of axons and muscle re-innervations and early use of electrical stimulation might maintain motor function in nerve injury and might improve functional recovery.[9]

It is evident from the literature that efficacy of different physical modalities in rehabilitation of facial muscles is controversial.[10] Besides, it was mentioned that several physical and therapeutic modalities, including exercises and massage were recommended in treatment of Bell's palsy but there are very few clinical trail to support their effectiveness.[11] One thing should keep in mind that there is a chance of spontaneous recovery without any treatment and many factors contribute in prognosis of Bell's palsy.[12]

Conclusion

The present case study was carried out from the female, at the age of 22 with the left sided facial palsy. Exercises such as facial massage and manual therapy help to gain the strength in muscles of facial expression, which are affected after hemorrhagic stroke. Physiotherapy improved spasticity considerably.

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Original Research Article

Chest Mobility Exercise with Staked Breathing Versus Chest Mobility Exercises with Incentive Spirometery On Chest Expansion with Pleural Effusion Patient: A Comparative Study

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ABSTRACT

Background: Pleural effusion is one of the commonly seen respiratory conditions in India with approximately 1 million people being diagnosed each year. Twenty to forty percent of hospitalized patients with bacterial pneumonia develop pleural effusion. In India unlike western countries, tuberculosis pleura effusion is common. The pleural cavity is involved in approximately 5% of all patients with tuberculosis. Since there was no literature regarding the effectiveness chest mobility exercise with staked breathing or chest mobility exercises with incentive spirometery in pleural effusion. There was a need to find out as to which approach are the best ones to implement.

Objective: To compare the efficacy of chest mobility exercise with stacked breathing versus chest mobility exercise with incentive spirometery on chest expansion in patients with pleural effusion.

Materialsand Method: 20 patients with pleural effusion were selected by easy sampling and randomly assigned into two groups(10patients each groups). Group A received chest mobility exercises and intensive spirometery and group B received chest mobility exercises and stacked breathing. Both groups were instructed to perform the intervention 3 time per day, 8 to 10 time per session for one week. Chest expansion was measured by thoracic flow cytometry before and after one week of intervention.

Result: In group Achest expansion increase from 2.68 to 2.87 which was statistically significant (P value < 0.0023). In Group B the chest expansion increases from 2.94 to 3.09 which was not statistically significant (P value < 0.216).

Conclusion: It was concluded from the result that both chest mobility exercises with intensive spirometery and chest mobility exercise with stacked breathing are equally effective in improving the chest expansion in subject with pleural effusion.

KEYWORDS: Pleural effusion, Chest mobility exercises, Incentive Spirometry, Stacked breathing, Thoracic flow cytometry.

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INTRODUCTION

A pleural effusion is accumulation of excessive fluid in the pleural space, the potential space that surrounds each lung

caused by disturbed osmotic or hydrostatic pressure in the plasma [1,2].Under normal condition, pleural fluid is secreted by the parietal pleural capillaries at a rate of 0.01 milliliter per kilogram weight per hour, and is cleared by lymphatic absorption leaving behind only 5-15 milliliters of fluid, which helps to maintain a functional vacuum between the parietal and visceral pleurae. Excess fluid within the pleural space can impair inspiration by upsetting the functional vacuum and hydrostatically increasing the resistance against lung expansion, resulting in a fully or partially collapsed lung.

Various kinds of fluid can accumulate in the pleural space, such as serous fluid (hydrothorax), blood (hemothorax), pus (pyothorax, more commonly known as pleural empyema). When unspecified, the term '' pleural effusion'' normally refers to hydrothorax. A pleural effusion can also be compounded by a Pneumothorax, leading to a hydropneu mothorax.A pleural effusion may be transudative or exudative. A transudative develops when fluid from the pulmonary capillaries moves into the pleural space. The fluid is thin and watery, containing a few blood cells and little protein. The pleural surfaces are not involved in producing the transudate. In contrast, an exudates develops when the pleural surface are diseased. The fluid has high protein content and a great deal of cellular debris. Exudates are usually caused by inflammation, infection or malignancy [3].

The common transudative causes of pleural effusion are left ventricular failure, cirrhotic liver disease, peritoneal dialysis, hypoalbuminaemia, nephritic syndrome, pulmonary embolism, hypothyroidism, and mitral stenosis, and the common exudative cause are parapneu-monic effusion, malignant neoplasm, pulmonary embolism, rheumatoid arthritis, pancreatitis, autoimmune disease etc [4].

When a pleural effusion has been determined to be exudative, additional evaluation is needed to determine its cause, and amylase, glucose; pH and cell count should be measured. Red blood cell counts are elevated in cases of hemothorax (for example after heart surgery or hemothorax from incomplete evacuation). Amylase levels are elevated in cases of esophageal rupture, pancreatic pleural effusion, or cancer. Glucose is decreased with cancer, bacterial infections, or rheumatoid pleuritis. PH is low in emphysema (<7.2) and may be low in cancer.

If cancer is suspected, the pleural fluid is sent for cytology. If cytology is negative, and cancer is still suspected, either a thoracoscopy, or needle biopsy of the pleura may be performed [5].The most common causes of exudative pleural effusion are bacterial pneumonia, cancer, viral infection, and pulmonary embolism. Other common cause is after heart surgery, when incompletely response that causes exudative pleural fluid. Conditions associated with exudative pleural effusion [6].Parapneumonic effusion due to pneumonia, malignancy, infection, trauma, pulmonary infarction, pulmonary embolism, autoimmune disorder, pancreatitis, Ruptured esophagus, rheumatoid pleurisy, and drug-induce lupus. Pleural effusion may also occur through medical or surgical interventions, including the use of medications, coronary artery bypass surgery, abdominal surgery, endoscopic variceal sclerotherapy, radiation therapy, liver or lung transplant, insertion of ventricular shunt as a treatment method of hydrocephalus [7,8], and intra or extra vascular insertion of central lines.

The physiotherapy management of pleural effusion would include breathing exercises, localized expansion exercises, belt exercises; positioning etc [9]. Chest mobility exercises are effective in improving the mobility of the chest wall, trunk, shoulders, increasing ventilation on that side of the chest, emphasizing depth ofinspiration and controlling expiration. These exercises areeffective in improving the chest expansion in subjects withpleural effusion. Study [10]concludes that chest mobility exercises have resulted in betterment ofrespiratory functions such as reduction in dyspnea level andsignificant improvement in chest expansion whenimplementing a specific stretching protocol in complicationssuch as secretion retention and pleural effusion following apercutaneous pig tail nephrostomy

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[11].Incentive spirometery has been found to be appropriate for lungre-expansion following major thoracic surgery [12],but it is not known whether Incentive spirometry can producesimilar kind of re-expansion in subjects with unilateral pleuraleffusion. Also, the Breath stacking technique has shown to beeffective particularly in uncooperative patients followingabdominal surgeries [13] and in mobilizinggreater lung volumes17 and in achieving and sustaining deepinspiration, even in uncoached patients 14]. But itis not known whether it will have similar effects in patientswith unilateral pleural effusion. Therefore, there exists a needto compare the effectiveness of chest mobility exercises withincentive spirometery and chest mobility exercises with stackedbreathing on the chest expansion in patients with unilateralpleural effusion.

MATERIALS AND METHODS

The source of data wasLeelamani Hospital, Kanpur. 20 patients with pleural effusion were collected by conveniencesampling. Patients of both genders in the age group of 20-50 years, diagnosed as unilateral pleural effusion with asymmetricalchest expansion were included in the study. However, patients with orthopaedic conditions, hypertension, malignancy, cognitive impairments, and pleural effusion due to transudateconditions like liver cirrhosis, CCF etc. and those who refusedwere excluded.After getting ethical clearance subjects were enrolled in thestudy. Patients with unilateral pleural effusion were recruitedfrom the medical ward of the hospital. Patients were selectedbased on the inclusion and exclusion criteria. Following aninitial assessment the patients were assigned to one of the twogroups by block randomization. After randomizing the patientto one of two groups, before the intervention chest expansion was measured by Thoracic flow cytometry [15].

Basal expansions were determined byusing a tape measure as it is known that pleural effusionaccumulates in the lower zones. Each measurement wasobtained after maximal expiration followed by maximuminspiration and another maximal expiration. Measurements were taken twice and the mean of the two values wasrecorded.Group Areceived chest mobility exercises with incentivespirometry [16]and the AARC [17].Group Breceived Chest mobility exercises with stackedbreathing according to guidelines given by Kisner (Milojeviæ *et al*., 2003) and breath stacking techniqueexplained by providence care. Both groups were instructed to perform the intervention 3times per day, 7-8 times per session for one week. Thoracicflow cytometry was repeated after one week.Data analysis was performed by SPSS. Alpha value was set as 0.05. Paired t test was usedto find out significant differences for the chest expansionwithin the groups. Unpaired t test was used to find outsignificant differences for the chest expansion between thegroups.

RESULTS

Data are mean ± standard deviation. In group A the meanage was 37.50 and sd was 5.86 and in group B the mean agewas 38.36 and sd is 6.20 which is not statistically significant (p value greater than 0.631). In group A there were 6 malesand 7females, in group B there were 7 males and 6 femaleswhich was not statistically significant (p value greater than0.604). In group A there were 9 right sided and 4 left sidedpleural effusion and in group B there were 8 right sided and 5left sided pleural effusion which was statistically notsignificant (p value greater than 0.604) In summarydemographic variables were homogeneous between groups.

Table 1: Base line data for demographic variables.

S. No.	Variable	Group A	Group B	P value
1	Age	37.50±5.86	38.36±6.20	>0.631
2	Gender	6/7	7/6	>0. 604
3	Side	9/4	8/5	>0.604

Table 2: Baseline Data for outcome variables.

S. No.	Variable	Group A	Group B	P value
1	Upper zone	0.18±0.41	0.14±0.22	>0.725
2	Middle zone	0.44±0.42	0.68±0.22	>.024
3	Lower zone	0.47±0.41	0.75±0.58	>0.110

Data are mean ± standard deviation. In group A the mean upper zone chest expansion was 1.29 and sd was 0.41, and in group B it was 0.14 and sd was 0.22 which was not

statisticallysignificant (p value greater than 0.725). In group A the mean middle zone chest expansion was 0.44 and sd was 0.42, and in group Bit was 0.68 and sd was 0.22 which was not statisticallysignificant (p value greater than 0.024). In group A the mean lower zone chest expansion was 0.47 and sd was 0.41, and in group B it was 0.75 and sd was 0.58 which is not statisticallySignificant (p value greater than 0.110). In summary theoutcome variables were homogeneous between groups.

Table 3: Pre post difference with in group A.

S. No.	Variable	Pre	Post	P value
1	Upper zone	0.18±0.41	0.20±0.40	>0.053
2	Middle zone	0.44±0.42	0.46±0.42	>0. 078
3	Lower zone	0.47±0.41	0.66±0.41	<.0001

Table 4: Pre post difference with in group B.

S. No.	Variable	Pre	Post	P value
1	Upper zone	0.14±0.22	0.50±0.26	<.0001
2	Middle zone	0.68±0.22	0.71±0.23	>.003
3	Lower zone	0.75±0.58	1.06±0.56	<.0001

Table 5: Mean difference between groups.

S. No.	Variable	Group A	Group B	P value
1	Upper zone	0.20±0.40	0.50±0.26	>.056
2	Middle zone	0.46±0.42	0.71±0.23	>.020
3	Lower zone	0.66±0.41	1.06±0.56	<.080

However when comparing between groups, the mean increase in upper zonechest expansion in group A was 0.20 with sd 0.40 and in group B it was 0.50 with sd 0.26 which was not statisticallysignificant (p value greater than 0.056). Mean increase in middle zone chest expansion in group A was 0.46 with sd 0.42 and in group B was 0.71 with sd 0.23 which was not statistically significant (p value greater than 0.020). Mean increase in lower zone chest expansion was 0.66 with sd 0.41 in group A and in group B it was 1.06 with sd 0.56 which was statistically significant (p value less than 0.080).

DISCUSSION

The objective of this study was to compare the efficacy ofchest mobility exercises and incentive spirometer with that ofchest mobility exercises and stacked breathing on chestexpansion in subjects with unilateral pleural effusion. Group Awhich has undergone chest mobility exercises with incentives pirometer has shown statistically significant increase in chestexpansion in the lower zones. Group B which has undergonechest mobility exercises with stacked breathing has shown statistically significant increase in chest expansion in the upperand lower zones. However, results did not show any statistically significantdifference between group A and group B.A study done byVikram *et al* who evaluated the effects of chest mobility exercises as an adjunct modality in post operative pulmonarymanagement and concluded that chest mobility exercises canenhance the chest wall elevation, thus increasing expansion [10].

In the present study chest mobility exercises were carried out in both the groups. This could haveresulted in equal improvement within group for lower zonesand since both groups have undergone chest mobility exercisesthere was no difference between groups. Another possiblemechanism could have been an equivalent increase in thetrans-pulmonary pressure both during incentive spirometry ingroup A and stacked breathing in group B because of whichthere was no statistically significant difference between thegroups for lower zones. This study has many limitations. Length of hospital stay and the medications varied for eachindividual. BMI was not considered which could haveinfluenced the study because if the patient is obese the chestexpansion is restricted. Small number of subject with unilateral pleural effusion was taken in each group, whichdecreases the applicability to whole populations. There was nomethod undertaken in the study to ensure that the subjectperform regular exercises without fail on a regular basis asthere was no reliable and valid method found to ensure theirregular follow up or to keep a check on their compliance toexercise.

CONCLUSION

The study concludes that both the techniques were equallyeffective in improving the chest expansion in subjects with unilateral pleural effusion.

Conflicts of interest: **None**

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UGC CARE Group 1

A CASE-STUDY OF NON-SPECIFIC RIGHT SHOULDER PAIN WITH THE EFFECT OF LIVER MOBILITY AND MOTILITY

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Abstract

Background: Shoulder problems including pain, are one of the more common reasons for physician visits for musculoskeletal symptoms. The shoulder is the most movable joint in the body. However, it is an unstable joint because of the range of motion allowed. This instability increases the likelihood of joint injury, often leading to a degenerative process in which tissues break down and no longer function well. Shoulder pain may be localized or may be referred to areas around the shoulder or down the arm. Other regions within the body (such as gallbladder, liver, or heart disease, or disease of the cervical spine of the neck) also may generate pain that the brain may interpret as arising from the shoulder. The pain and disabilities associated with shoulder pain can have a large impact on individuals and their families, communities and healthcare system affecting daily functioning and ability to work. It is the third most common musculoskeletal complaint presenting to physical therapy. **Objective:** Reducing the non specific right shoulder pain and improve the range of motion using an osteopathic approach. **Material & Methods**: The study was done on two patients aiming to reduce their right shoulder pain and mild restriction of shoulder rotation movement; we use visceral manipulation technique especially liver technique using liver for investigation and treatment purpose. **Results**: We found reduce the pain and improve range of movement of right shoulder after 15 min with the visceral manipulation techniques the approach is done for three times a week for two month.

Keywords: Shoulder pain, Disabilities, visceral manipulation, osteopathy.

Introduction

Shoulder joint is a complex joint consisting of glenohumeral, acromioclavicular, sternoclavicular, scapulothoracic and the articulation between coracoacromial arch and greater tuberosity. Glenoid cavity is a part of a larger sphere with the angular value of about 75 degree, where head of humerus is almost half of a smaller sphere with angular about 150 degree. The incidence of shoulder pain in community settings is high, estimated to be 11.2 per 1000 person-years .The liver is covered by the diaphragm that separates it from the lungs . The pain from diaphragm can go to the right shoulder. Some time there may be pus or blood that collects between the liver and the diaphragm and this then may produce right shoulder pain. Gallstones are one of the

most common medical problems. They can cause acute or chronic cholecystitis and result in surgery. Some time there may be pain radiating to the right scapula region and right shoulder together with right upper quadrant pain in these patient. It is therefore important to obtain a detail history from patients presenting with shoulder pain and determine treatment after pinpoint the underlying disorder by taking the physical examination findings, lab test, result and the result of any consultation are necessary in to account. We aimed to evaluate whether there was underlying gallbladder- related pathology in patient presenting to orthopedic out patient with right shoulder pain in this study. This type of patient during physical examination not shows any local tenderness of right shoulder joint. Because pain is not due to local region, it is due to visceral organ. Usually if you have a shoulder problem like a pulled muscle or osteoarthritis, moving the shoulder may make the pain better or worse. But if u have referred shoulder pain, you won't feel any difference if u move the shoulder. Innervation of liver and right shoulder is same, and phrenic nerve (Motor Nerve) innervate the shoulder capsule, diaphragm, and both layer of peritoneum (parietal and visceral).

Osteopathy has developed in to osteopathic medicine , now encompassing the appropriate use of pharmaceuticals, Osteopathic medical practitioners follow accepted methods of physical diagnosis and surgical diagnosis and treatment , including additional training in the evaluation and treatment of the neuro musculoskeletal system, osteopathic medicine still has its roots deeply seeded in four general principles(5).

Case Representation:

Two patient came to us both are having shoulder pain without any local tenderness. And patient having no history of trauma. Patient taken some medicine for abdominal pain due to liver problem.

Method for Treatment:

The liver is a heavy organ weighing on average between 1-2.5kg (2- 5.5lbs). Highly vascularized on as much as 1.5 liters of blood per minute passes through it. The liver serving as a vehicle for discharging strong emotions. The right triangular ligament, coronary ligament and left triangular ligament connect to the diaphragm. The falciform ligament divides the liver in to right and left lobe which is connect to the anterior abdominal valve and diaphragm. Organ can have sliding surface allowing them to articulate one with the other. A ligament support system attaching them to back body wall.

In the visceral manipulation technique apply only 15 minute for two time a week for 1 month as follow:

- Initially check the shoulder movement for observe the barrier (flexion , extension ,internal rotation, external rotation) Then apply the motility technique of liver very gentel way. After apply the technique see the response. Place one hand over the poster-lateral part of the chest at 4th and -5th intercostals space and other hand anterior supeormedial aspect of the chest at 5^{th} and 6^{th} intercostals space. Than feel the movement of the liver and observe the direction of restriction ,After assess the movement apply the assesstence medial posterior lat and inferior direction.
- Second approach liver mobility through Direct Subscostal approach TO THE Liver pushing the central part of liver posterior superior it should move 2 cm in the direction of push This manipulate

hepatorenal ligament by applying the same push towards the opposite direction of the trunk bending will manipulate right and left triangular ligament and also lifting the inferior border of liver with sudden fall will manipulate the coronary ligament.

- Then assess five sphincter for observe the pattern clockwise ,anticlockwise motion or freeze sphincter. After assessment I found sphincter of oddi is anticlockwise motion than correct this dysfunction.

Result:

Before apply the treatment technique the chief complain of pt is shoulder pain with mild stiffness. But after four initial settings of treatment patient feel 30% better in pain and improve the range of motion. Progressively after eight visit the symptoms of shoulder pain reduce 70% and stiffness reduce about 80 %.

Discussion :

Visceral mobility is the movement of the viscera in response to external forces . Voluntry movement , or involuntary movement, such as diaphragm with respiration of the heart beating, create the use external forces that push and pull on the viscera. There are a few basic concept about visceral manipulation. All organ have motility and mobility. The mobility of an organ is the way it move—a mechanical concept.

The viscera have an intrinsic active motion which we call motility. Visceral motility is perceptible to the hand but requires an educated sense of touch. It is kinetic expression of tissue in motion. For the most part, when assessing the viscera, each organ move in phases towards and away from the axix of body. Expir is the movement of an organ closer to the median axis and inspire is the movement of an organ away from it.

When applying visceral manipulation, initially started by general listening and local listing. This is where, in a matter of seconds, an assessment is made as to where the body is asking for attention once the fix the patient problem use the any other technique which is suitable for the patient like motility, mobility or any organ specific approach.

After proper physical assessment of patient apply the direct approach, indirect approach and correct the pattern of abdomen sphincter .Depending on the patient history and physical findings, the physician may choose to introduce forces in any of the above styles(3). The rational for implementing these relates to the measure components of the dysfunction and the principal being utilized to attain the most significant improvement(5). direct approach means treat the affected part directly through the motility method . Indirect approach means relese the fascia arround the affected organ .

"A system of diagnosis and treatment directed to the viscera to improve physiologic function ; typically the viscera are moved toward there fascial attachments to a point of fascial balance ;also called ventral techniques ."

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Effectiveness of cryotherapy and dry needling associated with myofascial trigger points associated with plantar heel Pain: Case study

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ABSTRACT

Background: Plantar fasciitis is also known as policeman's heel, there is inflammation of tendon which connects heel to the toes. It usually affects middle aged as well as older adults. The study was design to explore the efficiency of dry needling along with traditional therapy on foot pain and dysfunctions in patients with plantar fasciitis.

Method: A single case was randomly allocated equally into an experimental. she received dry needling once weekly for two weeks (14 days); cryotherapy for15mins per day for 1st week, ultrasound therapy (pulsed mode, 1.5 MHz) andthe needle was left in position for about 3 minutes. Dry needling was performed twice weekly for 2 weeksand intermittent passive stretching only. She was assessed on the first day before the intervention then reassessed on the 7th day and 14th day post intervention for foot pain and disability using variables of Visual Analogue scale (VAS) and Foot and Ankle disability index (FADI).

Results: After the treatment, subject's VAS and FADI significantly improved with the help of treatment of cryotherapy and dry needling with myofascial trigger points associated with plantar heel pain two weeks (14 days). Significantly the patient had continued decreases in pain that was measured 2/10 on VAS, this was a decrease from the original pain. Functional outcomes, as measured by the FADI, demonstrated improvements as well. The FADI scores improved from an initial 41 to 88 on the FADI, representing a minimal detectable change of ±4.48[29] ROM increase continued, for hip external rotation an increase of 10° and 8° of dorsiflexion from baseline which was initially 2 degrees. Hip internal rotation ROM did not vary significantly as expected. Return to functional activity started after 11th day of treatment protocol.

Conclusion: This case report illustrates the use of DN and home exercises to facilitate a favourable outcome in resolving persistent PF. These results indicate that DN could be a useful adjunct therapy to a home-based training program, allowing patients to resolve their heel pain. The DN myofascial sequence seemed to help this patient with a history of piriformis syndrome prior to the PF diagnosis. Further research is warranted to determine the utility of this type of DN technique for treating PF.

Key words: Trigger point,Dry Needling, Foot pain, Foot& Ankle Disability Index, Plantar fasciitis,

INTRODUCTION

Plantar fasciitis is the result of collagen degeneration of the plantar fascia at the origin, the calcaneal tuberosity of the heel as well as the surrounding perifascial structures.[1]Plantar fascia is helpful to maintain the biomechanics of foot, helpful to main the arch of the foot . It acts as a shock absorber. The diagnosis containing the segment "itis," this condition is notably characterized by an absence of inflammatory cells[2] [1] The inflammationat the ankle joint cause plantar fasciitis by which person has difficulty in walking ,and deposition of calcium and phosphorous which commonly called calcaneal spur . Among the three bands of plantar aponeurosis the central band originates from the medial tubercle on the plantar surface of the calcaneus where it travels toward the toes dividing into 5 slips prior to reaching metatarsal heads.

A recent systematic review concluded there is "insufficient evidence to suggest the use of ice/cryotherapy improves clinical outcomes."[52] As such, the acronyms ICE, RICE,[53,54] PRICE and POLICE[5] have recently been questioned because of their inclusion of cryotherapy.[52,53,54,55,56] Several studies have reported reductions in swelling with cryotherapy secondary to vasoconstriction and post capillary venous flow.[46-49] However, a correlation between Reduction of skin temperature reductions and systemic vasoconstriction have only been observed following hyperbaric gaseous cryotherapy and not topical ice pack application.[30] A systematic review concluded that icing may decrease motor performance and reverse lymphatic flow, thereby increasing extra vascular inflammation.[31] Deep dry needling (DDN) is an invasive technique used to reduce the hyperirritability of myofascial trigger point.The muscle fascia has trigger points which can be stimulated by Deep dry needling technique to reduce tender points in musclefascia junctions this procedure can be applied for both superficial and deep tissue levels thereby reducing the hyperirritable

points in skeletal muscles thus relieving the pain.Dry needling is typically used to treat muscles, ligaments, tendons, subcutaneous fascia, scar tissue, peripheral nerves, and neurovascular bundles for the management of a variety of neuromusculoskeletal pain syndromes. [34, 35-37]

Case Presentation: The patient was 38-year-old female on working on a post of AssistantProfessor due to which she is in state of prolonged standing. An Orthopaedician diagnosed her with PF and kept her on medication, the pain symptoms revived back as soon as she left the medicines. When the pain acted as in hindrance to her ADLs,so she was referred for physiotherapy where she was asked for an X-ray which revealed calcaneal spur. Pain at the time of assessment was 6/10 on VAS scale with gradual mode of onset, Patient also linked her painwith morning stiffness due to which foot ankle disability index was also required to be filled by the patient as well as range was also recorded.

After immediately getup in the morning pain is 9/10 at left foot after half an hour it has 6/10 on left side of foot, picking type pain present if footwear is worn. Without footwear, she complained of shooting pain in every step.

Intervention: -To determine what muscles will be treated, muscles fulfilling the following two criteria will be selected: (a) muscles that typically refer pain to the heel [33] and (b) muscles that can be directly palpated or that can be needled with precision and safety without ultrasound guidance. The clinician will perform a physical examination to find MTrPs following Travell and Simons' criteria: (1) the presence of a taut band and (2) identification of an exquisite spot tenderness or a nodule [33]. A flat palpation or pincer palpation technique will be used to palpate the MTrPs, depending on the muscle being assessed. The muscles to be treated will be the soleus, gastrocnemius, quadratus plantae, flexor digitorum brevis, and abductor hallucis. Intervention was given accordingly after assessing the Patient pain that was 6/10 on VAS scale and had completed the Foot and Ankle Disability Index (FADI). The FADI was designed to assess functional limitations related to foot and ankle conditions.[17] The FADI is a valid and reliable measure of foot and ankle disability.[17–19] The FADI is a patient-completed instrument that consists of the "FADI" subscale (24 scored items) in which the response options are presented as 5-point rating scales (range = 0–4). Scores for each subscale range from 0% (most disability) to 100% (least disability).[17] Goniometer was used to take the range of motion of the ankle joint.

The patient was seen for 12 visits over 14 days(2Weeks). The patient demonstrated continuous progress with each consecutive visit, with improvements in outcome scores and functional progress, as shown in Table 1. Seven days after initial DN treatment and 7 days after the second DN treatment, all outcomes were assessed. The patient was already demonstrating decreases in pain and first-step pain (6/10) as measured on the VAS. This was a decrease from the original pain. Function, as measured by the FADI, demonstrated improvements as well. The FADI scores improved from 41 to 63 on the FADI, representing a minimal detectable change of ±4.48.[29] These changes in pain and function were also accompanied by increased ROM of 6° in hip internal rotation, 9° of hip external rotation, and 6° of dorsiflexion.

TABLE 1: Patient/Outcomes Measures

Measure (All taken pre-treatment)	Pre-test	Post-test 1	Post-test 2
VAS, (1-10)			
Pain at Rest	6	5	2
Pain in First step	9	7	2
FADI	41	63	88
ROM			
Hip internal rotation	24°	30°	30°
Hip external rotation	28°	37°	40°
Dorsiflexion	2°	8°	10°

Abbreviations: FADI, Foot and Ankle Disability Index; ROM, range of motion; VAS, visual analogue scale.

Cryotherapy: ice pack -15 mins /day for1st week

Dry needling: The needle was left in position for about 3 minutes. Dry needling was performed twice weekly for 2 weeks

Ultrasound therapy: pulsed mode1,5 MHZ

A therapist who was experience in Active MTrP examination followed the identification procedures outlined by insertion, the needle was withdrawn partially and pressed in repeatedly to produce an appropriate response such as a local twitch, a dull ache, heaviness, distension, pressure, and/or a reproduction of the patient's symptoms. If an appropriate response was not elicited, the needle was removed; and the patient was re-examined. 2 If the patient was sensitive to the needle, the manipulation was decreased. The needle was left in position for about 3

minutes. Dry needling was performed twice weekly for 2 weeks, and both sides of the lower extremity were treated. During the DN treatment, calf muscle stretching and postural corrections of sitting and standing positions were taught to the patient. The patient was asked to walk, and he felt an immediate reportable reduction of pain with a feeling of lightness in both sides. After 2 weeks of DN, there were a 60% to 70% reduction in pain (3 for the right side and 2 for the left side), dramatic increase of the pressure pain threshold, and complete relief of pain (Table 1). He reported a sense of well-being and was able to fully return to his job. No adverse effects of DN such as bruising and severe pain were observed.

After the final treatment, 14 days post initial assessment, outcomes were assessed again. Progress had been continued; the patient had continued decreases in pain that was measured 2/10 on VAS, this was a decrease from the original pain. Functional outcomes, as measured by the FADI, demonstrated improvements as well. The FADI scores improved from an initial 41 to 88 on the FADI, representing a minimal detectable change of ±4.48[29] ROM increase continued, for hip external rotation an increase of 10° and 8° of dorsiflexion from baseline which was initially 2 degrees. Hip internal rotation ROM did not vary significantly as expected. Return to functional activity started after 11th day of treatment protocol.

DISCUSSION

The Foot and Ankle Disability Index (FADI)[38-41] is a region-specific self-report of function, firstly described in 1999 by Martin et al. The foot and ankle disability index were designed to assess functional limitations related to foot and ankle conditions. Hale and Hertel [38] advocate the use of the FADI and FADI Sport self-report instruments in clinical care and research applications in young adults with CAI.Plantar fasciitis is a common problem who are working in long standing position, it arises the health problem and causing heel pain. Plantar fasciae get to inflamed and the condition is known as Plantar fasciitis.

Above given treatment relief the patient in two sessions of dry needling during the 14 days of treatment. A problem was raised during the assessment when patient tried to fill the FADI FORM. She was confused with it. during the treatment session cryotherapy given immediate effect with ultrasoundtherapy & dry needling. After talking treatment patient got relief and abled to go her job. This index helpful to take assessment of the plantar fasciitis's patient. Dry needling had good effects, because after the dry needling patient felt lightness in the foot and pain reduced. During conduction of the study there was a potential confounder that the patient was having sedatives and pain relief medications at the starting phase of the treatment but due to ethical considerations the patient was asked to withdraw medications on initiation of physiotherapeutic regime.

The patient was very cooperative and helpful throughout the treatment procedure however, there were some drawbacks which included that, since the patient was not aware about the dry needlingprocedure and thus, she was a bit anxious about the whole treatment procedure. Thus, it is highly recommended that patients should be given proper counselling for such invasive procedures. The study also has some advantages or salient features which includes that this will be the first preliminary study to evaluate the effects of this treatment protocol on such patients. It is necessary for the researchers and students to understand the physiology and biomechanics behind the working of the treatment protocol. Since it yielded very significant results in single patient it is advised that further studies could be conducted and reported to provide enough evidence for generalization of these results. Also, the study indicates strong evidence for evaluating the reliability and reproducibility of this protocol.

CONCLUSION

This case report illustrates the use of DN and home exercises to facilitate a favourable outcome in resolving persistent PF. These results indicate that DN could be a useful adjunct therapy to a home-based training program, allowing patients to resolve their heel pain. The DN myofascial sequence seemed to help this patient with a history of piriformis syndrome prior to the PF diagnosis. Further research is warranted to determine the utility of this type of DN technique for treating PF.

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Assessment Of Refractive Errors In School Children Among Rural Areas Of District Gonda – An Observational Study

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ABSTRARCT - The purpose of the study was to determine the prevalence of refractive error among senior secondary school students in rural communities of district Gonda. A community based cross-sectional study was done by randomly selected senior secondary school children from 7^{th} – 12^{th} standard of rural areas of district Gonda, UP. Informed and written consent was obtained from the senior secondary school where the data is collected. Between September 2022 to December 2022, 1650 students from rural areas, participated in the community based cross sectional survey. The principal of the school granted permission for the screening of the students. Participant with dry eye, accommodative problems, squint, iris coloboma, corneal opacity, watering eye, amblyopia were excluded from the study. Myopia was identified in 333 (68.6%) of the students, whereas hypermetropia 17 (3.50%) and astigmatism was 135 (27.83%) present. Myopia was determined to be the most prevalent refractive error, followed by astigmatism and hypermetropia. It can be reduced with prevalent screening of school age children and the implemented by glasses (spectacles).

Keywords – Ametropia, Refractive Errors, Myopia, Hypermetropia, Astigmatism, Observational Study.

INTRODUCTION

Ametropia is a type of refractive error condition. It is defined as when parallel rays of light coming from infinity are focused either in front or behind the retina, when accommodation is at rest. The most common refractive error are myopia, hypermetropia and astigmatism, eye problems can cause impaired vision, double vision, headache and fatigue. Eyeglass [spectacles] are the most convenient and safest way to improve vision. In myopia, light are focused in front of the retina while in hypermetropia, parallel rays of light are focused behind the retina. In astigmatism, occurs when an eye can not equally focus light onto the retina.

Refractive Error (RE) is a major public health issue that affects a large ratio of children. Uncorrected refractive error (URE) is an avoidable cause of visual impairment. It is the most common cause of vision impairment and the second leading cause of blindness in the globally. Recent data estimate that about 90% of people with URE are living in rural and low-income countries. Early investigation and treatment can reduce the further deterioration (defect) and the risk of impaired vision.

Studies have found that both hereditary and environmental factors play essential roles in the progression of refractive error. Because early visual defects are usually asymptomatic, uncorrected RE can negatively affect the learning capability of schoolchildren as well as their social and mental development. Uncorrected refractive defects can cause short and long term effect in adults and children, including loss of educational and employment possibilities. Children are generally unaware of the problem and do not complain. This requires early detection and treatment of ocular problems.

Thus, the current study, assessment of prevalence of refractive errors among senior secondary school children in rural area of district Gonda. Most refractive errors are corrected/ treated with laser or surgical correction. This study analysed the prevalence of refractive error in school children in rural areas of district Gonda.

In 1994, a school eye screening program launch as a part of blindness control program. Vision screening program is recommended for pre-school children for early detection and treatment of uncorrected refractive error to ensure normal social and mental development and prevent amblyopia. In it, they will help detect eye conditions such as cataract, glaucoma, opacities and vitamin A deficiency which leads to loss of sight (vision). Ametropia (right eye and left eye) was expressed in percentage. Data was symbolized using suitable tables and diagrams. In children, refractive errors may effect the child's level of reading and have a negative impact on overall learning. It can leads to vision degradation is called refractive amblyopia.

Therefore, the main aim of this study is to estimate the prevalence of refractive errors among school-aged children of 10 to 17 years of age in Gonda, UP.

MATERIAL & METHODS

The purpose of this study was to determine the assessment of prevalence of refractive error among senior secondary school students (7^{th} -12^{th} standards) in rural communities of district Gonda. A community based cross sectional study included 1650 students from rural area from September 2022 to December 2022. It was done by randomly selected senior secondary school students from 7^{th} -12^{th} standards. The study enrolled 1650 students from approved schools.

The aim of this study were explained to principal of each school. All eye examination tests were given in front of a teacher during school hours from Monday to Saturday. Male and female students from 7^{th} – 12^{th} standards present the day of screening.

The data was recorded on the Excel Sheet. Snellen's vision chart at 6 meters was used to test vision. The refractive error was tested in both eyes by subjective method. When required, a retinoscope cycloplegic refraction was performed by objective method. Accurate binocular visual acuity data was collected and interpreted. This study investigates the prevalence of refractive error in school going students (7^{th} – 12^{th} standards) in rural areas of district Gonda.

Research Design - This study was a cross-sectional study among school-children in rural East India. The study included all the students (7^{th} - 12^{th} standard), who agreed to participate in this study. The study was conducted at five inter colleges of Gonda, U.P.

Time Frame - It was conducted between September to December month of 2022.

Sample Size - It was included 1650 participants including 7th to 12th standard students.

Sampling Procedure - This study was included clustered-sampling methods to collect the data by following the protocol of this study.

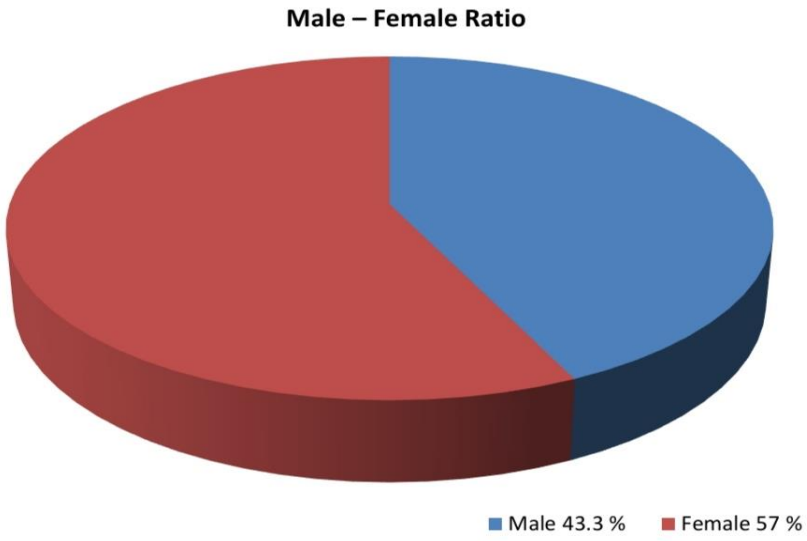
All data score recorded in a excel sheet. Snellen's vision chart at 6 meters was used to test vision. The refractive error was tested in both eyes by subjective method. When required, a retinoscope cycloplegic refraction was performed by objective method. Accurate binocular visual acuity data was collected and interpreted. This study investigates the prevalence of refractive error in school going students (7^{th} – 12^{th} standards) in rural areas of district Gonda.

Inclusion criteria- It was included 7th to 12th standard students, who agreed to participate in this study.

Exclusion criteria- It was excluded primary school students (1st to 6th standards) and who was not agreed to participate in this study.

RESULT

The study analyzed of refractive error in school going students in rural areas of district Gonda. Participants who screened in this survey were between 13-17 +/- 2 years of age from the rural areas. A total of 1650 participants were screened. Among the participants, 710 were male and 940 were female.



Prabhat Ranjan

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Refractive error was found to be the most common in those aged 15 - 17 years and the least common in 13-15 years of age. The study expressed that 705 (42.72%) participants have overall refractive error. In our study, uncorrected refractive error is 485 (68.79%) in male participants is 311 (64.12%) and in female is 394 (81.23%). This survey showed that myopia 333 (68.6%) and followed by astigmatism 135 (27.83%) were the most common refractive error while hypermetropia is 17 (3.50%).

S. NO.	PARAMETERS	OVERALL PREVALENCE
1.	Overall refractive error (RE)	705 (42.72%)
2.	Uncorrected refractive error (URE)	485 (68.79%)
3.	Refractive error (Male)	311 (44.11%)
4.	Refractive error (Female)	394 (55.88%)
-	**Refractive error by type**	-
5.	Myopia	333 (68.6%)
6.	Hypermetropia	17 (3.50%)
7.	Astigmatism	135 (27.83%)

Ametropia

In our study, the overall prevalence of refractive error 705 (42.72%) in the rural areas was found to be 485 (68.79%). Some studies suggested that the assessment of refractive error increased with the increasing age. It is the more seen in the age group of 15-17 +/- 2 years among school children of rural areas. Ametropia due to display devices use, working in dim illumination etc among the rural areas.

Myopia

Myopia was the most common type of refractive error. It is a higher risk factor among the school going students age group of rural communities due to variation in literacy and lifestyles (Dondana et. al. 2002). Srinivas et. al. 2002, myopia was associated with female gender than male due to limited outdoor activity time than males. Myopia was seen more frequently in less than 16 years of age. Myopia was the most common type of refractive error, conducted by G.V.S. Murthy et. al. 2002, Y. Gupta 2011, Mingguang He 2007, Shankar 2011. The World Health Organization (WHO) estimates that half of the population of the world may be myopic by 2050. In recent times, less time spent in outdoor activities has been recognized as a major risk factor for myopia development. The duration and intensity of near-work activities are also associated with myopia.

Some evidence reported that myopia prevalence rate different in India and other countries because of lifestyles, ethnicity and locality among the age groups. This might be due to the usage of displays, digital gadgets, working without prescribed glasses and work in dim/very bright digital lights for the extended period to complete the projects and other educational activities among the rural areas.

Hypermetropia

Hypermetropia is the commonest type of refractive error according to various studies Yekta et. al. 1010, Abdullah 2015, Saw 2011, Sheeladevi 2019.

While in this study prevalence was seen in less than 17 years with 17 (3.50%) in rural areas.

Astigmatism

The prevalence rate of astigmatism in our study is 135 (27.83%) in 15-17 +/- 2 years of age. In our study, it is also reported that the refractive error is mostly seen in the right eye of the patient as compared with the left eye.

DISCUSSION

Myopia 333 (68.6%), hypermetropia 17 (3.50%) and astigmatism 135 (27.83%) were more prevalent in 7^{th} - 12^{th} standards school students in rural communities. This population based cross sectional study focused on the assessment and prevalence of refractive error in school going children in rural population. The problem worsens if it is not discovered and addressed early in the young age population, particularly among children. The overall prevalence of refractive error in this study was 705 (42.72%). In our study, myopia was found to be the commonest refractive error, followed by astigmatism and hypermetropia. In our study, we have found that refractive error is more common in females than males. Refractive errors was the most common in 10-17 years of age.

The most important factor of vision impairment is the lack of vision screening programs for children and another factor showed low levels of awareness about refractive errors and other visual problems. Therefore, vision screening of children for refractive errors should be conducted at the community level and school health programs, accompanied by public awareness campaigns.

CONCLUSION

Uncorrected refractive error indicates a large population of visual impairment and blindness. Refractive errors affects many school going (7^{th} -12^{th}) children, where many cases go undiagnosed. Refractive errors was more common in rural school children aged 15-17 years in specially females. Now a days, with numerous changes of life styles occured among school going children especially due to excessive amount of near work activity (indoor activity) like computer or smart phones depended life styles rather than outdoor activity like games and exercises.

There are some changes of lifestyle based on their activity can affect on ocular health and refractive status of school going children. Childhood morbidity can be minimized by screening all school aged children using spectacle correction.

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NECK PAIN AND MANUAL THERAPY – A SYSTEMATIC REVIEW

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ABSTRACT

Neck pain can be a symptom of a more serious problem, the neck supports the weight of the head, it can be at risk of injuries and conditions that cause pain and restrict motion .Many people have develop a stiff and painful neck for no obvious reasons. According to statistics chronic neck pain is responsible for 14.6% of all cases of musculoskeletal problem & and annually 50% of the adult population experience it to the some extent. Neck pain also involve the other discomfort like spasm and stiffness of the muscles around the joint, it also affect the shoulder joint as the movement also involve the shoulder joint of patient. The neck pain can also be caused by the trauma, bad posture, and prolonged desk work. Musculoskeletal disorder are threatening quality of life by having the potential to restrict daily activities cause absence from work and result in a change or discontinuation in employment. Purpose: To update the findings of the NPTF on the effectiveness of exercise for the management of neck pain and associated disorders. Material & Methods –PubMed, Proquest, Pedro, Google Scholar and Science direct are used in literature search. Many factors like prolonged sitting at work and improper head posture during the work may effect the neck pain occurrence among employees, and those who works on the computer. For acute neck pain without serious pathology, primary treatments are exercise, yoga, massage, manual therapy, superficial heat. For patient with the radiculopathy, it may possible that the shoulder and the hand is also get involved due to the bad posture. The non-specific chronic neck pain could be associated with a deficit and alteration of neck muscles. Results- In total, 5 articles satisfied the inclusion criteria and were considered in the review comparing the patients, interventions and outcomes of treatment for chronic neck pain. 5 randomized control trials were reviewed on the Physiotherapy Evidence Database scale, five studied performed strengthening exercise, one study has a strengthening and an endurance exercise group, one study performed stretching exercise. The one study incorporating stretching exercise reported significant improvement in neck pain. Conclusion- Recent research has compared different postural approached on chronic neck pain based on what we know literature to date. It must be taken into account that the statistical weighing couldn't not be performed on different methods, but rather highlights, the start of the field of literature, since this is a narrative analysis.

Keywords: Multimodal care; Neck pain and associated disorders; Outcome; Recovery; Systematic review; Whiplash-associated disorders.

INTRODUCTION-

Manual therapy and exercise intervention can be used to reduce and cure the neck pain and also the deformities caused by the neck pain. Manual therapy is often used with exercise to treat neck pain. This cervical overview group systematic review update assesses if manual therapy, including manipulation or mobilisation, combined with exercise improves pain, function/disability, quality of life, global perceived effect, and patient satisfaction for adults with neck pain with or without cervicogenic headache or radiculopathy., function/disability, and global perceived effect when manual therapy and exercise are compared to no treatment. High quality evidence suggests greater short-term pain relief, than exercise alone, but no long-term differences across multiple outcomes for (sub)acute/chronic neck pain with or without cervicogenic headache. Moderate quality evidence supports this treatment combination for pain reduction and improved quality of life over manual therapy alone for chronic neck pain; and suggests greater short-term pain reduction when compared to traditional care for acute whiplash. Although 50% of whiplash victims recover in 3-6 months, 30-40% having persist mild to moderate pain and 10-20% remain in severe pain . It is phenomenon with physical impairment, physiological distress and social dysfunction, which call for an evidence based , cause effective rehabilitation treatment. Manual therapy involves neurophysiological mechanisms such as reduction in inflammatory biomarkers, decreased spinal excitability and pain sensitivity, modification of activity in cortical areas involved in pain processing, and excitation of sympathetic nervous system. Instead, although therapeutic exercise has also shown neurophysiological effects, it involves reorganization in motor patterns, structural adaptations, and increase in strength and endurance [1].

According to Dutch study 45% of patients with chronic neck pain visited their general practitioner with a condition during a 12 month period 51% of these were referred to physiotherapy treatment. Knowledge of the actual effect of physiotherapy is therefore important and is anticipated to be reflected in the awareness of evidence based practice among physiotherapist. The Cochrane Collaboration has provided systemic reviews on the effect of mobilization on neck disorders, patient education for neck pain, electrotherapy for neck pain, isometric exercise for neck pain with or without radiculopathy and conservative treatment for whiplash. The overall conclusion has been that the evidence of these treatment has been low and that no definite statements on the efficacy and clinic usefulness of these treatment can be made. A further Cochrane review on the effect of mobilization and MET of the neck pain found that cervical mobilization may provide pain reduction . An additional Cochrane interview on the effect of exercise mechanical disorders concluded that the summarized evidence indicate that there is a role of exercise in the treatment of acute and chronic mechanical neck pain + headache, but that the relative benefit of each type of exercise mode extensive research. [2]

Neck pain has been associated with decreased health quality of life, in several studies work related illness, work-related upper limb disorders because of keyboard and repetitive movements or action accounted for 56,000 cases and awkward and tiring positions for 29,000 cases. The most reason for work absenteeism among office workers is be cause of pain or tenderness in the region of the neck, inhibiting working abilities. Environmental (static or awkward postures, highly repetitive movements) & physical (inadequate strength or muscle endurance & poor posture) factors contribute to the development of work related neck pain. Computer workers are 2-3 times more likely to develop chronic neck pain when compared to general populations. Three studies found an association with between computer work and poor posture (forward head and postural alignment),cervical flexor and extensor muscle imbalances, muscle fatigue and development or worsening of work related neck pain.[3]

MATERIAL & METHODS-

Manual therapy involves the mobilisation and stretching ,mobilisation helps in increasing the restricted range of motion and breaks any adhesion that obstruct the range of motion. Mobilisation also helps to relieve the pain and reduced the spasm and stiffness. Stretching performs a great role in the neck pain as it provides the relief in the pain and eases the stiffness and restricted range of motion. Stretching improves the pain around the neck and also in the shoulder joint , most of the patient suffers from the radiating pain, the hand is also involved in the case of cervical spondiolytis. Mobilization performs wonder in the neck pain as it reduced the stiffness and hence improve the range of motion and stretching reduced the pain and spasm and stiffness. If trigger points are present around the rhomboid muscles because of the bad post[illegible] MFR can be provided at the particular trigger points to dissolve them and relieve pain. As the triggers [illegible] due to the bad posture and due to non-specific region which can produce discomfort

in the long sitting posture and walking. These conditions combined and can produced the various factors which may lead to painful conditions.[4]

Most patients who present with neck pain have "non-specific (simple) neck pain," where rhomboids have a postural or mechanical basis. Aetiological factors are poorly understood and are usually multi-factorial, including poor posture, anxiety, depression, neck strain. Neck pain after whiplash injury also fits into this category, provided no bony injury or neurological deficit is present. When mechanical factors are prominent, the condition is often referred to as "cervical spondylitis," although the term is often applied to all non-specific neck pain. Mechanical and degenerative factors are more likely to be present in chronic neck pain. In cervical spondylitis, degenerative changes start in the inter-vertebral discs with osteophyte formation and involvement of adjacent soft tissue structures. Many people over 30 show similar abnormalities on plain radiographs of the cervical spine, however, so the boundary between normal ageing and disease is difficult to define. Even severe degenerative changes are often asymptomatic, but can lead to neck pain, stiffness, or neurological complications. Many factors like prolonged sitting at work and improper head posture during the work may affect the neck pain occurrence among employees, and those who works on the computer. The relationship between neck pain and saggital postures of cervical and thoracic spine among the office workers. For acute neck pain without serious pathology, primary treatments are exercise, yoga, massage, manual therapy, superficial heat. For patient with the radiculopathy, it may possible that the shoulder and the hand is also get involved due to the bad posture. The non-specific chronic neck pain could be associated with a deficit and alteration of neck muscles. Our primary aim is to analyze differences between in postural stability, pain, cervical disability, and the relation between them produced by the treatment given such as manual therapy and exercise intervention. [5]

STUDY DESIGN – The study is a narrative review which consists of 5 articles reviewed in order to collect information regarding the physiotherapy measures for patients with neck pain.

Sample Size: The sample includes randomized controlled trials, cohort studies, and case-control studies comparing manual therapies, passive physical modalities, or acupuncture with other interventions, placebo or sham, or no intervention. Manual therapy included mobilization and MET , mobilization improves the range of motion of the patient also reduced the stiffness , and may relieve pain. The participants received a single treatment of cervical spine mobilization. There were no adjunctive interventions provided with the advice about neck care. Mobilization shows a very rapid in pain reduction and also in the stiffness as well also in the pain-free movement and free range of motion. [7]

Search strategy – The articles which were searched were done so depending upon the common Mesh terminologies used to find the relevant articles. The Mesh terminologies used were neck pain, neck stiffness, contractures, neck flexion, neck pain and physiotherapy, etc. The search engines which were used to collect articles were PubMed, Scopus, Google Scholar. A total of 56980 articles were gathered initially from the mesh terminologies which cumulated to be a total of the 90 articles at the end after removing duplication, filters and going for initial selection of the RCTs.

Outcomes-To be eligible for inclusion, a study had to assess pain by a visual analog scale, a numerical pain rating scale, or patient self-report as a primary outcome measure. Disability was assessed as a primary outcome measure if the chosen instrument measured the impact of chronic neck pain on everyday life, beyond work or leisure-time activities. If more than one measure of an outcome of interest was reported within the same study, only one was considered. We chose the measure that would most likely provide the most conservative estimate of the effect of manual therapy on the outcome due to the magnitude of the pain or disability. Outcome tools can be used for evaluations, monitoring change over time, diagnosis and prognosis of neck pain. Validated self-report questionnaires should be used with patients. The Neck Disability Index and the Patient Specific Functional Scale are two examples of these questionnaires. The main reason for this recommendation is that these tools establish a baseline status for pain, function, and disability that can be used later in intervention selection and goal tracking.

Data extraction: Study methodologies and relevant outcome measures, including isometric strength, Neck Disability Index scores, and pain scores, were extracted from relevant articles and grouped together for appraisal and synthesis.[8]

Inclusion and exclusion criteria –

Inclusion Criteria included the studies which involved physiotherapy management of neck pain whether generalized or non- generalized, articles which were published within 10 years of duration, articles focusing on the physiotherapy treatment as the mainstay and the articles which control group or cross over group for comparison of their interventions.

Exclusion Criteria included studies which were older than 10 years of duration, articles having another set of interventions apart from physiotherapy management, articles which involved cases dealing with whiplash injuries, radiculopathy, stress fractures, spondylitis like symptoms, forward head posture, upper cross syndrome, etc. The articles were also excluded if the articles had insignificant result within the group results and thus were considered as inappropriate for the study. Articles were also excluded if they were any other sort of study design apart from control trial, clinical trail, cross over trial, or randomized trials.

INTERVENTION-

These participants could only received the manual and exercise intervention, these treatments cannot be combine with any type of drugs and conservative treatment. In exercise therapy, isometrics can be practice to improve the strength of the muscle of the cervical region and hence improve the posture disability. Isometrics also work as a wonder in the pain and also increase the range of the motion. Isometrics also improve the strength of the neck muscles that help to prevent many disability of the neck i.e., forward neck posture and cervical spondylitis. We are going to concentrate on the diagnosis of cervical spondylitis and the evidence available for the different treatments. We are also mention some practical measures like strengthening exercises and stretching. Specific conditions like fibromyalgia, disc prolapse, and whiplash will not be considered, although some patients with these conditions may have been included in therapeutic studies. Cervical radiculopathy is one of the regularly happened conditions caused by the pressure of nerve roots and manual exercise can be done in order to relief pain. Both the strengthening activities and mobilisation has its adequacy, and the present investigation was intended to evaluate their belongings Individuals were randomized to either neck-specific exercise or prescribed physical activity by the principal investigator who did not perform any tests or interventions in the study. [9]

RESULTS-

Exercise intervention include isometric exercises and manual therapy including mobilisation and stretching exercises which results in pain reduction and also pain-free movement and also help in restoring the power of the muscles . Nonetheless, we found that manual therapy improved perceived pain before than therapeutic exercise, while therapeutic exercise reduced cervical disability before than manual therapy. Effect of these exercise shows medium and large effects for both experimental treatments. Participants in the prescribed physical activity group received a tailored written prescription of an individual physical activity, based on the initial patient-centered counseling session, as well as a general prescription of physical activity to perform on their own. The goal of the intervention was to reduce pain and improve general health. Isometric exercise (skeletal muscle contraction without shortening) also may be performed as HEP. Isometric exercise can be performed by resisted the movement of the muscles as the resistent provided by the therapist ,the size of the involved muscle group is unimportant, provided that maximal voluntary contraction is maintained to increase oxygen demand during the isometric exercise period. Isometric exercise does not involve body motion. Isometric exercise increases heart rate and CO without significant effects on vascular resistance. This form of exercise has the advantage of developing neurological coordination through neuromuscular adaptation. Cervical exercises performed in the position of neck function (upright) develop skills that transfer to normal daily activities. Regular monitoring of exercise programs is essential to ensure that exercises are performed optimally and to encourage the patients to perform them regularly. Rehabilitation of specific deep neck muscles helps Improve neuromuscular control and re-established sensorimotor control of cervical spine. These programs are effective for restoration of motor function and proved to be beneficial for reducing neck pain recurrences . Leading to middle cervical spine extended, lower cervical spine flexed. Exercising deep cervical flexor muscles improve motor control and helps to correct muscle imbalance between superficial and deep layer of cervical muscles . By training cervical flexor muscles, cervical lordosis can be corrected and specific neck pain.[10]

Prabhat Ranjan
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DISCUSSION-

This updated systematic review and meta-analysis aimed to determine a more accurate estimate of the effect of TE on pain and disability outcomes in people with CNSNP. We found 9 studies 28–36 investigating the efficacy of TE that met our inclusion criteria, of which 7 were deemed appropriate for a meta-analysis. The most important finding we obtained by pooling these 7 studies was a medium and significant overall effect size for TE in reducing pain in the short term (<1 month) and intermediate term (1–6 months) and a medium but not significant overall effect size in reducing disability in the short term and intermediate term. It was not possible to calculate an overall effect size for TE at long-term follow-up (6–12 months) due to the lack of studies examining this endpoint.[11]

Neck pain are common impairments, and the risk for both increases with the factors relating to work ergonomics, psychological control, and mental health. When an individual has co-occuring disorders, the problem may be magnified, however there is no report in the literature regarding adherence to physical therapy for the population. Evaluation and treatment of neck pain can be difficult because of the relationship between the muscles and the joints as well with the spine. Manual therapy and exercise of the cervical spine have been reported to be effective treatment for neck pain and disability related to the neck pain. [12]

The objective of this study was to determine the differences between experimental treatments in immediate, short, and medium terms, in addition to checking its effectiveness through a control group. Other studies have analyzed the differences between manual therapy and therapeutic exercise. However, they have not included complete clinical performance protocols, but isolated manual therapy or exercise techniques. The results obtained by the two experimental treatments with respect to the control showed a clear efficacy of these in subjects with nonspecific chronic neck pain, which showed statistically significant improvements and very high effect sizes in the short and medium terms in disability and perceived pain. Our results obtained overall improvements in disability and pain perceived following the two experimental treatments in the short and medium terms, manual therapy and therapeutic exercise for the neck.[13]

The latest systematic reviews rate the effect of these interventions as moderate Manual physical therapy and exercise was significantly more effective in reducing neck pain and disability, and increasing patient-perceived improvements during short- and long-term follow-ups. Statistical and clinical improvement in upper extremity pain scores was demonstrated at all follow-up periods for patients receiving manual physical therapy and exercise. Treatment success rates, as determined by those patients achieving.[14]

This case report demonstrates the safe utilization of different thrust and non-thrust manipulations on a patient with several complex neuromuscular conditions and facilitates increased self-efficacy through exercise. Following a two-week episode of care, the patient demonstrated no clinically significant improvement in her chronic neck pain using a multi-modal approach composed of manual therapy, cervicothoracic mobility exercises, cervicothoracic neuromuscular re-education, and endurance training. Time was a limiting factor in our ability to achieve significant changes in objective measures; therefore, we focused on improving self-efficacy and managing her complex condition. [15]

This report outlines the challenges to patient care for an individual with non-specific neck pain complicated by musculoskeletal and neurovascular comorbidities. One challenge area is the paucity of research on the conservative treatment of individuals with neck pain with impactful muscular and neuromuscular comorbidities. Furthermore, the psychometric properties of the clinical evaluation tools commonly used for individuals with neck pain are unknown for an individual with an upper cervical fusion and various comorbidities that may contribute to neck pain . Therefore, the results of the objective measures used in this case report, such as the CCFT, deep neck flexor endurance test, and NDI, must be interpreted with caution, as they may not accurately assess their respective impairment and functional limitation domains. Further research is needed to discern the clinical utility of tests and measures for sub-populations of individuals with musculoskeletal and neuromuscular comorbidities .There is limited evidence on the safety and efficacy of manual therapy in individuals with EDS and cervical fusion. Only a handful of published case have used thrust manipulation in a multi-modal approach to care for those with EDS or cervical fusion . The efficacy and safety of joint thrust manipulation in this population, with or without cervical fusion, remains unknown and is reliant upon sound clinical decision and risk-benefit analysis from the clinician . Despite a minimal short-term effect on her symptoms, this case report provides an isolated instance in which joint manipulation was safely performed on an

individual with EDS. In cervical spondylosis, degenerative changes start in the intervertebral discs with osteophyte formation and involvement of adjacent soft tissue structures. Many people over 30 show similar abnormalities on plain radiographs of the cervical spine, however, so the boundary between normal ageing and disease is difficult to define. Even severe degenerative changes are often asymptomatic, but can lead to neck pain, stiffness, or neurological complications.[13]

Overall, the evidence of effect of physiotherapy for chronic neck pain is strengthened. Yet, for some of the treatments offered, no definite effect and clinical usefulness can be shown. It does not necessarily implicate that these treatments have no effect, only that the present evidence is not sufficient Physiotherapy interventions for chronic neck pain showing the strongest support for pain are strength and endurance training and, treating patients with chronic WAD and patients with chronic non-specific neck pain. In patients with chronic WAD, multimodal physiotherapy was also shown to have a beneficial effect. The search strategy and selection criteria we used were quite strict and easy to apply and according to normal procedures for conducting systematic reviews . Yet the following limitations of the literature search may have introduced a bias: some relevant trials may have been missed if they used other keywords, although this is not very likely, results may be affected by our emphases during the methods for synthesis evidence. We might have chosen to exclude all trials with insufficient reporting on allocation sequence and allocation concealment. [10]

CONCLUSION-

There are no differences between groups in short and medium terms. Manual therapy achieves a faster reduction in pain perception than isometric exercise. Isometric exercise reduces deformity faster than manual therapy. Manual therapy reduces the pain and stiffness of the muscles and hence improve the range of motion and provide the pain-free ADLs. Clinical improvement could potentially be influenced by central processes. Patient-reported pain was decreased significantly from the initial visit. In the current case report, patient education and structured exercise program demonstrated an improvement in self-reported function deficit. The patient was able to sit for a longer duration and had a considerable improvement in pain associated with prolonged sitting. A supervised exercise program combined with patient education should be the ideal physiotherapy management for the case of neck pain associated with findings of CS. This controlled trial performed on the patient shows the improvement in the cervical movement and also provide them a healthy life to perform the pain-free activities. The strengthening exercises also improve the strength of the neck muscles as they got weaken due to bad posture of the neck , by the help of isometric exercise we can improve the strength of the muscles .The associated pain with the neck pain include shoulder pain is also treated by the MET which result in the improvement of range of motion and also reduces the pain of the patient by the first day .

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15.Manual therapy versus therapeutic exercise in non-specific chronic neck pain: a randomized controlled trial

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A CASE STUDY ON- A PHYSIOTHERAPY INTERVENTION PROTOCOL FOR RHEUMATOID ARTHRITIS

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ABSTRACT

Background- Rheumatoid arthritis (RA) is a painful, chronic disorder that shortens life expectancy and causes gradual joint degeneration, disability, and other problems. Even a small amount of inflammation has the potential to cause lasting impairment. Patients with RA may experience an intermittent or progressive clinical course depending on their symptoms. In the majority of patients, structural damage begins to appear within the first two years of the clinical course. In order to relieve pain and stop joint deterioration and functional loss, RA therapy must be successful. The treatment and prevention of RA is improved, and people with RA experience fewer challenges with daily living because of the applications of physiotherapy and rehabilitation, which greatly strengthen medicinal therapy.

Case Description- A 46 year old women had RA from 7 years . she had difficulty to perform ADLs like holding and grasping objects. Rheumatologists confirms the diagnosis of RA . she was having pain and stiffness in the hands

Interventions- Total 25 days of physiotherapy sessions was given to the patients in which we had given wax bath therapy and UST to decrease the pain and stiffness. Active ROM exercises with smile ball and resisted exercise with the help of rubber band helps to gain the hand grip strength.

Outcomes-The following 25 days treatment physiotherapy program there was marked improvement in ROM and decrease the pain and stiffness in the hands .patient was able to perform house hold chores .we advice to perform the home exercise program independently for the better outcomes.

Conclusion- This case study is consistent with current research that shows the benefits of active range of motion exercises with smile balls, resisted finger workouts with rubberbands, and the usage of hand grippers to strengthen hand muscles.Additionally, parrafin wax bath treatment and ust are efficient combo therapies for RA patients**.**

Keywords- Rhematoid arthritis , ROM exercise , physiotherapy

INTRODUCTION

RA is a chronic, symmetrical, inflammatory autoimmune disease .It affectsthe small joints(peripheral joints such as finger and wrist) and also affect the skin, eyes, heart, kidneys, and lungs. Joint bone and cartilage are frequently damaged, and tendons and ligaments become weak and make the patient frail. *joints get inflamed and bonny erosion start which causes degenerative changes around the joint* (1).Result is joint deformity occurred like Swan neck deformity, boutonniere deformity ,Triggered finger and thumb deformity occurs in hand, and flexion and valgus deformity of the knee can be formed in this condition. Rheumatoid nodules under the skin, fatigue, fever, weight loss, and stiffness of the affected joints lasting longer than 30 minutes are all common signs of RA. General onset is between the ages of 35 and 60, with periods of remission and worsening(2)

The hand is made up of a variety of intricate structures that allow for a wide range of movements, many of which are necessary for everyday tasks. The joints in the hand are synovial joints, like many other joints in the body. The synovium, a thin, malleable membrane that surrounds these joints, gives them mobility. Synovial fluid, a thin, transparent, viscous fluid produced by the synovium, generally lubricates and nourishes the joint to allow movement. However, in persons with rheumatoid arthritis, the immune system can misbehave and target healthy tissue in the fingers and wrists, causing the hand joints to become inflamed. Eventually, as a result of these modifications, RA begins to damage the joints in the hand and wrist, including wrist joint, Metacarpal joint , Metacarpophalangeal joint, interrphalengeal joint and proximal and distal interphalengeal joint.(3)

Based on its anti-inflammatory and analgesic properties, ultrasound is one of the therapeutic modalities frequently used by licensed healthcare professionals for the symptomatic management of RA. Compared to a placebo, ultrasound administered in water to the dorsal and palmar surfaces of the hand increased grip strength. Additionally, ultrasound reduced morning stiffness, marginally increased wrist dorsal flexion, and lowered the number of inflamed and uncomfortable joints.(4). we can help to reduce pain and inflammation by the use of heat application further we move to the rehabilitation part to treat the disability and functional capacity. By reducing pain the ROM of the hand grip may increase .Patinet will be able to do their ADLsor functional activity easily. The ROM and grip function significantly improved after a wax bath treatment and active hand workout. Active hand workouts alone can increase ROM, decrease stiffness, and pain with non-resisted motion.

AIM OF THE STUDY

This study aims to relive pain,prevent from joint damage and improve the functional capability in patients with R.A.

A CASE DESCRIPTION

A 46 year old women with 7 years of history of RA developed symptoms at hands ,knee joint and facial swelling .The main symptoms are swelling pain and lack of power in grasping objects . patient was diagnosed with RA 7 years ago by the rheumatologists. They carried out all important investigations and medications as needed. The patient currently using anti rheumatic medication. Morning stiffness ,fatigue ,pain and swelling are the primary complaints of the patients .patient have no past history of any disease as well as no surgical history. The patient had thepresent H/O HTN and obesity with wt 82 kg and height 5.2 ft. There was no history ofdiabetes. Patient had body ache, limited mobility and low functional activity. Patient had difficulty in holding or grasping the objects like grasping a cup and doing the household work. The pain aggravates when the patient adapted to cold weather and relieved by the hot application. Patient wanted to increase the hand power so that she would be able to do her household work. Pain was also the cause of decreasing the functional ability. Patient had complain to making a fist

PHYSICAL EXAMINATION

The hands' mobility was severely restricted, especially in the PIP and MCP joints, according to an objective physical assessment. . The little finger of right hand MCP joint was most affected. The swelling was present over the MCP joint and also the facial swelling involved. Patient cannot easily squeeze the hand gripper and sponge ball. During to carry any objectives patient complaining the pain. According to VAS pain at hand:- 6-7 at morning time and more worse at cold weather It will become 9. ROM of fingers measured by goniometer.

TREATMENT PROTOCOL

To improve the hand grip strength and in reducing the pain in first phase for 15 days our goal was to relieve pain and increase the ROM So we apply pain releving modalities like wax bath for 10mins , UST pulse mode for 7min. and provide active ROM exercise with the help of smile balls and slime balland for improvement of extension ROM of fingers minimal resistance exercise with the help of rubber bands.

In second phase for 15-25 days our goals was to increase hand grip strength, hand muscle extensibility so to improve the strength in this phase we was given different type of hand griper strengthen-repetion 10-15 for thrice a day and also to improve the extensibilityof hand muscle we will provide therabandexercises -Hand grip and twisting, vertical wrist extension and flexion, hand rolled by foam roller- 10x3 .

OUTCOME MEASURES

The recovery of the patient was evaluated on the following outcome measure on VAS scale and ROM check by goniometer. The prognosis was observed by comparing score with the data was taken on 15 to 25 days.

OUTCOME MEASURES	15 DAYS	25 DAYS
VAS Score	3	1
ROM	Right FLX-15 Left FLX-12	Right FLX-25 Left FLX- 20

Comparison of baseline postintervention score

DISCUSSION

According to the study's findings the exercise programme enhanced hand function overall, the wax bath therapy had no further significant effects, although the pain was instantly relieved after treatment after wax bath patient get relieved from stiffness in hand. After 25 days of treatment plan we observe that their was marked improvement in the ROM of fingers and strength was developed in hand. Activities of daily living are restricted for RA patients. Patients with RA need a lot of help with personal care, according to Dominick et al. The patient was told to utilise a wax bath to reduce the painful, swollen joints in their hands. Additionally, the patient was told to squeeze a soft sponge ball as tolerated. The ball may be wrapped around by fingers because it is small enough to fit in one hand. When using the sponge ball, the patient experienced no adverse side effects. Exercises with the hands were necessary to increase functional independence and hand function. Squeezing the sponge ball was a simple hand-function improvement exercise. As the patient gained greater independence, the quality of their lives began to improve.

CONCLUSION

This case report is consistent with recent studies that show wax bath therapy, UST and active ROM exercises with strengthening using smile balls, and resistive exercise with rubberband for individuals with rhematoid arthritis. After completing physiotherapy intervention, there was a noticeable improvement in the ROM and functional capability. According to VAS scale the pain was also reduced and stiffness was decreased and patient was able to do house hold activities . she was having no pain while grasping and holding the objects. For further improvement we asked patient for the home exercise program where she can do exercise independently for more better outcomes.

Prabhat Ranjan

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REFRACTIVE ERRORS AND ASSOCIATED FACTORS AMONG PATIENTS VISITING RAMA HOSPITAL IN KANPUR

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ABSTRACT

Background: In India, Refractive Error is the second leading cause of vision impairment and the third main cause of blindness. Because refraction services are scarce and difficult to obtain, Many people with refractive error live with impaired vision or blindness for the rest of their lives.

Objective: The primary goal of this study was to determine the prevalence of refractive errors and associated factors among patients who visited Rama Hospital, Kanpur.

Methods: A Retrospective cross-sectional study was conducted from May 2022 To December 2022, All patients who visited rama Hospital, Kanpur. The sample frame was the secondary eye unit outpatient departments register. to select samples, simple random sampling was used.

Data Was Entered By Using Epi-Data Version3 and analysed with statistical package for social l science20.Tables And graphs were used to display descriptive statistics, And logistic regression was used to examine the relationship between the dependent and independent variables. At $p<0.05$, statistical significance was inferred.

Results: Refractive error was detected in 42 (20.4%) of study participants. The average age was 40.69 ± 20.77.There were 120 men and 85 women in this group (58.5%and41.6%, respectively). Myopia (51.2%) was the most common refractive defect.

Conclusion & recommendation: Refractive error is a wide spread problem in our study area that affects people of all age groups. We recommend patients to have screening on regular basis so that refractive anomalies can be detected early.

Keywords: Refraction, Refractive error, Myopia

INTRODUCTION

Refractive error (RE) is a phenomenon that happens when the eye fails to concentrate light rays from objects onto the retinal plane, resulting in fuzzy images. Myopia (shortsightedness), hyperopia (longsightedness), and astigmatism (no single point of focus in the eye) are the three types of refractive defects. Anisometropia is a condition in which the refraction powers of two eyes differ [1]. Refractive error is one of the most common causes of vision impairment, accounting for 47% of all cases of vision impairment in high-income nations. In developing countries, refractive error has a substantial impact, perhaps resulting in decreased economic production [2].

The right-to-sightinitiative,Vision2020,was founded in1999with the goal of eliminating avoidable blindness by prioritizing a few particular causes of vision impairment and blindness based on their distribution, impact on the community, management potential, and afford- ability. One of the five priority issues is refractive error. According to the most recent global estimates, 12.8 million children between 5 and 15 suffer from refractive error-related visual impairment [2].

Refractive error affects people's lives, whether they are children or adults, causing difficulties in performing regular tasks, decreasing their vision, and eventually causing blindness. It affects people of all ages, but the impact is thought to be greater in youngsters due to the longer delay. Nuclear sclerosis is the primary cause of refractive error in adults, which shows an increasing tendency with increasing sclerosis but reduces after compensating for it [3-5].

Children are reported to be the most vulnerable segment of the population, with many suffering from vision impairment throughout their lives. Refractive error has gotten a lot of attention in the last two decades, with school-aged children being at a larger risk than the rest of the population [5].

Instead, they try to compensate for their vision problems by sitting close to the blackboard, pinching their eyes, and even avoiding work that requires good vision [6].

Despite the fact that refraction management is relatively simple and inexpensive with spectacles, millions of children and adults are dropping out of school and their productivity is declining. Refractive error is one of the most common eye diseases related to regular absenteeism and poor productivity, according to studies conducted in Nigerian hospitals and industries [6].

According to a national blindness survey conducted in India in 2006, refractive error was found to be the second leading cause of visual impairment, accounting for 33.4%, behind cataract (42.3%), and the third leading cause of blindness, accounting for 49.9, 11.5, and 7.8%, following cataract and trachomatous corneal opacity respectively. Females were found to have higher rates of blindness and low vision than males, with 1.9 versus 1.2 for blindness and 4.1 and 3.1 for impaired vision, respectively [7].

As previously stated, refractive error is a problem that requires attention, but no such attention has yet been given in the community. In addition, as per the knowledge of investigators, there were few studies in India and no research conducted specifically at study area where it's the main center of ophthalmic health in the region. As a result, we are interested in studying the burden and encouraging stakeholders to work on it in order to alleviate the problem.

METHODS AND MATERIALS

From May 2022 to December 2022, a hospital-based retrospective cross-sectional study was done using secondary data from registration o f patient. The investigation was conducted from May 2022 to December 2022, at Rama Hospital Secondary Eye Unit. All patients that visited Rama Hospital Secondary Eye Unit were considered a source population.

All patients that visited Hospital Secondary Eye Unit during the study period were included in the study population. All patients who visited the Rama hospital's eye-out patient department for an ocular ailment between May 2022 to December 2022 and registration and medical cards with recorded needed variables were included in the study. Patients with uncorrected RE or amblyopia who visited the eye unit between May 2022 to December 2022 and incomplete registration book and medical cards were excluded from the research.

A single population proportion calculation was used to calculate sample size. As a result, 205 patients were randomly selected for the study using a simple random sampling technique from the registration book.

$$\text{That is: - } n = \frac{[Z\ a^2]\ 2 * P * (1 - P)}{d^2}$$

Plus 10% non-response rate where n=the final sample size

p= proportion/prevalence of myopia, which is16.6% [8]

d= maximum allow able error in this case 0.05(5%)

According to the size for this study

$= (1.96)^2 0.1606(1–0.1606)/ (0.05^2)$

=3.8416*0.13480764/0.0025= 208

Plus 10% non¯response rate

n=229

Ophthalmic nurses working in the secondary eye unit used a WHO standard check list to collect data from the registration book and
Patient cards from April to June 2018. To ensure data quality, data collectors received a half-day training on the data collecting instrument.
Pretest was done on 10% of the overall sample size (23 samples) in Dessie referral hospital. Data was collected by ophthalmic nurses, and the quality of the data was reviewed on a daily basis by principal investigators. The questions were evaluated for clarity, completeness, and consistency. The data was entered into Epidata version 3 and then transferred to SPSS V.20. Descriptive statistics such as frequency distribution, table, graph, and summary measures were produced to explain the research population in connection to pertinent variables.
Furthermore, each independent variable to the outcome variable was subjected to a bivariate binary logistic regression analysis to discover statistically significant associated factors. In multivariate binary logistic regressions, variables with a *P*-value of less than 0.05 were considered statistically significant and were given a 95% confidence interval and an AOR.

RESULT

Socio- demographic characteristics of respondents

For the study, a total of 205 case records were obtained. The records of 205 participants were reviewed. There were 120 men and 85 females aged 1–100 years (58.5 and 41.4 %, respectively). The subjects' average age was 40.69±20.70 years. The majority of the cases 135 (85 males and 50 females) live in the rural region (65.8 %), while 70 (45 males and 25 females) live in the urban area (34.10 %) (Table 1).

Magnitude of refractive error

Refractive error was identifed in 42 of the 205 study participants (18.34%), 95%C.I (15.6-22.47%). Two-thirds (66.66%) of the 42 people with refractive error were females, and one-third (33.33%) were men. Myopia was detected in 22 (52.4%) people; astigmatism in 12 (28.5%) people, and hyperopia in just 8 people (19%). Myopia was more common in women, while astigmatism was more common in men. Almost two-thirds of the refractive error distribution was seen in those aged 11 to 30 years (40.5%) and 51 to 60 years (31%) (Table 2).

Table 1 Shows the cross tabulation age and gender distribution of patients visiting RAMA Hospital's secondary eye unit in Kanpur, India (N=205)

Age of participant	Sex of participant		Frequency (%)
	Male	Female	
<10	4	4	8(3.5)
11–20	12	12	24(10.5)
21–30	15	16	31(13.5)
31–40	12	16	28(12.2)
41–50	17	14	31(13.5)
51–60	33	14	47(20.5)
>60	43	17	60(26.2)

Sex of participant	Address of participant		
	Urban	Rural	
Male	37	99	136 (59)
Female	30	63	93(40.6)

Table 2 Shows the distribution of age and refractive error in patients visiting RAMA Hospital's secondary eye unit in Kanpur, India (N=205)

Age category	Type of refractive error			Total	%
	Myopia	Hyperopia	Astigmatism		
1–10	0	0	0	0	0
11–20	6	0	2	8	19%
21–30	8	1	2	11	26.2%
31–40	2	2	2	6	14.3%
41–50	0	1	3	4	9.5%
51–60	5	3	3	11	26.2%
>60	1	1	0	2	4.8%
Total	22	8	12	42	100%

Refractive error degree

In this study, the degree of refractive error in myopic individuals (22 cases) was 5.2%, which is about half of the total (12 cases) only 4.4% of them have>-3D, while nearly half of the remaining (10 instances) have 3D. On the other hand, three out of every eight instances with hypermetropia have>3D, and one out of every eight cases has 3D. Astigmatism accounts for 5.2% of all refractive cases (Table3).

Table 3 Shows the distribution of refractive error degrees of patients visiting RAMA Hospital's secondary eye unit in Kanpur, India (N=205)

Degree of refractive error	Frequency	Percent
Normal	187	81.7
Myopia (>-3D)	12	5.2
Myopia (<-3D)	10	4.4
Hyperopia (>3D)	02	0.9
Hyperopia (<3D)	06	2.6
Astigmatism	12	5.2
Total	205	100.0

Presenting visual acuity and Medical history

The distribution of presenting visual acuity from 205 frequencies, with about half of the cases falling into this category. 105 (49.7%) are normal; nearly a quarter (47%) have moderate visual impairment, and 21 people (9.2%) have severe visual impairment. The remaining 41 cases (17.9%) were blind.

The vast majority of the study population, 186 (93.4%), had no medical history; however, 15 (6.6%) had co-morbid medical history, with 7having diabetes and the other 7 having hypertension (Table 4).

Factors associated with refractive error

On bivariate regression, sex, age category, medical his- tory, and surgical history show a significant *p*-value of less than 0.3 (CI of 95% and adjusted odd ratio) for dependent variables from other, nondependent factors.

Table 4 Medical history of patients visiting RAMA Hospital's secondary eye unit in Kanpur, India (N=205)

Variables		Frequency	Percent
Medical History	Have medical history	15	6.6
	Have no medical history	214	93.4
If Yes, type of medical history	DM	07	3.1
	Hypertension	07	3.1
	Other	01	0.4

In multivariate binary logistic regressions, variables having a *P*-value of less than 0.25 in bivariate analysis were imported. In multivariate binary logistic regressions, those factors with *P*-value less than 0.05 provided with 95% CI and AOR sex, medical history, and surgical history are statistically significant variables. Females had a four times higher risk of developing refractive error than males. The patient's medical history (diabetes, hypertension) is strongly associated with refractive error (Table 5).

Table 5 Multivariate regression among patients visiting RAMA Hospital's secondary eye unit in Kanpur, India (N=205)

	COR	AOR	(95% CI)	P-value
Sex				
Male [ref*]				
Female	3.75	3.9	[1.75, 8.87]	0.001*
Age	0.974	0.76	[0.36, 1.84]	0.125
Medical history				
Yes	2.39	5.57	[1.12, 27.7]	0.036*
No				
Surgical history				
Yes	0.077	2.5	[0.01, 64]	0.017* No[ref]

(ref- reference), * = Highly significant

DISCUSSION

In this study, we discovered that refractive error was responsible for (18.34%), 95%C.I (15.6-22.47%) of the eye problems encountered in our research area. This is consistent with recent data from other Nigerian eye-care facilities, which indicated that refractive error ranged between 18.6 and 22.0% [9]. This fnding was lower than hospital-based research in Ghana, which found refractive error in 44.3% of the subjects [6], and also lower than community-based investigations in Ethiopia [6, 10, 11]. This implies a great effort is needed by policy makers and the patients themselves to reduce the issue.

However, it's worth noting that the rate reported by this hospitalbased study is higher than several other communitybased studies in Nigeria, which have shown rates ranging from 2.6 to 15.4% [9, 12]. This indicates that uncorrected or under-corrected refractive errors have severe consequences for the individual, family and society. These include lost educational and employment opportunities, as well as economic costs to the family and government and generally impair quality of life. Females were almost four times more affected than males in this survey. This occurrence was observed across all age groups. The larger female population is consistent with fndings from previous research in developing countries, such as Nigeria [9, 12]. This study's female gender preponderance could be explained by the fact that specific forms of refractive errors are more common in females than in males.

Myopia was the most common eye condition in this investigation. This accounted for 52.4% of all refractive error cases. Te most prevalent refractive error in Africa has a variety of reports. While myopia has been identifed as the most prevalent distance refractive defect, astigmatism [13] and hyperopia [12, 14, 15] have also been identifed. Uncorrected distance refractive error (mostly myopia) has been identifed as the leading cause of vision impairment worldwide, and this trend is expected to continue. This result is similar to Adegbehing be et al. in IleIfe (22.7%) [13] and Emerole et al. in Owerri (23.4%) in similar hospital-based investigations, as well as 26.99% in population research in Southern India, but lower than Adeoti and Egbewale's fndings in Osobgo (39.2%) [15].

In comparison to males, more women [16] had myopia in varied degrees [4]. In an epidemiological review of myopia, women were found to have a higher prevalence than men. Myopia was at its peak between the ages of 10 and 30. Te severity of myopia varies with age, with the majority of cases occurring between the ages of one and ten years and remaining relatively stable between the ages of twelve and fifty years [17].

Limitation

One disadvantage of this study is that it was conducted in a hospital setting, which could lead to an overestimation of the magnitude of refractive error because most people go to the hospital for vision problems. Regardless, because the hospital is a community-oriented health care provider, the fndings can still be projected to the community.

CONCLUSION

As a conclusion, refractive error is more prevalent in this study area that affects people of all ages. Also, myopia is the most frequent kind of refractive error, and astigmatism affects a large percentage of patients. Variables like sex, medical history, and surgical history were proved to be statistically significant with refractive error. As a result, we urge that they get screened on a regular basis so that refractive anomalies can be detected early. In addition, we recommend hospital, staffs and clients to make a big concern for patients with past history of medical and surgical cases since they are associated with eye anomaly. The staffs will make every effort to improve and/ or adjust the situation.

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Assessment of Ametropia in School Children among Urban Areas of District Agra: An Observational Study

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ABSTRACT

The purpose of this study was to determine the prevalence of refractive error among senior secondary school students in urban communities at district Agra. A community-based cross-sectional study was done by randomly selected school children from (9th-12th) grades of urban areas of district Agra UP. Informed and written Consent was obtained from the school where the data is collected. Every test was administered in front of a teacher from Monday through Saturday during regular class hours. Students in grades 9 through 12 who were present on the screening day were selected to have their eyes examined. Participants with dry eye, accommodative problems, amblyopia, squint, or other defects were excluded from the study. Refractive errors (myopia) were more common in school going children. Refractive error was more common in urban school children aged 15 and under (specially females). The most common refractive errors were myopia, hypermetropia, and astigmatism. Screenings for refractive issues should be carried out in preschools and schools to identify them early. Refractive error should also be taught to parents and school children.

KEY WORDS: Assessment, Purpose, School Children, Observational.

INTRODUCTION

Ametropia is a refractive error defined as a state of refraction when parallel light rays coming from infinity are focused either in front or behind the retina, when the accommodation is at rest. *Globally, it is the most common cause of visual impairment and the second leading cause of treatable blindness.* Early investigation and treatment can reduce the risk of impaired vision. Uncorrected refractive defects can cause shortand long-term effects in adults and children, including loss of educational and employment possibilities for people, families, and society.

With Vision 2020-the right to sight, which set a goal of eliminating cataracts, xerophthalmia, and other preventable causes of juvenile blindness by 2020. India accounts for 20% (7.8 million) of the world's 39 million blind people, with cataracts accounting for 62%, refractive error for 19.7%, glaucoma for 5.8%, and corneal blindness 1%. According to Indian studies, refractive errors account for 81.7% of urban visual impairment (Gupta et al., 2002; Park et al., 2002; Ore et al., 2009; WHO et al., 2014; Wiryani et al., 2021).

Thus, the current study assess the prevalence of various refractive errors among senior secondary school children in urban areas of district Agra.

MATERIAL AND METHODS

Aim and Objective:

The purpose of this study was to determine the prevalence of different types of refractive error (myopia, hypermetropia and astigmatism) among senior secondary school students in urban communities at district Agra. A community-based cross-sectional study was done by randomly selected senior secondary school children from (9th-12th) standard of urban areas of district Agra UP.

Subject Recruitment:

Informed and written Consent was obtained from the secondary school where the data is collected. During school hours, each test was administered in front of a teacher. Male and female students from 9th to 12th grades present on the day of screening were chosen for the eye examination. The study did not include participants with squinting, amblyopia, dry eyes, accommodative problems, or oth er organic defects.

To assess refractive errors, the children were given a questionnaire (both language Hindi /English). Snellen's Vision chart at 6 meters was used to test vision. Subjective assessment for the refractive error was done in either one or both eyes with < 6/12 vision. When necessary, cycloplegic objective refraction (Tropicamide) was used to complete the objective refraction using a Retinoscope. This is a refractive error in one or both eyes. Less than 6/12 to 6/18 for low visual acuity, less than 6/18 to 6/60 for moderate visual acuity, less than 6/60 to 3/60 for severe visual acuity, and less than 3/60 for blindness acuity.

RESULT AND DISCUSSION

Analysis of ametropia in school children in urban areas of district Agra. A total of 850 children were screened. In this study, there was insignificant difference in the proportion of male (50.9%) and (49%) female participants from the urban areas (Figure-1). The age is calculated between 12 -17year with mean age group is 15 year.

In the age group, years (n=850), the female respondents account for (55.1%) which is higher than male respondents (44.8%). In order≥the15-year age group, the population distribution was higher among females (52.2%) compared to male children's (47.7%).

The Gender distribution of the examined population was not statistically significant from the enumerate population (n=850). Approximately three-fourth examined children were attending school, including almost all the younger ones but less than half of the 9th-year-old students. The difference was found to be insignificant in the 9th standard. (Table-1).

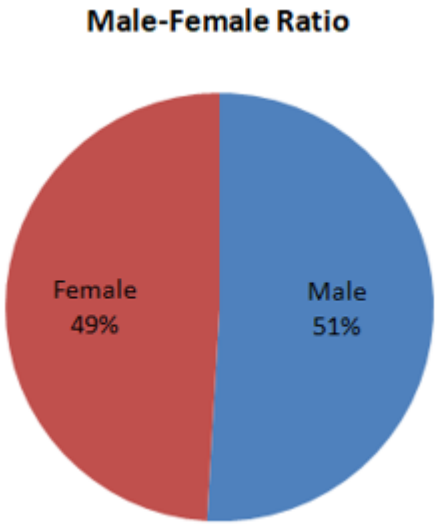

Figure 1 Gender Distribution

Ametropia:

In our study, the overall prevalence of refractive error (n=850) in the urban areas was found to be (13.5%) with most of the cases. Triveni et al. (2021) reported a much higher prevalence of refractive error (47.37%) in the age group of 9-12 years in the urban areas, which was much higher compared to our study. Studies reported that the estimation of refractive error increased with the increasing age among school going children of urban areas. This might be due to the usage of displays, digital devices, working without prescribed glasses, prolonged exposure in the dim lights to complete educational activities among the urban areas.

Myopia:

Among the types of Ametropia, most of respondents had myopia (8.7%), followed by (4.1%) Astigmatism and (1.2%) hypermetropia. Myopia was the commonest type of refractive error reported in various studies conducted by Raju et al., (2004); Dandona (2002); Saw, (2008); Liang, (2009). The study conducted by Dandona et. al (2002) reported myopia as a higher risk factor among the younger age group of urban areas due to variations in illiteracy, lifestyle, educational demands. The variation among different countries and within India might be because of the disparities among lifestyle, ethnicity, and varied locations among the other age groups.

Estimation of Refractive errors		
Ametropia	**Mean (n)**	**Percentage (%)**
Myopia	74	8.70
Hypermetropia	4	0.4
Astigmatism	44	5.1
Overall ametropia	115	13.5

Hypermetropia:

Some studies like Abdullah et al., (2015) show hypermetropia is the most common type of refractive error among the population. In our study, the prevalence was seen in <15 years with (0.4%) urban areas.

Astigmatism:

The prevalence rate of astigmatism in our study was seen in 20 years of age groups, the prevalence rate was usually higher. It can be suggested that astigmatism increases with increasing age (Vitale et al., 2008).

In our study, it is also reported that the refractive error is mostly seen in the right eye of the patient with myopia (5.1%), hypermetropia (0.9%), and astigmatism (3.0%) compared with left eye.

CONCLUSION

Refractive errors (myopia) were more common in metropolitan school children. Refractive error was more common in urban school children aged 15 and under (especially females). Myopia was determined to be the most prevalent refractive error, followed by astigmatism and hypermetropia. Preschool and school screenings should be conducted to detect refractive problems early. Furthermore, school children and their parents should be taught about refractive errors.

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Effectiveness IASTM Technique To Reduce The Plantar Heel Pain In Plantar Fasciitis :-A Case Report

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Abstract- *Plantar fasciitis is a common condition causing heel and arch pain and has been related with degenerative changes in the plantar fascia resulting in tissue thickening. Instrument Assisted Soft Tissue Mobilization (IASTM) is an intervention that allows clinicians deep penetration to treat tissues. The mechanical forces caused by IASTM might cause localized tissue trauma leading to stimulation of the body's natural inflammation and healing processes.*

Case description:

The subject was a 38-year-old female housewife who presented with right foot pain. The clinical impression was formulated based on the combination of traditional physical therapy examination procedures findings of the plantar fascia demonstrating thickness and tendinosis like changes within the plantar fascia 3 cm distally from the calcaneus. Pain was worst at the morning time but after some time it reduces , but at long standing and when she stood after siting to standing she felt intense pain.

Outcomes:

The patient was seen for twelve treatment sessions over four weeks, at which time the goals of normal ankle dorsiflexion, no pain with palpation of the plantar fascia, and no reported pain during gait were achieved, and she hasn't pain after changing the posture from sitting to standing and pain is also reduce when she stood for long time. No intense pain present when she worked .

Discussion:

This case report represent that the effect of IASTM in plantar fasciitis was more fruitful after giving the cryotherapy. IASTM followed by two repetitions of 30 seconds static stretching and 20 minutes of icing IASTM followed by two repetitions of 30 seconds static stretching and 20 minutes of icing,as a method to objectively assess the pain in patients with plantar fascia . This was used to determine the optimal location for the application of IASTM during the conservative management of plantar fasciitis.

Keywords- Cryotherapy,Instrument Assisted Soft Tissue Manipulation, ROM of Knee joint, Plantar fasciitis

I. INTRODUCTION

Plantar fasciitis is the result of collagen degeneration of the plantar fascia at the origin, the calcaneal tuberosity of the heel as well as the surrounding perifascial structures.[1] plantar fascia is helpful to maintain the biomechanics of foot, helpful to main the arch of the foot . it act as a shock absorber. the diagnosis containing the segment "itis," this condition is notably characterized by an absence of inflammatory cells[2].[1]

The inflammation at the ankle joint cause plantar fasciitis by which person has difficulty in walking,and deposition of calcium and phosphorous which commonly called calcaneal spur is also a cause of plantar fasciitis.

Plantar fasciitis is a common condition causing medial heel and arch pain.[12-14] Plantar fasciitis is the most common foot condition seen in clinical practice, which affects about two million Americans annually. There is a life span incidence of plantar fasciitis of about 10%.[1] It has been reported that the prevalence of plantar fasciitis is between 11 to 15% of all foot symptoms, with a higher occurrence between the ages of 40 and 60.[1,15] Risk factors for the development of plantar fasciitis including obesity, prolonged standing, poor ankle biomechanics, a decreased medial arch height, leg length inequity, heel spurs, and sports activities such as running. Plantar fasciitis accounts for about 10% of all running related injuries.[1,15] With conservative management it has been reported that 80% of the cases will have symptom resolution within 12 months.[16]

It is believed that plantar fasciitis is the result of prolonged loading resulting in adaptive changes in the fascia.[1] It has been related to degenerative changes in the plantar fascia resulting in tissue thickening, which could include proliferation of fibroblasts and a perpetuating inflammatory cycle.[15] The localized healing responses results in the production of new connective tissue, which is laid down

in a disorganized fashion and will cause the formation of adhesions and thickening of the plantar fascia.[15]

It has been reported that the use of instrument assisted soft tissue mobilization (IASTM) is beneficial.[17] IASTM is a modality that allows clinicians to achieve a localized and deep penetration of tissues, while reducing stress placed on the hands and fingers of clinicians.[18] Although the exact effects of IASTM remain elusive, mechanical forces caused by the IASTM might result in localized tissue trauma leading to stimulation of the body's natural inflammation and healing processes.[19] The proposed benefits of IASTM are at the molecular and cellular level.[19,20]It has also been proposed that IASTM may decrease pain through the stimulation of mechanoreceptors within the tissues resulting in the inhibition of nociceptor activity.[20] This decrease in localized pain may contribute to increased range of motion, reduction of tissue tension, increase in tissue extensibility and producing normalization of neuromuscular movement patterns.[20] IASTM followed by two repetitions of 30 seconds static stretching and 20 minutes of icing resulted in clinically meaning changes in active range of motion. The exact dosing of IASTM is not clear, however, recommended treatment time ranges from a few minutes up to 20 minutes.[23]

Clinical Presentation:

The patient (a women with 38 years of age)experienced a sudden onset of heel pain after awake first couple of steps. Her pain was typically worse with weightbearing .Differential diagnosis consisted of calcaneal contusion, calcaneal stress fracture, inflammation of fascia pain at the mid tarsal or subtalar joints, and plantar fasciitis or plantar fascia rupture. Due to the fact that her plain radiographs were showed the calcaneal spur. The fact that weightbearing/ loading activities continued to provoke her symptoms in the heel and medial arch led the authors to the discern that the plantar fascia was the underlying cause of the subject's symptoms. She reported an unremarkable medical history with a negative general health screen ; therefore, further examination of this subject was appropriate. Examination included pain assessment and joint mobility assessment followed by soft tissue assessment to further identify related tissues contributing to the subject's presentation.

II. EXAMINATION

She reported pain in the right foot during the first couple of steps. She appeared comfortable when seated. Findings of this, including AROM, arthrokinematic motion assessment, and strength assessment Visual inspection in standing revealed a forward head posture, an increased thoracic kyphosis, increased lumbar lordosis, minimal knee valgus on the right, pronation of the calcaneus R>L, pes planus valgus R>L, and minimal hallux valgus on the right. Poor postural positioning can be attributed to a variety of musculoskeletal dysfunctions, which include ankle/ foot pain, knee pain, hip pain, and lower back pain.[35-37]

Visit	**1 (Initial visit)**	**2**	**3**	**4 (Reexamination)**	**5**	**6**	**7**	**8 (Reexamination)**
NPRS heel	3	2	1	1	1	1	0	0
NPRS arch	6	4	4	3	2	1	1	0
LEFS	39			24		11		0
Ankle DF-knee straight (degrees)	5 (17 on the left)	11	15	16	16	15	15	18
Ankle DF knee flexed (degrees)	8 (22 on the left)	12	17	17	18	18	20	20
MTP Dorsiflexion with ankle plantar flexion	65			65				65
Knee flexion/ Extension	Normal compared to left			Normal compared to left				Normal compared to left
Hip flexion/ internal rotation / extension	Normal compared to left			Normal compared to left				Normal compared to left
Arthrokinematic	decreased posterio			Normal posterior glide				Normal posterior glide

assessment	r glide talus Increased medial glide calcaneus Increased plantar glide navicular			talus Increased medial glide calcaneus Increased plantar glide navicular				talus Increased medial glide calcaneus Increased plantar glide navicular
Neurovasuclar testing	(-) Tinel at tarsal tunnel (-) SLR (-) pulse palpation			(-) Tinel at tarsal tunnel (-) SLR (-) pulse palpation				(-) Tinel at tarsal tunnel (-) SLR (-) pulse palpation
Windlass test	(+)			(+)				(-)
Strength (MMT)	R Triceps surae complex graded 4/5 R Tibialis posterior 3+/5 R Gluteus medius/ minimus 4-/5 Flexor digitorum 4/5			R Triceps surae complex 4+/5 R Tibialis posterior 4/5 R Gluteus medius/ minimus 4/5 Flexor digitorum 5-/5				Triceps surae complex 5/5 Tibialis posterior 4+/5 Gluteus medius/ minimus 5-/5 Flexor digitorum 5/5

NPRS = Numeric Pain Rating Scale; LEFS = Lower Extremity Functional Scale; SLR = straight leg raise

III. DISCUSSION

In this case report , the management of a 38-year-old woman who was presenting with heel and arch pain limiting her work ability. Based on a cluster of evaluation findings, including ASOS, length and strength assessment appeared that this subject presented with plantar fasciitis. The therapeutical benefit of IASTM is based on the tissue friction effect by the tool believed to increase local blood flow. Additionally, the use of the tool could cause localized tissue trauma resulting in an inflammatory cascade within the tissue.[20-22] This observation does not support any circulatory benefits of IASTM to the plantar fascia in this case. Because no cause and effect relationships can be inferred from this case report, future studies should use other method to evaluate the effect of IASTM on the circulation in the different layers of human tissues in larger sample sizes. Instrument Assisted Soft Tissue Mobilization (IASTM) is an intervention that allows clinicians deep penetration to treat tissues. The mechanical forces caused by IASTM might cause localized tissue trauma leading to stimulation of the body's natural inflammation and healing processes. The objective of this study was to determine the effectiveness of IASTM for decreasing pain and increasing function in participants with plantar heel pain.

IV. RESULT

In this case report I think that cryotherapy has also had an effect to reduce the pain because it reduces the nerve conduction velocity and reduces the inflammatory response also and IASTM also work on to reduce the inflammatory response. So subject saw the effect of the IASTM and she has found relief from the pain, due to which her joint ROM increases. Subject returned her daily work.

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Molecular Identification And Detection of Virulence Genes Among Pseudomonas Aeruginosa Isolated From Different Infectious Origins

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Abstract- Background and Objectives: *Pseudomonas aeruginosa possesses a variety of virulence factors that may contribute to its pathogenicity. The aim of this study was to evaluate oprI, oprL and toxA genes for PCR identification of clinical P. aeruginosa. In order to find out any relation between special virulence factors and special manifestation of P. aeruginosa infections, we detected virulence factors among these isolates by PCR. Ribotyping was used to evaluate the clonal relationship between strains with the same genetic patterns of the genes studied.*

Materials and Methods: *In this study, 268 isolates of P. aeruginosa were recovered from burn, wound and pulmonary tract infections. The prevalence of oprI, oprL, toxA, lasB, exoS and nan1 genes was determined by PCR. One hundred and four isolates were selected randomly to investigate clonal diversity of the isolates with ribotyping using SmaI.*

Results and Conclusions: *All P. aeruginosa isolates in this study carried oprI, oprL and lasB genes. Difference between exoS prevalence in isolates from pulmonary tract and burn isolates was statistically significant. Prevalence of nan1 and toxA gene was significantly higher in pulmonary tract and burn isolates, respectively. Ribotyping showed that most of the isolates (87%) belonged to clone A and B.*

Detection of oprI, oprL and toxA genes by PCR is recommended for molecular identification of P. aeruginosa. Determination of different virulence genes of P. aeruginosa isolates suggests that they are associated with different levels of intrinsic virulence and pathogenicity. Ribotyping showed that strains with the same genetic patterns of the genes do not necessarily have similar ribotype patterns.

Keywords- Pseudomonas aeruginosa, ribotyping, virulence factors

I. INTRODUCTION

Pseudomonas aeruginosa is an opportunistic pathogen capable of infecting virtually all tissues. Pulmonary tract colonization with mucoid *P. aeruginosa* is a major cause of morbidity and mortality in patients with cystic fibrosis (1). *P. aeruginosa* infections in hospitals mainly affect the patients in intensive care units and those having catheterization, burn, and/or chronic illnesses (2).Although conventional microbiological methods for identifying *P. aeruginosa* from clinical and environmental samples are reliable, they require several days to be completed. Rapid detection of isolates causing hospital infections is very important for consequent treatment decision of patients.

PCR has the potential for identifying microbial species rapidly by amplification of sequences unique to a particular organism (3). L and I lipoproteins are two outer membrane proteins of *P. aeruginosa* responsible for inherent resistance of *P. aeruginosa* to antibiotics and antiseptics. As these proteins are found only in this organism, they could be a reliable factor for rapid identification of *P. aeruginosa* in clinical samples (4-6). *P. aeruginosa* also has a large number of virulence factors such as exotoxin A, exoenzyme S, elastase and sialidase which are tightly regulated by cell-to-cell signalling systems (7). Protein biosynthesis is inhibited by exotoxin A and virulence factor exoenzyme S is secreted by a type III section system (8, 9). A zinc metalloprotease called Las B has an elastolytic activity on lung tissue (10). The gene called *nan1* encodes a sialidase that is responsible for adherence to the respiratory tract (11).

In epidemiologic studies, dissemination of resistant and highly virulent pathogens is also the main problem worldwide. Because of highly conserved rRNA sequences among the eubacteria, chromosomal DNA restriction fragment length polymorphism of rRNA genes (ribotyping) is a powerful approach to discriminate strains, between and within species (12).

In this study, we examined rapid identification of *P. aeruginosa* isolated from pulmonary tract, wound and burn samples based on PCR amplification of I lipoprotein (*oprI*) for detection of genus and L lipoprotein (*oprL*) for detection of species of this organism. The *toxA* gene was also examined to evaluate molecular detection of the isolates by this factor. Furthermore, in order to find any relation between special virulence factors and special manifestation of *P. aeruginosa* infections, we detected *exoS, nan1*, *lasB* virulence factors among these isolates by PCR. Ribotyping was also used to evaluate the clonal relationship between strains with the same genetic patterns of the genes studied in this research.

II. MATERIALS AND MTHODS

Bacterial strains and identification test. Totally 268 *P. aeruginosa* isolates including 100 strains recovered from burn, 50 from wound and 118 from pulmonary tract infections were obtained from patients admitted in four hospitals in Kanpur, India. Each strain was identified on the basis of colony morphology and conventional biochemical testes (13).

Preparation of bacterial DNA. All isolates were inoculated aerobically on tryptose soy broth for 18–24 hour at 37° C. Bacterial DNA extraction was performed using phenol-chloroform method as previously described (14).

Detection of virulence genes by PCR. PCR amplifica- tions of the *oprI, oprL, toxA, exoS, nan1* and *lasB* genes were performed in 25 µl reaction mixture containing 0.5 µl of dNTPs (10 mM), 0.5 µl of each primer (10 pmol), 1.5 µl $MgCl_2$ (25 mM), 0.2 µl *Taq* DNA polymerase (5 U/µl) (Fermentas, Lithuania) (3, 4, 15). Each gene was amplified separately. *Pseudomonas aeruginosa* ATCC 27853 and *E. coli* ATCC 25922 were used as positive and negative control respectively. PCR products were visualized by electrophoresis using a 1% agarose gel stained with ethidium bromide.

Ribotyping. Ribotyping was performed as described previously (16). In brief, the extracted DNA from *P. aeruginosa* strains was cleaved by *Sma*I restriction endonuclease (Fermentas, Lithuania). The fragments were separated by electrophoresis and then transferred to nylon membrane by vacuum blotter (Bio-Rad Laboratories, Hercules, CA). Hybridization was performed by probes labeled with digoxigenenin. The membrane was then visualized by NBT (nitroblue tetrazolium) and BCIP (5-bromo-4-chloro-3-indolyl phosphate).

Statistical method.

The distribution of virulence genes with respect to strain origin was compared using the Chi square test**.**

III. RESULTS

The *oprI* and *oprL* genes were detected in all of268 *P. aeruginosa* isolates collected. However, presence of *toxA* gene in clinical samples was different. According to Table 1 the presence of *toxA* gene in isolates from burn was significantly higher than pulmonary tract ($P < 0.05$).Our results showed that all tested isolates harbored *lasB* gene. However, difference between *exoS* prevalence in isolates from pulmonary tract and burn isolates was statistically significant ($P < 0.05$). The *nan1* gene, other virulence factor studied in this research, was found in 55 (46.6%) of 118 isolates from pulmonary tract, 15 (30%) of 50 from wound and 4 (4%) of 100 from burn specimens. The prevalence of *nan1* gene was significantly higher in isolates of pulmonary tract than burn specimens ($P < 0.05$). There was a borderline significant difference in the prevalence of *nanI* gene among the isolates from pulmonary tract and wound infections. Furthermore, the prevalence of *nan1* among wound isolates was signi- ficantly higher than burn isolates ($P < 0.05$) (Table 1).

Table 1. Prevalence of *toxA*, *exoS* and *nan1* among *P. aeruginosa* obtained from various sources.

	1	2	3	
Virulence gene	Wound (%) (n = 50)	Burn (%) (n = 100)	Pulmonary tract (%) (n = 118)	(Chi square test)
toxA+	45 (90)	97 (97)	101 (85.6)	*0.004 = (2,3)
exoS+	31 (62)	67 (67)	56 (47.4)	*0.004 = (2,3)
nan1+	15 (30)	4 (4)	55 (46.6)	(1,2) = 0.000= (1,3(* *0.000 = (2,3(* 0.04

Table-2 Various genetic groups of *P. aeruginosa* isolates according to the presence of virulence genes. *oprI*, *oprL* and *lasB* occurred in all isolates.

Genetic Group \ Isolate	Wound	Burn	Pulmonary tract	Total
I	14	3	16	33
II	1	1	31	33
III	17	36	33	86
IV	13	57	21	91
V	2	2	2	6
VI	3	1	7	11
VII	0	0	5	5
VIII	0	0	3	3
Total	50	100	118	268

group I: presence *toxA*, *exoS* and *nan1*; group II: presence *toxA* and *nan1*; group III: presence *toxA* and *exoS*; group IV: presence *toxA*; group V: presence *exoS*; group VI: non-existence *toxA*, *exoS* and *nan1*; group VII: presence *exoS* and *nan1*; group VIII: presence *nan1*.

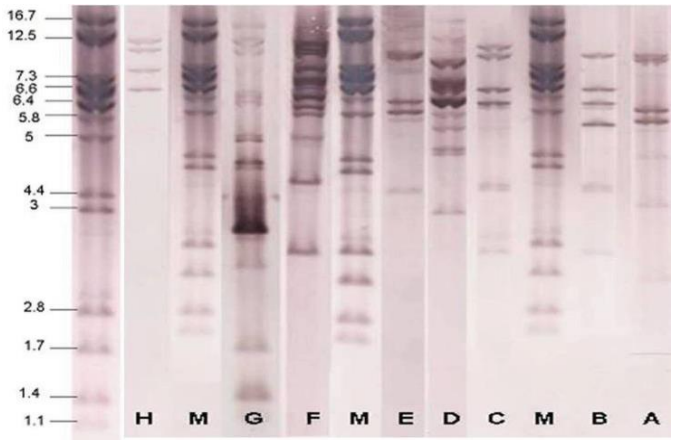

Fig. 1. Ribotyping of *P. aeruginosa*. M ribotype is related to *Citrobacter koseri* CIP 105177 (Grimont 32) that selected as marker.

Table 3. Numbers and ribotype patterns for genetic groups of *P. aeruginosa* isolates.

Isolate \ Genetic group	I	II	III	IV	V	VI	Total
Wound	11 (8A, 3B)	1 (1B)	11 (6A, 4B, 1E)	13 (2A, 10B, 1C)	1 (1D)	3 (2C, 1F)	40 (16 A ,18B, 3C, 1D, 1E, 1F)
Burn	2 (2A)	0	19 (17A, 2B)	10 (7A, 3B)	0	3 (Wound 11 (8A, 3B))	34
Pulmonary tract	4 (4A)	12 (4A, 6B, 2C)	4 (4B)	4 (1A, 2B, 1D)	1 (1B)	(1A, 2B, 2D)	(10A,15B,2C ,3D)
Total	17 (14A, 3B)	13 (4A, 7B ,2C)	34 (23A, 10B, 1E)	27 (10A, 15B, 1C, 1D)	2 (1D, 1B)	11 (2A, 2B, 2C, 2D, 1F, 1G,1H)	104 (53A, 36B, 5C, 4D, 1E, 1F, 1G, 1H)

IV. CHARACTERIZATION OF *PSEUDOMONAS AERUGINOSA*

The isolates were divided into 8 genetic groups (I-VIII) based on the presence of six genes amplified by PCR (Table 2).

Of 8 genetic groups obtained from PCR results, 104 isolates were randomly selected to investigate clonal diversity of the isolates by ribotyping. Ribotyping patterns of the isolates compared by visual inspection. Ribotyping analysis generated 8 distinct patterns (A-H) (Fig. 1). These isolates were distributed in ribotypes A (53 isolates), B (28 isolates), C (5 isolates), D (4 isolates), E (1 isolate), F (1 isolate), G (1 isolate) and H (1 isolate) patterns (Table 3).

V. DISCUSSION

Identification of *P. aeruginosa* has traditionally relied on phenotypic methods. This still is the most accurate standard when dealing with typical isolates of *P. aeruginosa*. In cystic fibrosis (CF) patients,*P. aeruginosa* isolates display unusual phenotypic reactions (17). Moreover, biochemical testing takes long time to perform and requires extensive hands- on work by the technician and for ongoing evaluation. Molecular methods have been reported to be superior to the phenotypic methods for identification of *P. aeruginosa* (17).De Vos *et al*. (1997) by designing a multiplex PCR assay based on *oprI* and *oprL* genes for molecular detection of *P. aeruginosa* showed that the specificity and sensitivity of the PCR assay were 74 and 100%, respectively (4). Lavenir *et al.* also noted that all of *P. aeruginosa* strains contained the *oprI* and *oprL* genes (sensitivity = 100%, specificity = 80%). Similarly in this study, all of the 268 isolates were remarkably positive for both *oprI* and *oprL* genes (18).According to these studies, detection of *P. aeruginosa* by PCR of *oprI* and *oprL* genes has a high sensitivity but a low specificity. The reason of low specificity of *oprI* and *oprL* genes is that, although the entire genome of *P. aeruginosa* has been sequenced, the genomes of its closest relatives have not. Thus, presence of false positive results among other species of bacteria during PCR assay of *oprI* and *oprL* genes indicate that they may have some similar sequences to *oprI* and *oprL* genes in their genomes (17). Consequently, use of only single gene target for molecular identification of *P. aeruginosa* potentially suffers from the same polymorphisms that complicate biochemical identification of this organism.Khan and Cerniglia also developed a PCR. procedure to detect *P. aeruginosa* by amplifying the *toxA* gene (3). They reported that of 130 tested *P. aeruginosa* isolates, 125 (96%) contained the *toxA* gene (sensitivity = 96%), whereas other species of bacteria did not yield any positive results (specificity = 100%). Qin *et al*. and Lavenir *et al.* also reported similar results. These studies indicate that, unlike *oprI* and *oprL* genes, detection of *P. aeruginosa* by PCR of *toxA* gene has a high specificity but a low sensitivity (17, 18). In this study our results also showed that 243 (90.7%) of 268 isolates harbored *toxA* gene.

The *ptxR* gene, expression enhancer of *toxA* gene, was only detected in *P. aeruginosa* isolates; whereas other species of *Pseudomonas* did not yield any positive results (19). Low sensitivity with *toxA* PCR screening is due to the fact that some isolates of *P. aeruginosa* do not carry this gene naturally.

Pathogenicity of *P. aeruginosa* is clearly multifactorial. LasB is one of the most important proteases of *P. aeruginosa* (20). In this study all isolates examined harbored *lasB* gene. This finding is in agreement with previous reports (20-21). Mutation of *lasB* gene reduces markedly *P. aeruginosa* invasion (22). Prevalence of the *lasB* gene in all the environmental and clinical isolates implies the importance of LasB factor to survival of *P. aeruginosa* in various settings.

P. aeruginosa isolates generally express cytotoxicity or invasion phenotypes which is correlated with presence of *exoU* (encoding exotoxin U) or *exoS* (encoding exotoxin S) respectively (23). In our study difference between *exoS* prevalence in the isolates from pulmonary tract and burn infections was statistically significant ($P < 0.05$) (Table 1).

The proportion of isolates from pulmonary tract infections that exhibited *exoS* (47.4%) in this study was lower than that previously reported (20, 15, 24, 25). The conflicting results of these studies may be due to differences in the number of clinical isolates from different sites or due to the isolates from patients with different clinical and physiological conditions (20, 24)

About the *nan1* gene, the other virulence factor studied in this research, we found that the prevalence of *nan1* was significantly higher in isolates from pulmonary tract than isolates from burn ($P < 0.05$). Furthermore, the prevalence of *nan1* among the isolates from wound was significantly higher than burn ($P < 0.05$). Similar to our results, Lanotte *et al.* reported that 7 (41.2%) of 17 wound isolates and 12 (48%) of 25 pulmonary tract isolates contained *nan1* gene. This gene has probably A role in CF pulmonary disease evolution as previously described (15). The low prevalence of this factor among isolates from burn infections may show that the role of this gene in the burn infections is less important than wound and pulmonary tract infections.

The differences in the distributions of virulence factor genes in the populations strengthen the probability that some *P. aeruginosa* strains are better adapted to the specific conditions found in specific infectious sites (15).

The isolates in this study were divided into 8 genetic groups (I-VIII) based on presence of the investigated virulence genes in the isolates. There was no correlation between clinical origin of *P. aeruginosa* isolates and their distribution in the 8 genetic groups (Table 2).

Although ribotyping is slightly less discriminatory than pulsed field gel electrophoresis (PFGE) (26), the high rate of interlaboratory reproducibility and the speed of the generation of results make this method a valuable approach for characterization of clinical bacteria (12). Ribotypoing demonstrated 8 distinct ribotype patterns (A-H). Fifty-three (51%) and 38 (36%) isolates belonged to ribotype pattern A and B, respectively. Indeed, most of the isolates (87%) belonged to ribotype pattern A and B. There was no significant meaningful correlation between genetic groups and ribotype patterns.

In conclusion, it seems that simultaneous use of *oprI*, *oprL* and *toxA* genes provides more confident detection of *P. aeruginosa* by PCR. Determination of different virulence genes of *P. aeruginosa* isolates suggests that they are associated with different levels of intrinsic virulence and pathogenicity. This may have different consequence on the outcome of infections. Significant correlations between some virulence genes and source of infections obtained in this research indicates that more further studies is required for finding out the actual role of these genes in different clinical infectious caused by *P. aeruginosa*. Ribotyping showed that strains with similar virulence genes do not necessarily have similar ribotype patterns. However, clonal spread of highly virulent isolates of *P. aeruginosa* within hospitals needs to apply additional precautions in clinical settings.

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POST-OPERATIVE COMPLICATION ASSOCIATED WITH ORIF IN LOWER LIMB AND ITS PHYSIOTHERAPY MANAGEMENT (DEEP VEIN THROMBOSIS)

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Abstract

Background: The development of a thrombus, or blood clot, in a deep vein is known as deep vein thrombosis(DVT).Thrombophlebitis, another name for clot, is an condition in which vein becomes inflamed. The leg's femoral vein or popliteal vein are frequent affected in DVT. Pulmonary embolism (PE), an major cause of DVT which mainly occur when lungs get affected due to blood clots. Medical emergency can also occur because pulmonary embolism is an life threatening condition. **Treatment:-**DVT affect the elderly population, with an slight male sex preferences. Clinically symptoms vary based on obstruction and blood vessel wall inflammation and are often asymptomatic. Diagnosis of DVT is based on some popular test. These test are D-dimer test and compression . . Ankle pumps, Knee motion, heel raise, Straight leg raise these are the treatment which were given to the patient for the treatment of DVT. **Results**: DVT is an clinical condition that carries some risk because it can result in pulmonary embolism, as a result it requires prompt diagnosis and treatment . DVT, consulting a physiotherapist for DVT treatment and prevention is the recommended plan of action if you are prone to the condition. Physical therapists have extensive knowledge of the anatomy and the responses of the body to various stimuli. Being active is the first step in treating DVT. Ankle pumps, Knee motion, heel raise, Straight leg raise these are the treatment which were given to the patient for the treatment of DVT

Keyword

DVT; D-dimer test; Thrombus; Venography; Embolism, Ankle toe , Heel Raise, Knee Motion straight leg raise tech(SLR)

Introduction:-

A-spot where bone tissue is no. completely continuous. Fracture is the medical term for this condition, which can affect any bone in the body. There are numerous ways that bones can shatter, including closed fractures, which do not harm the surrounding tissue.

Due to the increased danger of infection in compound fractures, which also damages surrounding tissue and penetrates the skin, they are more serious than typical fractures.

A surgeon uses a medullary nail, plate, and screw for broken bone reduction and internal fixation. When the bone fracture has breached the skin, it is utilized to heal badly displaced or open bone fractures. A procedure known as open reduction and internal fixation (ORIF) is performed to stabilize and cure shattered bones. Open reduction contrasts with closed. reduction, which can be accomplished without requiring surgery, in that the damaged bone is corrected during the "open" technique of surgery.Internal fixation describes the devices (screws, plates, or rods) utilized to stabilize the bone.ORIF is a two-stage operation that is completed in a single step.

In the final stage, the fractured bone is corrected and repositioned. This is what we mean by fracture. Reduction

Metal implants are utilized to hold the fractured bone together during the second step, also referred to as internal fixation the surgeon places the metal implant inside or on top of the broken bone. These hold the bone in place as the fracture heals. Bone alignment is only ideal in clean wounds.

In some cases, your consultant may use external fixation (metal pins in the bone above and below the fracture site held together with rods like scaffolding) to stabilise the bone while it heals. The pins and screws project out of the skin and are attached to metal or carbon fibre bars. They are removed once the bones are sufficiently healed or are ready to be changed to internal fixation devices.

After postoperative care, osteomyelitis infection, malunion, delayed union, joint stiffness, myositis ossification, and osteonecrosis, deep vein thrombosis is a more frequent complication (1).

Second-worst scenario, if the infection cannot be managed and your life is in jeopardy, the limb may need to be amputated. It is essential to make an effort to prevent infection because of this. The surgically repaired bone will be immobilized with a sling, cast, or splint following the treatment to allow the fracture time to heal. How quickly you recover depends on a number of factors, including your age, the severity of the fracture and skin damage, the presence of an infection, and other factors. Following surgery, you can be prescribed a course of antibiotics and get physiotherapy to assist prevent(2)

In prosperous countries, venous thromboembolic disease is thought to affect one in 1000 persons annually.1 Although it can occur in other veins, such as those in the brain, limbs, retina, and mesentery, deep vein thrombosis of the leg is the most common symptom of the disorder.

It will cause death if it is not treated quickly. One of the morbidities linked to deep vein thrombosis is the post-thrombotic syndrome, which is brought on by chronic venous hypertension and results in limb discomfort, swelling, hyperpigmentation, dermatitis, ulcers, venous gangrene, and lip dermatosclerosis.

After surgery, we discover that the patient has DVT due to pain and oedema. Based on the patient's medical history and physical symptoms, the clinical diagnosis of deep vein thrombosis of the lower limbs screening tests for deep vein thrombosis. The patient was shown to have a strong negative predictive value for the screening test, which can be utilized as a rule-out test to lessen the requirement for

the necessity for an urgent screening test that can be carried out is paramount. Centred on the use of plethysmography and D- While there are some exercises you may do on your own to reduce your chance of developing DVT, consulting a physiotherapist for DVT treatment and prevention is the recommended plan of action if you are prone to the condition.

Physical therapists have extensive knowledge of the anatomy and the responses of the body to various stimuli. Being active is the first step in treating DVT. If you can, you must go for regular walks. Spend a few minutes standing up, walking down the hall, and then coming back if you work at a desk.

2: Screening investigations for deep vein thrombosis

D-dimer tests-Laboratory tests: Enzyme linked immunosorbent assay (ELISA) Latex agglutination.

- Near patient tests: Simpli RED (agglutination test) Simplify (immune chromatography test)
- Plethysmography-Digital photo plethysmography
- Strain gauge plethysmography
- Impedance plethysmography

D dimer evaluations Plasma D-dimers are

Particular cross-linked derivatives of fibrin that are formed when fibrin is destroyed by plasmin, and their quantities are higher in individuals with venous thromboembolism.

High D- dimer concentrations, while sensitive for venous thromboembolism, aren't adequately specific for a positive diagnosis because they frequently occur in other situations such cancer pregnancy and post-operative recovery. However, when combined with clinical probability and plethysmographs,

D-dimer tests typically show a high negative predictive value and are helpful rule-out tests that decrease the necessity for imaging. (3,4,5,6)

Plethysmography

Plethysmography is the word used to describe the recording of change in limb size brought on by tissue fluid or blood that has accumulated in the vein. This measurement can be undertaken in various ways: photo plethysmography, strain gauge, and electrical impedance.

Digital photo plethysmography –

Photo plethysmography depends on the absorption of light by haemoglobin in the red cell. Digital photo plethysmography is assisted by a microprocessor, and the test is easy to perform. (7) A digital measurement probe is placed on the skin, 10 cm above the medial malleolus of the affected leg 1). The patient then rests for 45 seconds after doing 10 dorsiflex of the foot in accordance with standard technique. Based on the characteristics of the reflected light the venous refilling time is calculated and presented as a printed graph (fig 2) in one study of 180 hospital inpatients a venous refilling time of longer than 20 seconds excluded a deep vein thrombosis and had a sensitivity of 100% and a specificity of 47%.(7) Digital photo plethysmography is a simple screening test to perform, but bigger studies are needed to evaluate its usefulness fully.

Computerised strain gauge plethysmography-

The principle behind computerised strain gauge plethysmography is to measure changes in calf dimensions while venous outflow is occluded by inflation of a thigh cuff. (8) The rate of decrease in calf size when this occlusion is removed is a measure of venous outflow. The norm in healthy venous systems is rapid emptying. With the presence of proximal vessels, outflow is obstructed. The stain gauge is calibrated using and measurements of blood flow in the leg are computed. The method can be

carried out with little training, and the test can be completed in 15 minutes. One study of 307 consecutive patients showed a sensitivity of 90% for proximal (popliteal, femoral, or iliac vein) deep vein thrombosis and 66% for distal (calf vein) deep vein thrombosis.(8)

Impedance plethysmography-

Impedance plethysmography relies on the principle that the volume of blood in the leg affects the blood's ability to conduct an electrical current, which is inversely proportional to the impedance between two electrodes placed along the calf. A cuff is inflated around the thigh to obstruct venous outflow but not arterial inflow. As blood accumulates in the leg below the cuff, impedance between the calf electrodes falls. The sudden release of the cuff results in the blood volume of the leg decreasing, resulting in a rapid increase in impedance. Obstruction to venous flow such as with a deep vein thrombosis causes a reduction in the rate of venous emptying (and slower increase in impedance) than normal. (9)

Definitive investigations for deep vein thrombosis

- Venography
- Ultrasonography: Compression ultrasound Duplex ultrasonography Colour coded Doppler ultrasonography.
- Computed tomography.
- Magnetic resonance imaging

A D-dimer test and ultrasonography are two other approaches. According to some research, patients who had a normal initial ultrasound test and a normal D-dimer concentration did not require a second ultrasound scan. (10)

These are the diagnostic approach to diagnose the Deep vein thrombosis. To prevent the deep vein thrombosis, we should start the pre and post operative physiotherapy treatment. No doubt that doctor prescribed some medicines to reduce the DVT.

TREATMENT: -

Anticoagulation is a crucial part of treatment.

Patients with DVT can mostly be managed only with oral anticoagulants, with a few significant exceptions and catheter directed thrombolysis (CDT) may be recommended in the acute.(11,12)

The following can increase your risk of developing a DVT:-

1. Air travel, especially on long-haul flights
   - sitting or lying still for long periods of time
   - surgery or hospitalization
   - pregnancy and the first few weeks after giving birth
   - overweight or obesity
   - a previous history of a blood clot in your legs, chest or arms
   - varicose veins.
   - taking the oral contraceptive pill can also increase your risk of developing a DVT.

2.Major signs and symptoms to look out for: The affected limb will likely experience discomfortedema, warmth, and redness.Leg discolouration and edoema, or swelling of the ankle and foot, arefurther symptoms.These sensations frequently spread to the foot and toe

Physiotherapy Treatment for Deep Venous Thrombosis

DVT, consulting a physiotherapist for DVT treatment and prevention is the recommended plan of action if you are prone to the condition. Physical therapists have extensive knowledge of the anatomy and the responses of the body to various stimuli. Being active is the first step in treating DVT. If you can, you must go for regular walks. Spend a few minutes standing up, walking down the hall, and then coming back if you work at a desk.

The best exercises for this condition are:

Ankle pumps:

To perform, first point your toes away from your head before pulling them back.Perform quickly and use al l of your possible range of motion.Repeat at least 10 times every hour while you are awake.This straightfor ward workout promotes blood circulation and lowers the chance of clotting

Knee motion:

Place your foot flat on the ground while seated in a chair.For two to three minutes, carefully rock your kne e from side to side while keeping your foot on the ground.The ligaments around your ankle are stretched a nd relaxed as a result.

Heelraise:-

Stand with your hands in front of you and lean on a wall, countertop, or chair back for support during the h eel raise exercise.Step apart with your feet and slowlyraise and lower yourself onto your toes.Start with ro ughly 10 of them and increase the number to 20 or more.

Straight leg raises:

This is a simple exercise that aid to build muscle and increase circulation.
Lay on your back on the floor to perform. While keeping the other leg flat on the ground, bend one knee to a 90-degree angle. Lift the straight leg six inches off the ground while taking a slow, deep breath. Lower the leg after three seconds of holding the other leg and repeat.

After the surgery to prevent the Deep vein thrombosis lower limb of the patient position is that a pillow should be placed under the limb and take a step for patient to prevent the DVT is RICE which stand for rest , icing, compression, elevation.

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Influence of Respiratory Muscle Training and Balance Exercise in Children with Cerebral Palsy: A Randomized Controlled Trial

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ABSTRACT

The study's objective was to ascertain the effects of inspiratory muscle and balance training on children with hemiplegic cerebral palsy's (CP) pulmonary function, respiratory muscle strength (RMS), functional ability, and balance.

CONTENT AND METHODOLOGY:

This study comprised 30 kids with hemiplegic CP (Gross Motor Function Classification System I-II). The training group's programme (n = 15) contained inspiratory muscle training (IMT) in addition to CPRP for 8 weeks, whereas the control group's programme (n = 15) featured traditional physiotherapy rehabilitation programme (CPRP) that included balance exercises.

RESULTS:

The six-minute walk test (6MWT), RMS measurement, balance tests, and lung function tests served as the outcome measures. Pneumatic function, balance, and 6MWT distance score changes did not differ significantly between groups (p >.05), however the training group's maximum inspiratory and expiratory pressures increased even more (p >.05).

CONCLUSION:

The rehabilitative strategy for children with CP will benefit considerably from RMS assessment, the identification of kids who require it, and adding IMT to CPRP.

INTRODUCTION:

The term "cerebral palsy" (CP) refers to a set of illnesses characterised by aberrant muscle tone, movement, and posture that resulted from brain injury in the womb, at delivery, or in the early postnatal period.[1] Children with cerebral palsy experience issues with posture, mobility, postural control, and balance as a result of damage to the central nervous system, which also affects the musculoskeletal, neurological, and sensory systems. Cognitive, perceptional, sensory, and behavioral issues are frequently present in conjunction with CP's motor difficulties, as well as secondary musculoskeletal issues, epilepsy, and related impairments (such as vision or hearing loss, intellectual incapacity, or oral-motor issues).[2] Postural control is one of the most significant issues in children with CP.

For children with CP, maintaining the postural control required for performing daily activities is frequently a great challenge. Children with CP who struggle with balance-requiring gross motor tasks

like reaching or walking may experience issues due to the compromised postural control.[3, 4] Due to the clinical significance of motor dysfunction in CP, most treatment strategies concentrate on enhancing motor function and physical capacity.[5] However, in addition to the motor issues, children with CP also run the risk of pulmonary abnormalities.

A number of factors, including deformities of the spine and chest wall, reduced airway clearance, repeated aspiration, a poor cough mechanism, and nutritional condition, affect respiratory status in CP.[6] Respiratory issues, which are common in CP, contribute to increased morbidity and death. Children with CP may exhibit abnormal pulmonary function, such as poor airway clearance, weak respiratory muscles, and limited chest motion.[7, 8] When compared to children who are usually developing, children with cerebral palsy (CP) have lower pulmonary function, according to previous research.[9] In a few small trials, children with CP also had respiratory muscle weakness.[10, 11]

Children with cerebral palsy have lower respiratory muscle strength and more severe motor function, which are correlated.[8,12] Children with diplegic CP had weaker respiratory muscles than children with hemiplegic CP. IMT is frequently utilized to enhance lung function and respiratory muscle strength in a variety of conditions. Balance and respiratory muscle strength have been linked in several studies, and IMT has been shown to enhance balance in a variety of conditions.[13-16] To the best of our knowledge, three studies have looked at the results of respiratory muscle training in CP kids using various tools and methods.[17]

When the relationship between the strength of the respiratory muscles and balance is taken into account, improving balance can be accomplished via IMT. On the basis of this data, it is hypothesised that IMT may help children with hemiplegic CP balance and postural stability. In order to evaluate the effects of IMT and balance training on pulmonary function, respiratory muscle strength, functional capacity, postural control, and balance in kids with hemiplegic CP, this study looked at a number of different variables.

MATERIALS AND METHODS

For a period of 8 weeks, this prospective investigation was carried out as a randomized-controlled trial with a pretest/posttest design. The research was carried out in compliance with Rama University's approved guidelines. All parents provided their consents in writing and with full knowledge.

SUBJECT AND ENVIRONMENT

In order to participate in this study, 245 people with CP were screened. The inclusion criteria were being identified by a child neurology specialist as having hemiplegic CP (one side of the body is afflicted, addressed at the levels of "body function and structure" according to ICF), aged 7 to 16 years old, classed as Gross Motor Function Classification System. (GMFCS) level I or level II (was used to define the key points “activity and participation” according to ICF19) and having sufficient communication skills for understanding of spoken or written language. The exclusion criteria were orthopedic surgery and/or botulinum toxin – an injection in the lower extremity within the past 6 months, severe convulsions that could not be controlled by drugs.

SAMPLE SIZE

6MWT variable, which had the highest standard deviation of all the variables in our investigation, the sample size was determined. An increase of 66 m was attained in 6MWT of children with CP (500 60 m)

with IMT, resulting in an effect size of 1.1. According to our calculations, each group needs at least 15 participants in order to detect an improvement in the 6MWT with IMT with a 95% confidence level and an 80% power (1-) in our study.

MEASURES OF EVALUATION AND RESULTS:

DEMOGRAPHIC INFORMATION

The children's age, sex, topographic classification (right or left affected side), birth weight, type of birth, gestational age, auxiliary equipment use (if any), and medication use (if any) were all noted along with their demographic and clinical data. By calculating the body mass index (BMI) for each child, the height and weight were recorded. The GMFCS was used to determine the children's gross motor function levels. The same researcher assessed all of the kids in both groups before treatment and after the 8-week physiotherapy programme on both groups of kids.

BALANCE AND POSTURAL STABILITY

To measure balance and postural stability, the Biodex Balance System was employed.[18] A support handle, a display, a printer, and a platform with either static or dynamic modes (12 levels) make up the BBS. Before the assessment, all of the kids in both groups received a description of the test procedures. The Postural Stability Test (PST), Limits of Stability Test (LoST), and Test of Sensory Integration and Balance (TSIB) were the three BBS tests that were administered to the kids.

THE SIX-MINUTE WALK TEST (6MWT)

The Biodex Balance System (BBS; Biodex Medical Systems, Shirley, NY, USA) was used as a valid and a reliable device to quantify balance and postural stability. The BBS consists of a support handle, a display, a printer and a platform, which has a static mode or dynamic modes (12 levels). Descriptive information about the test steps were given to all children in both groups before the evaluation. Children underwent three tests for BBS: the Postural Stability Test (PST), Limits of Stability Test (LoST), and the Test of Sensory Integration and Balance (TSIB). Prior to the test, the kids relaxed in a chair not far from the starting position for 10 minutes. Blood pressure, oxygen saturation, and heart rate were then recorded both during this time and right after the test was finished. The Modified Borg Scale was used to assess levels of dyspnea and fatigue both before and after the test. The distance in metres was noted after six minutes. The test was conducted during the school day with the kids wearing orthotics when necessary.
PFTs were carried out using a COSMED Pony FX (COSMED; Italy) spirometer in accordance with the recommendations of the American Thoracic Society (ATS) and European Respiratory Society (ERS).[19] Peak expiratory flow (PEF), forced vital capacity (FVC), forced expiratory volume at 1 second (FEV1), and FEV1/FVC were all measured and represented as a percentage of the anticipated values. Each youngster was informed the manoeuvre before the exam, and a visual demonstration of it was also given. Before the test, the kids took a 10-minute break, and the best score from the three tests was accepted as the outcome. The child's unaffected hand was used to hold the device throughout the test.

ASSESSMENT OF RESPIRATORY MUSCLE STRENGTH

The ATS/ERS criteria22 were followed for measuring respiratory muscle strength using a portable, electronic pressure transducer (MicroRPM, Micro Medical, UK) with a stiff, plastic, flanged mouthpiece. After maximum inspiration and maximal expiration, respectively, the maximal inspiratory

pressure (MIP) and maximal expiratory pressure (MEP) were measured. The physical therapist described the manoeuvre to each child and gave them a visual demonstration before the measurement. During the evaluation, the kid held the device in their unaffected hand. Children in both groups of this study had their respiratory muscle strength assessed once a week. The most effective rating among the three

STATISTICAL ANALYSIS

Quantitative data are shown as means with standard deviations, whereas qualitative variables are shown as percentages. The SPSS V.20 programme (SPSS Inc., USA) was used to perform the statistical analyses. For the purpose of determining whether the data had a normal distribution, the Kolmogorov-Smirnov test was applied. Using the chi-square test, qualitative data from the two groups' analysis was evaluated. The comparison of pre- and posttest conditions within each group was done using the paired sample t-test. To examine group differences for the outcomes of the BBS, 6MWT, PFT, and respiratory muscular strength, independent samples t-tests were used. For all analyses, p .05 was considered as the significant level. Cohen's d results are 0.8 and represent the effect size (Cohen's d) and 95% confidence interval (lower and upper).

RESULTS:

225 individuals with CP diagnoses were screened for this study (Figure 1). Only 38 of the screened participants had hemiplegic CP, and of the 36 kids who met the inclusion and exclusion requirements, 30 (16 girls and 14 boys) agreed to participate, be randomly assigned, and be evaluated. Table 1 presents the demographic and clinical traits of the two groups, along with comparisons between them. Regarding the children's baseline characteristics, there was no statistically significant difference between the two groups (p >.05). When the mothers of the participants' children were examined during their pregnancies, it was discovered that all of the children were born through spontaneous pregnancies, and none of the moms had used assisted reproductive technologies. There were no discernible differences between the groups (p >.05); however, five children in the CPRP+IMT group and three children in the CPRP group both regularly used anticonvulsant medications.

The intervention programmes had no negative effects on either group during the trial, and the training sessions were highly received. The lung function, respiratory muscle strength, and functional capacity of the two groups' pre- and post-training values, as well as the training's effects, are all significantly different. In terms of lung function, respiratory muscle strength, functional capacity, postural stability, and balance evaluations, there was no difference between them at the start of the trial. The FVC (% predicted), FEV1 (% predicted), and FEV1/FCV% values did not differ substantially between the two groups (p >.05), but the MIP, MEP, PEF (% predicted), and 6MWT values did (p .001). The CPRP +IMT group considerably outperformed the CPRP group in terms of improvements to MIP and MEP values (p .001). Cohen's d values for the effect sizes in MIP and MEP were quite high (3.154 and 2.714, respectively).[20] After the treatment, there were no discernible variations in the PFT and 6MWT findings between the groups (p >.05).

Both groups' pre- and post-training postural stability and balance evaluation results, as well as the effects of the treatment, are clear. With the exception of the post-training postural stability and balance values for the TSIB subgroups "eyes closed firm surface" and "eyes closed foam surface," both groups showed

a considerable improvement. Regarding postural stability and balance changes following therapy, there were no statistically significant differences between the two groups.

DISCUSSION:

This study examined the effects of IMT and balance training on pulmonary function, respiratory muscle strength, functional ability, and balance in children with hemiplegic CP.

This is the first study that we are aware of that looked at how balance and IMT training affected balance and postural control in children with CP. This study's most significant discovery was that IMT increased the respiratory muscles' strength in kids with hemiplegic CP. Both groups saw improvements in their respiratory muscle strength, functional capacity, postural stability, and balance following the treatment, but there were no discernible variations in their pulmonary function (aside from PEF). PFT, functional capacity, postural control, and balance parameters did not significantly change between the two groups, however MIP and MEP values considerably increased in favor of the CPRP+IMT group.

The primary factor in both morbidity and mortality in CP is respiratory problems. The majority of rehabilitation strategies, however, are concentrated on enhancing motor function and maintaining current physical capacity because the limitation of functional activities brought on by motor dysfunction and the secondary problems linked to the musculoskeletal system are frequent in patients with CP. Clinical symptoms that hinder daily physical activity and stop the development of motor function in CP include poor air clearance, decreased chest wall mobility, and inadequate respiratory muscle function. Studies have shown that children with CP have weaker respiratory muscles than children with normal development, and they also have worse respiratory function.[21] The timing of the contraction of the trunk muscles during the movement of the extremities is correlated with the activation of the respiratory muscles; the regulation of the trunk and the extremities may include interaction with the diaphragm, which is the primary respiratory muscle. Reduced core stability, a prerequisite for good balance and ambulation, may result from impaired respiratory muscle activation.

People with chronic obstructive pulmonary disease have been shown to have less control of mediolateral stability and a higher risk of falling.[22] IMT has been shown to improve movement and balance in people with heart failure, multiple sclerosis, and neuromuscular diseases, according to a number of studies.[23] In this work, we tested the hypothesis that IMT strengthens the scalene muscles and diaphragm, enhancing thoracic stability and enhancing balance and postural control. We are aware of only one study that examined the impact of IMT for six weeks on postural control in CP children. The researchers found that IMT enhanced trunk control, with the exception of static sitting balance, which was measured using the Trunk Control Measurements Scale.

CONCLUSION:

In this study, it was discovered that children with hemiplegic CP had respiratory muscle impairment. The outcomes of this experiment show that IMT training combined with a CPRP may be a secure and beneficial way to increase the respiratory muscle strength in children with CP. Studies on various IMT approaches are required because it is unclear how IMT affects pulmonary function in children with CP. Balance exercises based on NDT can help CP children with their balance and postural control. PEF, respiratory muscle strength, functional capacity, balance, and postural control scores all increased in all children, demonstrating the significant effects balancing training had on these metrics. The association

between IMT and particular aspects of balance and postural control in children with CP, such as posture, spasticity, and peripheral muscular strength, has to be further researched.

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Kitchen Platform Also Cause The Spinal Pain In Females

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Abstract- *Scientific scrutiny of low back problems demonstrates its socio-economic importance in most industrialized societies. The patho-mechanics of low back pain is unknown. Physicians[1] are beginning to get better perception of what causes of pain psycho-social factors, PIVD, spondylolisthesis, OA, muscular imbalance etc or other pathological & bio-chemical factors.*

Material and Methods: *Patients from suspected cases of spinal pain were received in my clinic are kids or adults using mobile phones, laptops or computers and house-wives in kitchens. Females, who are working at high-platform kitchen at urban areas. Their posture leads to hyperextension [hyperlordosis] of lumbar spine that causes associates with hyper flexion of cervical spine and increase thoracic kyphosis and both knees are slightly flexed in posture.*

Result: *By the use of stepper for standing posture, reduce the load of knee joint. Use of high-stools for sitting posture, pressure of the Lumbar spine is much reduced. Modified kitchen platforms and therapeutic exercises leads to improve functional activities and posture by reducing pain and muscular imbalance. Spinal pain continues to be a major public health problem with an increasing trend. So, correction of hyperextension [hyperlordosis] of lumbar spine and hyper flexion of cervical spine, thoracic kyphosis and prevent the knees from flexion by therapeutic exercises, using high stools in kitchens during work, alternating changes of stepper under the leg and nutritional supplements for improve musculoskeletal nutritional status and modify the high-platforms in the kitchen.*

I. INTRODUCTION

Pain is a distressing feeling often caused by intense or damaging stimuli. It is a major symptom in many medical conditions, and can interfere with a person's quality of life. Now a day, it is very common problem in developing and developed countries. The pain may be characterized as a dull ache, shooting or piercing pain, or a burning sensation.

Back pain can affect people of any age, for different reasons. As people get older, the chance of developing lower back pain increases, due to factors such as previous occupation and degenerative disk disease. Low back pain and neck pain are the first and fourth leading causes of years lived with disability.

Lower back pain may be linked to the bony lumbar spine, discs between the vertebrae, ligaments around the spine and discs, spinal cord and nerves, lower back muscles, abdominal and pelvic internal organs, and the skin around the lumbar area. Pain in the upper back may be due to disorders of the aorta, tumors in the chest, and spine inflammation.

Spinal pain is divided into neck pain (cervical), middle back pain (thoracic), lower back pain (lumbar) or coccydynia (tailbone or sacral pain) based on the segment affected. The lumbar area is the most common area for pain, as it supports most of the weight in the upper body.

[2]Persistent pain interfering with daily activities is common. The prevalence of chronic pain in the adult population ranges from 2% to 40%. With a median point prevalence of 15%. The lifetime prevalence of spinal pain has been reported as 54% to 80%. Studies of the prevalence of low back pain and neck pain and its impact in general have shown 23% of patients reporting grade 2 to grade 4 low back pains versus 15% with neck pain.

The present study was conducted among females between the ages of 25-50 years. A total of 25 women between the ages of 25-50 years including in the study. A group of females are house-wives, working-women and females from rural areas. Females, who are house-wives, and spend 5-6 hours per day in the modular kitchen. Office Working ladies are spend 6-7 hours per day in front of computers or laptops. Females belongs from rural areas, spend 5-6 hours per day in the kitchen but in sitting position.

II. MATERIALS AND METHODS

Patients from suspected cases of spinal pain were received in my clinic are kids and adults using mobile phones and laptops or computers and house-wife in kitchens.

The women were interviewed using pre-structured. A detailed profile, obstetric and medical histories were collected. After through proper assessment, back pain was suspected.

A group of 5 females, who are working in kitchen at least 5-6 hours every day. So, because of long duration of standing posture, women get tired and take the support of high platforms in modular kitchens. [4]This posture leads to hyperextension [hyperlordosis] of lumbar spine that causes associates with hyper flexion of cervical spine and increase thoracic kyphosis and both knees are slightly flexed in posture. This poor posture leads to flattening of cervical lordosis [elongation of neck extensors and shortening of flexors], hyperlordosis of lumbar spine [Stretching/elongation of lumbar flexion muscles and shortening of lumbar extensors], flexed knee joint [shortening of hamstring]. Short muscles fibers caused hyper toned muscles and elongate muscle fibers caused weakness of muscles.

After proper assessment of these symptoms, we decided the therapeutic protocols for improve ADL and reduce pain and postural correction. In this therapeutic approach, we educate the patient for correct posture and range of motion exercises of cervical in every half an hour. Stretching exercise of neck flexors and spinal extensors and hip flexors and strengthening exercises of abdomen, gluteus and neck extensors. Quadriceps strengthening and hamstrings and calf static stretching.

Advice the patient to use stepper during work in kitchen to prevent hyperextension [hyperlordosis] of lumbar spine and reduce the stress of knee joint muscles. Also use the high-stools in the kitchen for sitting during work.

Working posture becomes an important factor while designing ergonomically sound tools, equipment and workstation or platform. Platform is nor too high or nor too low. Platform height of the kitchen is at the level of umbilical region. So the need for assessing reduction of muscular stress on the women worker with the use of improved tools and implements was felt so that the women can be persuaded to use the effective improved equipment to ensure right work posture for the selected activities and can have least fatigue and discomfort to the body.

Good body posture and ergonomics are, therefore, important for the homemaker who spends major portion of her time performing household tasks. Her working arrangements should be ergonomically correct to enable her good body posture. She should be able to stand or sit at the place of her work without having to stoop, stretch or climb to do the work in hand. Advice the patient to reduce the body weight and improve dietary status according to patient's nutritional requirements.

5 women from the second group used to work in the office. They continue spend 6-7 hours in computer work. So, because of long duration of sitting posture, neck goes to flexion and upper back are also affected. This posture leads to changing neck curve from concave to convex which is creating one big C-curve. Chin jutting, sitting more on spine as pelvis tilt back, discs begin bulging. This posture also leads to straightening of lumbar spine.

The last group of 5 females are belongs from rural areas who spend 5-6 hours in the kitchen but they work in sitting position or proper an Indian style kitchen.

III. RESULTS

In this study total of 15 women between the age group 25-50 years. The greater proportion of women belonging to 25-50 years age group i.e. the 25-30 years, the patient getting relief from pain in lower back from using stepper is 30%-40% and in knee joint is 50%-60%. From the high-stool 60%-70% in lower back, 70%-80% in knee joint and 30%-40% in neck pain. Then prescribed therapeutic exercises with therapeutic tools, we found better results through exercises. Patient getting relief from pain in lower back is 70%-80%, in neck pain 60%-70% in and knee joint is 70%-80% and these exercises are also very helpful to increase the range of motion of cervical and lumbar movements.

The age group of 30-40 years of females, the patient getting relief from pain in lower back from using stepper is 25%-30% and 40%-50% in knee joint. Using the high-stool, the pain is relieved 50%-60% in lower back, 60%-70% in knee joint and 30%-35% in neck. Through prescribed exercises patient getting relief from pain in lower back is 60%-70% and 50%-60% in neck pain and 60%-70% in knee joint.

The last group between the ages of 40-50 years of females, lower back pain is relieved 20%-25% and knee joint is 15%-30% through stepper. The patient getting relief from lower back pain using high-stools is 40%-50%, 45%-50% in knee joint and 25%-30% in neck pain.

In this age group, we prescribed therapeutic exercises with nutritional supplements because nutritional status is very low in this group of females. So, through exercises, relief from lower back pain is 50%-60%, knee joint pain is 40%-50% and 30%-40% in neck.

Percentage of improved clinical symptoms in various segments after therapeutic approaches:-

Table 1:-

Age	Therapeutic tools and exercises	Involved Regions		
		Cervical Region	Lumbar Region	Knee Joint
25-30 years	Stepper	-	30%-40%	50%-60%
	High-stool	30%-40%	60%-70%	70%-80%
	Therapeutic-Exercises	60%-70%	70%-80%	70%-80%

Table 2:-

Age	Therapeutic tools and exercises	Involved Regions		
		Cervical Region	Lumbar Region	Knee Joint
30-40 years	Stepper	-	25%-30%	40%-50%
	High-stool	50%-60%	60%-70%	30%-35%
	Therapeutic-Exercises	50%-60%	60%-70%	60%-70%

Table 3:-

Age	Therapeutic tools and exercises	Involved Regions		
		Cervical Region	Lumbar Region	Knee Joint
40-50 years	Stepper	-	20%-25%	15%-30%
	High-stool	40%-50%	40%-50%	25%-30%
	Therapeutic-Exercises with nutritional supplements	40%-50%	50%-60%	30%-40%

IV. DISCUSSION

This study revealed the overall prevalence of spinal pain and deformities among house-wives and working ladies in urban areas. Our result is found to be pain and deformities of spinal segments in house-wives of rural areas as well as urban areas. As per data of 30 females selected in our clinics, the criteria are based on their working-time and associated age groups.

[3]After proper examinations of the patients between the ages of 25-50 years, we found that in office-working ladies mainly suffer from cervical pain because of maximum use of laptops, computer and mobile phones.

On the other side, the house-wives between the age group of 25-50 years, who work in modular kitchens, are mainly suffer from cervical pain, lumbar pain and knee pain. After proper assessment, we found that high platforms in the kitchen are the main cause for these clinical symptoms. Then we decided the treatment protocols.

By the use of stepper for standing posture, reduce the load of knee joint and avoid excessive pelvic tilting which is caused by hyper-lordotic lumbar spine. Patient getting much relief by stepper at the age of 25-30 years. The relief is comparatively mild in knee pain and lumbar pain at the age of 40-50 years, because lack of nutritional status, maternal deliveries etc. The pelvic stability in step standing positions was achieved by dynamic weight shifts through tactile cueing of lower trunk abdominals and gluteus maximus. The exercise was further progressed to stepping sideways in standing with posterior tilted pelvis, which involved the coordinated activity between quadratus lumborum, adductor and abductors of the hips.

In another, by the use of high-stools for sitting posture, pressure of the knee joint and lumbar spine is much reduced. Patient getting much relief in hyperlordotic posture of lumbar spine and hyper flexion of cervical spine, of all groups regarding study.

Another treatment protocol for this study is therapeutic exercises. Stretching exercises for neck flexors, spinal extensors and hip flexors and strengthening exercises of neck extensors, abdomen and gluteal muscles are helps to reduce the pain and increase the range of motion of spine. Quadriceps strengthening exercises and stretching of hamstring muscles are reduces pain and improves function of knee joint. It leads to improve functional activities and posture by reducing pain and muscular imbalance. We prescribed [5]nutritional supplements at the age group of 40-50 years because Indian females having weak musculature of spine because of less exercises after pregnancy and poor nutritional status.

We advice the patients that they correct kitchen platforms according to their heights. We said that if the platform kitchen is at the umbilicus level then the hyperextension [hyperlordosis] of lumbar spine is reduced and it leads to decreased stress over the knee joint and extra loading of knee joint muscles. Patient also getting relief from pain of cervical spine because of modified high-platform; cervical flexion is also reduced than the previous condition.

V. CONCLUSION

The present study was carried out from the modular kitchens in the urban areas. By the use of stepper, high-stools and Modified platforms in the kitchen and therapeutic exercises for muscular imbalance, reduce pain and improve functional range of motion of the affected joints, patient getting relief from their problems. Nutritional supplements also play an important role in the elderly.

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Prevalence of Computer Vision Syndrome and its Associated Risk Factors - A Cross Sectional Study

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ABSTRACT

Purpose: To determine the prevalence of computer vision syndrome and its associated risk factors among undergraduate medical students.

Material and Methods: This institution based cross sectional study was carried out from 15th September to 15th December 2022 on undergraduate medical students of SCPM Ayurvedic Medical College, Gonda, UP. All the students (398 sample size) within age group 18-26 years and who have used computer in 1 month preceding the date of the study were included in the study. Students who were using medication that affect visual health, diagnosed with underlying systemic disease like Diabetes, Hypertension, having preexisting eye diseases and those who do not give inform written consent were excluded from study.

Results: Mean age of 20.16 ± 3.81 years. Out of 398 respondents 266 (67.2%) claimed that they have experienced at least (headache, eye fatigue, burning sensation, eye irritation, neck shoulder pain) related to Computer vision syndrome. Ocular symptoms of computer user ranged from eye irritation (48%), burning sensation (33%), eye fatigue (15%). Extra ocular complaints include neck shoulder pain (21.8%) to headache (38%) problems. Eye fatigue and headache was significantly associated with computer usage time (240 min/ 4 hrs).

Conclusion: Computer vision syndrome is a very frequent condition among undergraduate medical students.

Key words: computer vision syndrome, prevalence, ocular complaints, extra ocular symptoms

INTRODUCTION

With modern technology, use of computer devices and gadgets has almost become indispensible in every aspect of life. Adults and children alike are using computers and other electronic devices for both vocational and recreational purposes. They are not only being used at work places offices, academic institutions but there usage is also very much common even at recreational places and homes.

It is estimated that approximately 45 million workers directly use computers by staring into electronic devices for hours continuously. With the advent of the Internet, the modern world has become addicted to the screen instead of using traditional books. It has been documented that 75% of all the daily activities involves the use of computer.

These devices make life easier but can also cause harm if used improperly. Prolonged use of computers and other digital electronic devices often leads to a group of symptoms collectively known as ‘’Computer Vision Syndrome’’ (CVS).

American Optometric Association defined computer vision syndrome as “a complex of eye and vision problems related to activities, which stress the near vision and which are experienced in relation or during the use of computer”. According to the association, optometrists report performing 10 million eye examinations per year for visual problems related to computer use.

Visual problems are reported to be most frequently occurring health problem associated with excessive computer usage. Most commonly reported visual complaints include redness, dry eyes, burning sensation and blurring of vision. Ergonomic problems associated with computer use include muscular stiffness, cervical pain, headache, numbness of the fingers.

Symptoms of computer vision syndrome are broadly classified into four categories: i) asthenopic – sore eyes, eye strain, (ii) ocular surface related- dry eye, irritation, watering, (iii) visual – double vision, blurred vision, slowness of focus change iv) extra ocular – shoulder pain, neck pain, back ache .

Globally, nearly 60 million people are suffering from CVS and approximately million new cases occur every year. In United States more than 143 million people work on computer every day. Excessive use of technology has lead to increase prevalence of CVS with resultant loss of productivity and hampered quality of life. But unfortunately there is few studies are available in this condition. CVS is growing public health issue and contributing significantly towards reducing quality of life and productivity at work place.

According to report of American Optometric Association, nearly 14% of patients report for ocular examination because of computer vision syndrome and such effected individuals are not even aware that they are suffering from this condition. ***The objective of this study is to determine the prevalence of computer vision syndrome and its associated risk factors among undergraduate medical students.*** It will help the public health professionals and all the stakeholders to take measures to reduce this public health issue and help to create awareness among public regarding health hazards of computers and digital electronic devices.

MATERIAL AND METHODS

This institution based cross sectional study was carried out from 15th September to 15th December 2022 on undergraduate medical students of SCPM Ayurvedic Medical College, Gonda, UP. Study participants were enrolled by non-probability convenience sampling. Sample size was found to be 445. All the students within age group 18-26 years and those who have used computer in 1 month preceding the date of the study were included in the study.

Exclusion Criteria - Students who were using medication that affect visual health like (anti tuberculosis treatment and steroids), those diagnosed with underlying systemic disease like Diabetes, Hypertension, having pre-existing eye diseases and those who do not give informed written consent were excluded from study.

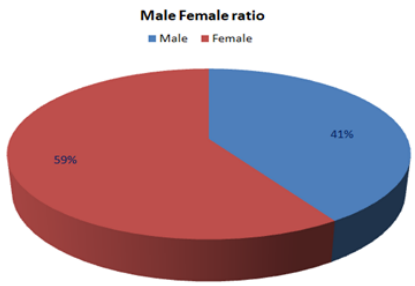
Inclusion Criteria - All those students having the symptoms of computer vision syndrome either intermittently or continuously for at least one week during last six months were included in the diagnostic criteria of computer vision syndrome.

The CVS related symptoms include irritation of eyes, eye fatigue, burning sensation, and headache and neck shoulder pain. The participants were surveyed using a structured questionnaire, which included the basic demographic profile, time spend on device, distance from screen, seating position, screen filters used, screen brightness, illumination of the surrounding environment, awareness of the 20/20/20 rule symptoms experienced after viewing screen, frequency of break while working on computers, symptoms aggravated by posture and potential risk factors during its usage.

Online forms were sent to the randomly selected medical students, and a paper-based questionnaire was distributed in the Medical College.

RESULTS

Overall, 445 Participants were enrolled in study. 412 questionnaires were returned. 14 were discarded because they were filled incompletely. Finally, at the end of study 398 participants [163 (41%) males and 235 (59%) female] were included in study. The age range between 18 to 26 years with mean age of 22 ± 3 years. Out of 398 respondents 266 (67.2%) claimed that they have experienced at least one symptoms related to Computer vision syndrome.



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Complaints associated with computer usage are broadly categorized into two categories, ocular and extra ocular or muscular skeletal problems. Out 266 (67.2%) affected, 152 (56.7 %) students experienced ocular complaints while 42 (15.6 %) students were having extra ocular complaints including headache and musculoskeletal problems. The frequency distribution in this study include 192 (48%) irritation of eyes, 133 (33.2 %) burning sensation and 63 (16%) experience eye fatigue. Extra ocular complaints range from neck shoulder pain 88 (22 %) to headache 152 (38.1 %) problems.

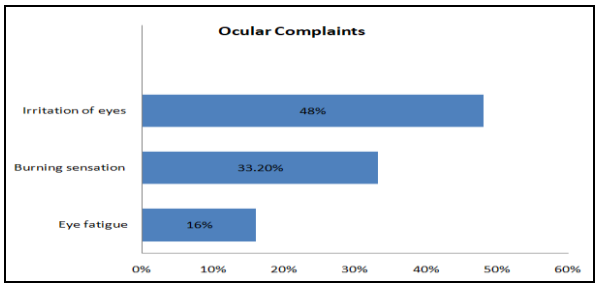

Fig: 1 Frequency of Ocular Complaints

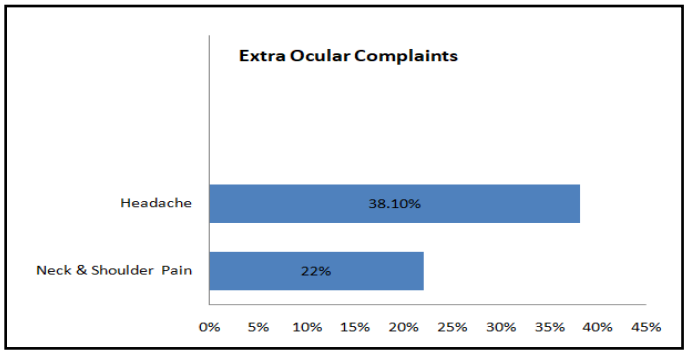

Fig: 2 Frequency of Extra Ocular Complaints

CVS symptoms were commonly observed among the students 64.4% who used computers for more than 4 hours (240 min) as compared to 34.4% of participants who spend less than 4 hours (240 min). Significant association was seen for laptop and phone usage time (> 240 min/4 hours) with eye fatigue and headache.

Details are shown in Table 1.

Table 1: Association of Computer Usage with Symptoms of Computer Vision Syndrome

Variables	Groups	Eye fatigue	Headache	Neck & shoulder pain	Irritation of eyes
		n/percentage	n/percentage	n/percentage	n/percentage
Laptop time	≤ 240 min	138 / 34.4 %	39 / 10.1 %	73 / 18.1 %	32 / 8.1 %
	>240 min	256 / 64.4 %	141 / 34.7 %	55 / 14.4 %	18/ 4.5 %
Phone time	≤ 240 min	47 / 11.5 %	59 / 15.1 %	72 / 17.6 %	21 / 5.3 %
	>240 min	144 / 35.5 %	182 / 45.7 %	91 / 22.1 %	29 / 7.1 %
Distance from laptop/ desktop	< forearm length	57 / 14.7 %	77 / 19.1 %	72 / 18.2 %	102 / 25.6 %
	> forearm length	51 / 12.7 %	62 / 15.4 %	56 / 14.6 %	96 / 23.8 %
Distance from Mobile Phone	< 12 inches	61 / 15.3 %	85 / 21.3 %	65 / 15.7 %	26 / 6.7 %
	12 – 16 inches	42 / 10.5 %	71 / 17.7 %	49 / 12.1 %	16 / 4.1 %
	>16 inches	16 / 4.1 %	66 / 16.5 %	17 / 4.2 %	9 / 2.7 %

Headache was experienced by 70 (17.6%) of the students in lying position, 110 (27.6%) in sitting and in 31(7.5%) using both method. Headache significantly occurs in 110 (27.6 %) students using computer in sitting position. Similarly, neck and shoulder pain is also more commonly observed in 129 (32.1 %) of students in sitting position as compared to 86 (21.5%) in lying and 25 (6.2 %) in both sitting and lying both positions.

Details are Mentioned in Table 2.
Symptoms of CVS get worsen with less frequent breaks. There was no significant association of CVS symptoms with frequency of breaks. However, all the symptoms associated with computer vision syndrome improve after increasing the intervals of break.

Details are shown in Table 2.

Table 2: Pattern of Computer Usage with Symptoms of Computer Vision Syndrome

Variable	Groups	Eye fatigue	Headache	Neck & shoulder pain	Irritation of eyes
		n/percentage	n/percentage	n/percentage	n/percentage
Posture	Mostly Sitting	35 / 8.4 %	110 / 27.6 %	129 / 32.1 %	11 / 2.6 %
	Mostly lying	39 / 9.2 %	70 / 17.6 %	86 / 21.5 %	12 / 2.7 %
	Sitting/Lying both	30 / 7.2 %	31 / 7.5 %	25 / 6.2 %	6 / 1.50 %
Symptoms aggravated by improper illumination	Yes	78 / 19.6 %	105 / 26.3 %	83 / 20.7 %	38 / 9.5 %
	No	69 / 17.4 %	82 / 20.6 %	78 / 19.7 %	25 / 6.5 %
Frequency of Breaks	≤ 60 min	81 / 20.3 %	104 / 26.1 %	93 / 23.2 %	33 / 8.3 %
	>60 min	77 / 19.1 %	98 / 24.6 %	83 / 20.7 %	55 / 14.5 %

DISCUSSION

The present study was conducted on the medical students of SCPM College and prevalence of computer vision syndrome was found to be 67%.

In this study all the symptoms even transient one were considered to meet the criteria of CVS while in our study symptoms lasting for at least one month duration were considered this can be reason for overestimation of prevalence in former study. Study conducted on university students of Malaysia reported high prevalence of CVS as compared to our study 89.9% [8]. Study conducted in Nigeria reported the prevalence as 74% [9].

In our study most frequent ocular complaint reported was 48% irritation of eyes, then burning sensation 33% followed by eye fatigue 16%.While in extra ocular symptoms , most common symptom was headache (38%) then neck shoulder pain was experienced by 22% individual. In study carried out in Iran, most frequent ocular problem was pain in eyes (41%) then excessive watering (18%) followed by then burning and itching in eyes (15%). In extra ocular symptoms, 38% students suffered headache and 19% shoulder pain. In our study headache was reported by 41% and neck shoulder pain was experienced by 21% participants[10].

In our study, burning sensation was reported by 133 (33.2 %) students this is in accordance to the study conducted in India where burning sensation was experienced by 32% medical students[11]. Another study conducted in India by Talwar et al reported relatively low prevalence of burning sensation as it was experienced by 28.9% of the participants[12]. While in contrast study conducted among call center workers report high prevalence of burning sensation as it was experienced by 54.6%[13] .

The duration of computer work is directly related to eye symptoms, longer duration tends to result in long-lasting complaints even after the work is finished. In our study duration of computer work (both mobile phone and laptop time) is found to be directly associated with symptoms of computer vision syndrome. Computer usage time more than 4 hour (240

minutes) is found to be significantly associated with visual symptoms. Significant association was observed for headache and eye fatigue.

Another study done in India reported the results in accordance with our study in which the ocular symptoms including eye strain itching and burning are more common in computer users more than 6 hours[14]. While Stella et al. reported that CVS symptoms are more common in people using computer for more than 8 hours daily[15].

In our study, the participants who take break experience less frequent symptoms. Latest research reported that the evidence that taking break do not relief the symptoms associated with CVS[16]. Study conducted by Straker et al also document that musculoskeletal symptoms get aggravated by sitting posture[17]. Our study fairly highlighted this public health issue and identified the risk factors associated with computer vision syndrome.

It is recommended to follow the rule of 20/20/20 to reduce the symptoms of computer vision. Rule of 20/20/20 states that one should sit 20 feet away; take 20 min break after 20 minutes of computer use.

CONCLUSION

This study concludes that computer vision syndrome is a highly frequent condition among undergraduate medical students. Our study that computer related health problems now become a significant public health issue. There is intense need to create public health awareness by organizing awareness lectures in order to make general public sensitize about harmful health effects of computer usage. Young generation should be addressed by organizing health awareness lectures at academic institutes to make youth aware of health problems associated with computer usage. This is multi disciplinary task and there is need of integration of all concerned stake holders in order to make effective strategies to stay this problem. All concerned authorities should collaborate to make effective implementation of preventive strategies and ergonomics. Periodic monitoring and medical examinations should be arranged to avoid complications and to limit disability.

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Ethical Approval: Approved

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The Consequences Of Improved Hand Hygiene On Nosocomial MRSA Control

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Abstract- *The purpose of this review is to examine studies that have assessed the association between hand hygiene enhancement and methicillin-resistant Staphylococcus aureus (MRSA) rates and to explore controversies surrounding the association. Many studies have been published confirming the bond between improved hand hygiene compliance and reduction in MRSA acquisition and infections, including bacteremia. These studies have also shown the cost-beneficial nature of these programmes. Despite considerable research some issues remain unanswered still, including the temporal relationship between hand hygiene enhancement strategies and decrease in MRSA rates, association between hand hygiene enhancement and MRSA-related surgical site infections, diminishing effect of hand hygiene compliance on MRSA rates after reaching a threshold and the role of instituting contact precautions in the setting of low MRSA rates and sufficient hand hygiene compliance. In conclusion, enhancement of hand hygiene compliance has been shown to reduce MRSA rates; however, some open issues warrant further investigation.*

Keywords- Hand hygiene, Hand washing, Multimodal strategy, Alcohol-based hand rubs, Nosocomial MRSA, MRSA control, MRSA bacteremia.

I. INTRODUCTION

It has been more than a century since Ignaz Semmelweis's discovery that healthcare workers' hands could potentially transmit infections to patients. Semmelweis's uncelebrated death in an asylum was vindicated by a slew of evidence that emerged later, and continues to emerge until now, showing clear association between hand hygiene and healthcare associated infections (HAI), especially those related to MRSA (Table 1). Clonal spread of MRSA is facilitated by cross-transmission via the hands of healthcare workers and exacerbated by the selection pressure exerted by broad spectrum antibiotic treatments [1]. Consequently, control of endemic MRSA generally revolves around reduction of antibiotic usage, screening and contact isolation of MRSA carriers, decolonization and improvement of hand hygiene compliance (Figure 1). While opinions differ with regard to the best infection control method, hand hygiene is considered the cornerstone by many experts [2]. This review focuses on summarising existing evidence on the role of hand hygiene on MRSA control.

II. REVIEW

The evidence and the known

The ultimate aim of MRSA control strategies is to prevent MRSA clinical infections, especially MRSA bacteremia. In 2000, Pittet and colleagues from University of Geneva Hospitals, Switzerland conducted a quasi-experimental interventional cohort study to assess the effect of enhancement of hand hygiene compliance on MRSA transmission and nosocomial infection rates [3]. A combination of visual reminders, increasing access to alcohol-based hand rubs (ABHR), hand hygiene performance monitoring and feedback to hospital staff and senior management support resulted in an increase of hand hygiene compliance from 48% in 1994 to 66% in 1997. During the same period, incidence of MRSA bacteremia and MRSA clinical cultures decreased from 0.74 to 0.24 episodes per 10000 patient days ($p < 0.001$) and 2.16 to 0.93 episodes per 10000 patient-days ($P < 0.001$), respectively. Investigators also observed a significant year-on-year reduction in MRSA acquisition ($p = 0.021$). Hand hygiene enhancement was implemented as part of a multimodal infection control strategy and the design of the study precluded apportioning of benefit to specific elements of the strategy. However, it is noteworthy that hand hygiene enhancement was the only incremental intervention introduced during the study period.

Table 1 Selected studies that specifically assessed the role of hand hygiene enhancement on methicillin-resistant Staphylococcus aureus rates-

First author and year	Trail design	Setting	Hand hygine enhancement strategy	Other interventions to reduce MRSA
Pittet et al.[3]	Quasi-experimental	Hospital-wide	ABHR, staff education, reminders, performance and feedback and administrative	Onsite surveillance, implementation of preventati

			involvement	on guidelines, outbreak investigations, and environmental sanitization
Johnnsonet al. [5]	Quasi-experimental	Hospital-wide	ABHR, staff education, reminders, performance and feedback and culture change program	Enhanced cleaning of healthcare equipment and decolonization of MRSA patients
Graysonn et al. [7]	Quasi-experimental	Multiple hospital	ABHR, education, performance and recommendations feedback and culture change	Individual hospitals observed various MRSA control measures
Stone et al.[10]	Prospective ecological	Acute NHS hospital trusts, UK	ABHR, education, performance feedback and patient empowerment	Saving lives campaign, Health Act 2006, and visit to trusts by Department of Health improvement team
Kirkland et al. [11]	Before and after study	Hospital-wide	Leadership accountability, measurement/performance, feedback, ABHR ,education/training and marketing/communication	None reported
Lee et al.[15]	Prospective interventional cohort study	Surgical wards	Handhygine improvement program as per WHO guideline	Screening and contact isolation and targeted decoloniza
Derde et al.[17]	Hybrid prospective interventional cohort study and RCT	Intensive care unit	Handhygine improvement program as per WHO guideline	tion Universal decolonization in phase 2 and screening and isolation in phase 3

Abbreviations: MRSA methicillin-resistant Staphylococcus aureus, ABHR alcohol-based handrubs, NHS National Health Service, RCT randomized controlled trial

Additionally, investigators estimated that an average of US$ 1.42 per patient admitted was required to support the MRSA prevention programme and concluded that the hand hygiene multimodal promotion strategy was cost-saving if even 1% of the reduction in HAI observed could be attributed to improved hand hygiene practices. In 2004, Pittet and colleagues evaluated the long-term costs associated with the hand hygiene promotion campaign and found that the campaign's total costs corresponded to less than 1% of costs attributable to HAI [4]. The adaptability and effectiveness of the Geneva multimodal intervention model was reiterated by an Australian group in 2005 under advice of the University of Geneva infection control team [5]. The Australian investigators implemented an infection control bundle consisting of enhancement of hand hygiene compliance with ABHR, decolonization of MRSA carriers, enhanced cleaning of healthcare equipment and hospital-wide culture change program for 3 years to control endemic MRSA. During the first 12 months, the hand hygiene compliance rate improved significantly from 21% to 42% ($p < 0.001$). Interestingly, in the first 28 months MRSA clinical isolates and MRSA bacteremia remained static. Moreover, the MRSA colonization rate did not change at 12 months post-intervention. By 36 months postintervention, however, the MRSA clinical isolates per 100 patient-discharges per month declined by 40% (95% CI, 23% - 58%; $p < 0.001$) while the patient-episodes of MRSA bacteremia declined significantly ($p = 0.003$) compared to pre-intervention period. Subsequently, the group implemented a centrally coordinated, multisite hand hygiene culture-change program in Victorian healthcare institutions and assessed its effect on MRSA bacteremia [6].

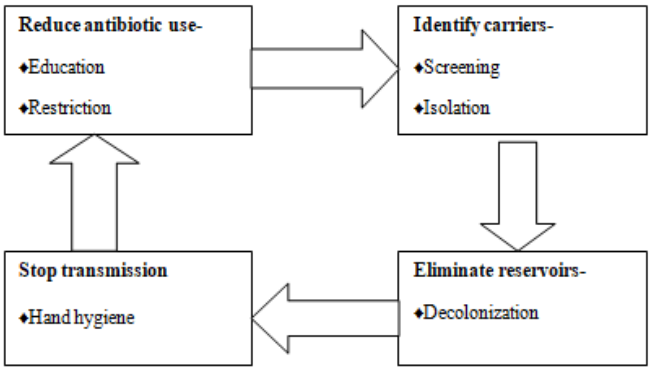

Figure 1- Strategies to control nosocomial methicillin-resistant S. aureus. Adapted with permission from Harbarth [1]

Encouragingly, with increase in hand hygiene compliance by about 30%, the incidence of MRSA bacteremia reduced from 0.03 per 100 patient-days per month to 0.01 per 100 patientdays per month (p = 0.09 for trend) at 12 months. It is important to note that the ABHR used both in the original "Geneva multimodal programme" as well as in the Australian interventions contained chlorhexidine (0.5%). Riding on these impressive results, the Australian National Hand Hygiene initiative (NHHI), also known as "Hand Hygiene Australia", was launched in 2009 and two years later investigators documented a significant decline in national MRSA bacteremia rates (p = 0.008). Although the changes in total MRSA bacteremia rate during 2009–2010 cannot be definitively linked to NHHI, they are in line with previous Australian and international reports [7]. More recently, the impact of the NHHI on healthcare-associated S. aureus bacteremia was investigated by Barnett and colleague [8]. Four out of 6 states noted a reduction in infection rates. Varying degree of change in infection control measures resulted in different rates of response with 2 states showing immediate reduction and another 2 states showing linear decrease in infection rates. Two states, which already had an established initiative with low MRSA infection rates before the implementation of NHHI did not show further decline on employed statistical models to investigate the hospital-level relationships among MRSA prevalence, antibiotics use and infection control policies and practices across Europe [9]. Adjusted linear regression analysis showed that lower MRSA prevalence was associated with use of ABHR for hand hygiene (mean difference 10.3%, 99% CI 1.2 – 10.3), and placement of MRSA patients in single rooms (mean difference 11.2%, 99% CI 1.4 – 20.9). However, after adjusting further for geographical variation, the single strongest predictor that remained was the use of ABHR. While response bias cannot be ruled out as the participating hospitals were self-selecting, the fact that this was a large study spanning the whole of Europe, might risk and makes the study more generalizable. In 2004, the Clean Your Hands campaign was rolled out to healthcare workers in all acute National Health Service (NHS) hospital trusts in England and Wales to control the rate of MRSA, methicillin-sensitive S. aureus (MRSA), and Clostridium difficile infection [10]. The campaign had three predefined phases: 1 July 2004 to 31 December 2004 (before roll out), 1 January to 30 June 2005 (campaign roll out) and 1 July 2005 to 30 June 2008 (after roll out). An ecological study done to assess the effect of this campaign was published recently and revealed that as the campaign moved along the 3 phases, procurement of soap and ABHR tripled. Increased procurement of ABHR was independently associated with reduced MRSA bacteremia, but only in the last four quarters of the study (adjusted incidence rate ratio for 1mL increase per patient bed day 0.990, 95% CI, 0.985 to 0.995; p < 0.0001). However, increasing procurement was not the sole driver of falling MRSA bacteremia as publication of Health Act 2006 and Department of Health improvement team visits, which happened at the same time, were both strongly correlated with falling MRSA rates. A 3-year, multifaceted, sequential implementation of hand hygiene enhancement intervention at a US teaching hospital resulted in an increase in hand hygiene compliance from 41% to 87% (p < 0.01). This was accompanied by a significant and sustained reduction in healthcare associated S. aureus bacteremia from 2.1 to 1.4 per 1000 patient-days (p = 0.004). Contrary to expectations, S. aureus infections attributable to the operating room which were expected to be less sensitive to changes in hand hygiene compliance rose against the general trend [11]. Similarly, sustained reduction in MRSA rates was also demonstrated by investigators from Singapore where hand hygiene enhancement was implemented as part of a bundle [12]. A systematic review has summarized the literature available until 2009 on the impact of ABHR use on MRSA rates [13]. Among 12 studies included in the review, an increase in ABHR use correlated significantly with an improvement in the MRSA situation (r = 0.78) and was associated with a significant reduction of MRSA rates, whereas no significant correlation was observed between compliance level and MRSA. This latter observation was confirmed by a prospective, observational, ecological study from Ontario, Canada, which also failed to demonstrate a positive ecological impact of improved hand hygiene compliance rates on the incidence of MRSA bacteremia, despite significant improvements in rates of compliance among healthcare personnel [14]. The authors argued that this might be due to both the already extremely low rate of MRSA bacteremia in Ontario at the start of the study and/or the relatively high rates of hand hygiene compliance. One of the most convincing evidence for the role that hand hygiene compliance plays in MRSA control came from a recent hybrid study involving a prospective interventional cohort study and a randomized

controlled trial by Derde and colleagues [15]. They investigated baseline MRSA rates (Phase 1) against the combined effect of enhanced hand hygiene and universal decolonization (Phase 2), as well as the additional impact of screening and contact precautions (Phase 3) on MRSA, vancomycin-resistant Enterococci (VRE) and highly resistant Enterobacteriaceaes (HRE) in 13 European ICUs. Multidrug-resistant organisms (MDRO) rates reduced significantly in phase 2 but did not decrease further in phase 3 with introduction of screening and isolation. Even though the independent effect of hand hygiene enhancement was indeterminable, this was the first cluster-randomized trial to confirm the positive role of hand hygiene enhancement in MRSA control. The unknown Firstly, the delay between improved hand hygiene compliance, increased ABHR use and a subsequent decrease in MRSA cross-infection rates has not been well established and remains open to debate. In an interventional time series analysis, Vernaz and colleagued demonstrated an almost immediate effect of increased ABHR use on MRSA rates with lag times between 0 and 4 months [16]. However the above mentioned study by Johnson and colleagues took more than 2 years of sustained improvement in hand hygiene compliance rate before a favourable effect was seen on MRSA infection rates [5]. Delayed effect by more than two years was also noticed by investigators from Clean Your Hands campaign [10]. They proposed two plausible explanations, that this delay might be due to a possible non-linear association between hand hygiene and MRSA prevalence, or due to long term changes in community reservoir of MRSA carriage resulting from the intervention. Moreover hand hygiene campaigns involve education and behaviour change and are therefore unlikely to have a short term effect on MRSA rate. Secondly, the effect of promoting ABHRs on postoperative surgical site infection due to MRSA might be less significant than previously estimated. In a recent multicentre controlled trial in Europe comparing enhanced hand hygiene with universal MRSA screening, contact precautions and targeted decolonization, hand hygiene promotion on surgical wards outside of the operating theatre did not effectively reduce MRSA rates on its own [17]. However, cessation of this intervention was associated with an increase in MRSA rates suggesting that discontinuing activities to optimise hand hygiene practices may be detrimental. Similarly, in the study from the New Hampshire teaching hospital described above, [11] hospital wide hand hygiene enhancement program did not reduce MRSA surgical site infections attributable to operating rooms. Thirdly, the incremental benefit of hand hygiene on MRSA after a certain threshold has been reached is unclear. The general assumption of greater hand hygiene compliance yielding greater benefit is being challenged. Cooper and colleagues demonstrated that while a large reduction in ward-level prevalence and colonized patient-days of S. aureus is observed when the hand hygiene compliance increases from zero to 20%, minimal additional difference is noticed when the compliance increases above 40% [18]. Another modelling study of transmission of MRSA in ICUs did find that hand hygiene enhancement was the most effective way of reducing MRSA transmission [19]. While this study predicted that the attack rate would increase dramatically if the hand hygiene compliance fell below 40%, similar to the Cooper study they found little benefit with increasing hand hygiene compliance above 48%. The law of diminishing return in improving hand hygiene compliance was also supported by other studies [14,20]. This finding, however, was in contrast to the Geneva multimodal intervention by Pittet and colleagues [3] which saw a significant reduction in MRSA bacteremia and MRSA clinical cultures with the increase in hand hygiene compliance from 48% to 66%. It must be stressed here that in facilities with low hand hygiene compliance or very high MRSA rates, a campaign promoting ABHR use may still be highly effective. Lastly, it remains unclear whether contact precautions can be stopped in settings with relatively low MRSA prevalence and sufficient hand hygiene compliance [2]. Good hand hygiene practices may suffer as a result of misuse of gloves and may subsequently increase MRSA rates. Since microbial contamination of healthcare workers' hands can occur despite the use of barrier gloves, regardless of presence of leaks, hand hygiene remains an important component of appropriate glove use [21-23]. Moreover, recent high-quality studies have questioned the value of patient isolation and contact precautions for effective MRSA control in high endemicity settings [24]. Thus some experts suggest that low MRSA rates can be sustained by promoting standard precautions and good hand hygiene practices only [2]. In contrast, places with a strict 'search and destroy' strategy, like the Netherlands, Denmark and Western Australia [25], limit the likelihood of undetected MRSA carriers in hospitals through early preemptive isolation of high risk patients. This renders low hand hygiene compliance rates of limited concern as far as MRSA transmissions from undetected carriers are concerned. However, other pathogens may of course slip through these targeted MRSA early detection and prevention nets, as evidenced by the recent large OXA-48 outbreak in the Netherlands [26]. As such, the hypothesis of whether adequate hand hygiene compliance alone without contact precautions is sufficient to control MRSA transmissions, needs to be tested in large clinical trials in which standard precautions and hand hygiene are tested alone, not as a part of a multimodal intervention as is often the case [15].

III. CONCLUSIONS

Appropriate hand hygiene during patient care is the primary means of reducing the spread of MRSA. However, further research is necessary to determine the quantitative association between increased hand hygiene compliance, ABHR use and MRSA reduction as well as the role of improving hand hygiene only, independent of contact precautions, for MRSA control.

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Effect of Physiotherapy For Severe Ill Ilpatients With COVID-19 in ICU

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Abstract-

Objective: *To find out the Effect of Physiotherapy techniques for severe ill patient with COVID-19 in ICU at Rama hospital and research centre.*

Material and Methods: *- one hundred fifty five patient received ICU physiotherapy service in ICU at Rama hospital and research centre. All Of these, patients were established for initiating physiotherapy intervention and sixty five patients were on mechanical ventilation during initial physiotherapy intervention. Both group received physiotherapy intervention in initial condition in ICU. Both groups was assessed using visual analogue scale (VAS) for breathlessness, Peak expiratory flow rates (PEFR) and Oxygen saturation level (SaO_2) before and after 2 weak treatment program.*

Result: *- Patient in both groups reported significant improvement after 2 weeks of treatment program compared to baseline on all outcome measure except PEFR that was not significantly improve in both group. Both groups showed more improvement on PEFR and on VAS for breathlessness but more improvement significantly seen in who received physiotherapy treatment along with medical treatment.*

Conclusion: *- physiotherapy techniques along with medical treatment are more effective in Covid-19 patient in intensive care unit. Patients who were outside previously established for initiating physiotherapy intervention were able to participate with physiotherapist and shows functional improvement. It's very necessary for clinical decision making physiotherapy practice while treating patients with covid-19 in the ICU.*

I. INTRODUCTION

Coronavisrus disease 2019 (COVID-19) is a contagious disease caused by a virus, the severe acute respiratory syndrome. The first known case was indentified in Wuhan, China, in December 2019.[1] The disease quickly spread worldwide, resulting in the COVID-19 pandemic. Symptoms of COVID-19 are variable, but often include fever[2], cough, headache[3], fatigue, breathing difficulties, loss of smell, and loss. Symptoms may begin one to fourteen days after exposure to the virus. At least a third of people who are infected do not develop noticeable symptoms.[7] Of those people who develop symptoms noticeable enough to be classed as patient, most (81%) develop mild to moderate symptoms (up to pneumonia), while 14%develops severe symptoms (dyspnea, hypoxia, or more then 50% lung involvement on imaging), and 5% develop critical symptoms (respiratory failure, shock, or multiorgan dysfunction)[8] Older people are at a higher risk of developing severe symptoms. Some people continue to experience a range of effects (long COVID) for months after recovery, and damage to organs has been observed.[9] Multi-year studies are underway to further investigate the long-term effects of the disease.[9]

COVID-19 transmits when people breathe air contaminated by droplets and small airborne particles containing the virus. The risk of breathing these is highest when people are in close proximity, but they can be inhaled over longer distances, particularly indoors. Transmission can also occur if splashed or sprayed with contaminated fluids in the eyes, nose or mouth, and, rarely, via contaminated surfaces. People remain contagious for up to 20 days, and can spread the virus even if they do not develop symptoms.[10][11] COVID-19 testing methods to detect the virus's nucleic acid include real-time reverse transcription polymerase chain reaction (rRT-PCR),[12][13] transcription-mediated amplification, and reverse transcription loop-mediated isothermal amplification (RT-LAMP)[12][13] from a nasopharyngeal swab.[14]

Several COVID-19 vaccines have been approved and distributed in various countries, which *have initiated mass vaccination campaigns. Other preventive measures include physical or social distancing*, quarantining, ventilation of indoor spaces, covering coughs and sneezes, hand washing, and keeping unwashed hands away from the face. The use of face masks or coverings has been recommended in public settings to minimize the risk of transmission. While work is underway to develop drugs that inhibit the virus, the primary treatment is symptomatic. Management involves the treatment of symptoms, supportive care, isolation, and experimental measures.

COVID-19 primarily affects the respiratory system and can cause a range of complication within the cardiovascular, neurological, and musculoskeletal system. This complication along with prolonged time in the intensive care unit (ICU), can contribute to reduce functional mobility and quality of life,[15] [16] increased mortality, and increased the risk for developing post intensive care syndrome and ICU acquired weakness[11][12]. Physiotherapist has an important role in addressing patient function and quality of life during after ICU admission. There are multiple published guidelines related to mobilizing patients in the ICU are proven to be safe and feasible [17] to diminished the consequence of post ICU syndrome and to decrease ICU and hospital length of stay. [21] Patient who participates with physiotherapist demonstrates better functional outcomes, is more likely to discharge home, and is more likely to return to an independent functional status. [17]

In the beginning of the COVID-19 pandemic, PT involvement seemed to be limited, especially in the ICU [18] [19]. After discussion with clinicians at other hospitals and reviewing the available literature, PT intervention seemed to primarily focus on proning, range of motion, and bed exercises.[18] [19] During physical therapy sessions, the authors observed that these patients could tolerate more mobility than anticipated. However, some of the patients were outside of our normal parameters for initiating PT intervention and continu ing mobility during physical therapy sessions. The authors realized that to adapt to this unique clinical situation, a new algorithm was needed to assist in the clinical decision-making process.

Multiple guidelines for PT intervention have been published throughout this pandemic.[28–30] Initial publications focus primarily on personal protective equipment, infection control procedures, airway clearance, and post acute care.[18][20] A few publications mention patients in the ICU; however, the information seems to focus on respiratory care, range of motion, and bed mobility with limited out-of-bed activity and ambulation.[18] [22] [23] published guidelines for physiotherapy management for patients with COVID-19 in the acute care setting, providing a general overview of basic concepts of patient management. The information about their experience with patients with COVID-19 in the ICU and reported no adverse events associated with PT intervention in the ICU, including during ambulation.

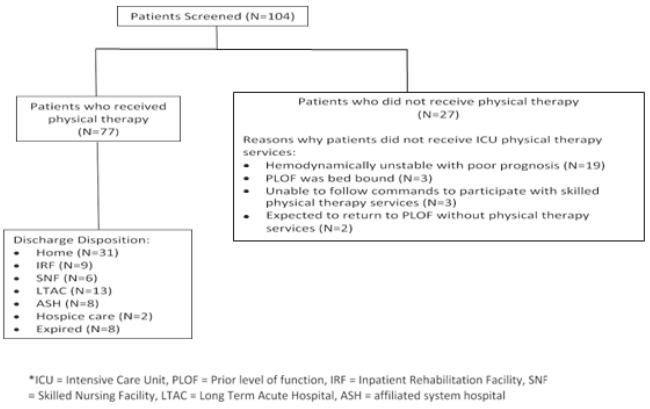
Physiotherapy involvement in the care of patients with COVID-19 in the authors' ICUs.[23] Also, the publications mentioned above provide limited information to assist clinicians with the clinical decision-making process required at the bedside to safely and effectively provide PT intervention and mobilize patients in ICU.

To fill this gap in the literature, the authors created a clinical decision-making algorithm to assist with identify- ing appropriate patients and timing for intervention for patients with COVID-19 in the ICU. The aim of this study is to describe our Physiotherapy practice for patients with critical illness due to COVID-19 at a tertiary hospital; and describe a novel clinical decision-making and its use in enhancing clinical practice for patients with COVID-19 in the ICU.

II. METHODS

This study is a retrospective chart review that was taken from Rama Hospital and research centre In Kanpur. The medical records of patients admitted ICU with a physical therapy consult were screened from August to December 2021 (Fig. 1). Inclusion criteria required patients to have a positive COVID-19 test during their hospital admission, have a referral for physical therapy while in the ICU, be able to actively participate with physical therapy, and have acceptable medical stability. Patients who were expected to recover without skilled PT intervention, bedbound at baseline, unable to follow commands or hemodynamically unstable with poor medical prognosis were screened and discharged physiotherapy clinical and demographic data and all patient physiotherapy encounters were collected by medical record.

There is a large body of evidence regarding mobilizing patients who are critically ill, on mechanical ventilation, with acute respiratory distress syndrome (ARDS), sepsis, or other causes of respiratory failure. As a result of the COVID-19 pandemic, health care professionals have been challenged to adjust best practices. For the establishment a standard of Physiotherapy practice and decision-making for patients with COVID-19 in the ICU. This evolved from the current clinical decision-making process, along with new information from published research and clinical experience gained during the pandemic.



*ICU = Intensive Care Unit, PLOF = Prior level of function, IRF = Inpatient Rehabilitation Facility, SNF = Skilled Nursing Facility, LTAC = Long Term Acute Hospital, ASH = affiliated system hospital

The clinical decision-making considers the patients cognitive, hemodynamic, and respiratory stability to help guide mobilization of patients. Physiotherapy intervention was initiated using the response dependent progression of mobility. [24] Additional supplemental oxygen or ventilator support was given as needed after consultation with the medical team and order was received for target oxygen saturation (SpO2) levels to be maintained during activity for individual patients.

The Activity Measure for Post-Acute Care was assessed during all physiotherapy encounters. The ICU Mobility Score (Perme Score), Medical Research Council Sum Score (MRC-SS), were performed during all ICU physiotherapy initial evaluations and re-evaluations. Because of frequent in- tubation and encephalopathy causing limited communication ability, the Barthel Index (BI) was included during this pandemic to provide an objective assessment of prior level of function. The BI measures activities of daily living and function. The score ranges from 0 to 100 with higher scores indicating more independence. Although it has not been validated as a tool to formally measure a patient's prior level of function, this pandemic has challenged clinicians to adjust their practice and become creative. The BI is simple to perform and easy to use with patients at the bedside.

The Perme Score is used to objectively assess a patient's functional mobility in any ICU at a specific moment in time. It begins with assessing mental status and ends in the distance walked in 2 minutes. The score ranges from 0 to 32 and is derived from 15 items grouped into 7 categories. It has been shown to have high inter-rater reliability and validity. The MRC-SS uses a 6-point scale ranging from 0 to 60 to measure muscle strength. The ability to follow commands is initially assessed followed by measuring the strength of 3 muscle groups in all 4 limbs. The MRC-SS was shown to have good-to-excellent inter observer agreement and is most commonly used as a diagnostic tool for ICUAW. The RASS is a structured assessment of sedation and agitation used for patients with altered [illegible] ranges from 25 to 14, with negative numbers correlating to degree of sedation and positive numbers correlating to degree of agitation. It was found to have high reliability and validity in adult ICU patients. [25]

TABLE 1
Patient Characteristics (N 5 77)

Age, median (IQR)	58 (46.5–70.5)
Sex—female, n (%)	36 (46.8)
BMI, median (IQR)	30.6 (26.5–36.3)
Hospital LOS—days, median (IQR)	18 (13–25)
ICU LOS—days, median (IQR)	13 (7–18.5)
Days on ventilator, median (IQR)	10 (5–17)
P/F Ratio on evaluation, median (IQR)	280 (203–403.8)
FiO_2 on evaluation, median (IQR)	40 (35–50)
PEEP on evaluation, median (IQR)	8 (5–10)
Number of PT visits during admission , median (IQR)	6(4-6)
Duration of PT visits during admission , min, median (IQR)	31.2 (20-40)
AM-PAC Score on evaluation, Median (IQR)	9 (5-14)
Perme Score on evaluation, median	12 (6-23)
BARTHEL Index	80 (80-100)

The following data were collected at the initial physical therapy evaluation: oxygen delivery method, PEEP, FiO_2, heart rate, mean arterial pressure, SpO2, P/F ratio, BI, MRC-SS, AM-PAC, Perme Score, RASS. During all physiotherapy sessions, the patient's highest level of mobility was recorded using a 5-point scale. A score of 1 indicates the patient performed bed level activity, 2: sitting side of bed, 3: Standing at bedside, 4: ambulating up to five feet, and 5: ambulating more than 5 feet.

Data extracted from the medical record were reviewed by members of the research team to ensure accuracy and prevent any form of potential bias. Data were entered by sub investigators into a password protected, secured computer. Descriptive results are presented as frequencies, percentages, medians, and inter quartile ranges. Because the data did not meet assumptions of normality, nonparametric tests were used to compare groups and to identify relationships between clinical variables.

III. RESULT

One hundred fifty five patients with COVID-19 were admitted to ICU in Rama Hospital and Research centre

between March and May 2020. Seventy eight patients received a physical therapy consult and 52 of these patients received ICU physical therapy services. Twenty-five patients were deemed inappropriate for physiotherapy services for the reasons identified in of the patients who received ICU physiotherapy. Of the patients who received ICU physiotherapy 7.8% received ECMO support during their ICU admission. A median of 2 weeks passed between ICU admission and the initial physical therapy evaluation.

The median BI score to indicate the patient's prior level of function was 100. During the initial physical therapy evaluation, the median AM-PAC score was 8 and the median Perme score was 10). As seen, 16.9% of patients stood at the bedside, 20.8% of patients ambulated #5 feet and 13.0% of patients ambulated 5 feet during the initial evaluation. There was a statistically significant improvement between AM-PAC scores on the initial physical therapy evaluation and the last physical therapy note before ICU discharge.

At the time of hospital discharge, 65 (70.1%) patients had multiple new complications present, 12 patients had only pulmonary complications, 7 patients had only musculoskeletal complications, 4 patients (1.3%) had only cognitive impairments, 3 patients (1.2%) had only neurological impairments, and 14 patients had no complications.

Patients on Mechanical Ventilation in ICU

Of the 52 patients who received ICU physical therapy services, 32 patients were receiving mechanical ventilation support via endotracheal tube on the initial physiotherapy evaluation. The median highest level of mobility for these patients during the initial physiotherapy evaluation was 2 to 3. Fifty-point six percent of these patients had a RASS Score of 0 and 29.8% had a score of 21. The highest level of mobility shows no relationship with the mechanical ventilation settings of PEEP sessions. Our data shows that during the initial physiotherapy evaluation, this critically ill patient population was able to progress past bed exercises and passive mobility, with more than one-third of these patients standing or ambulating. Between the initial physiotherapy evaluation and ICU discharge, there was a statistically significant improvement in all aspect. Without this novel algorithm, these patients may not have received PT intervention while in the ICU or intervention may have been delayed based on our previous guidelines. In addition, as the number of patient admissions increased with subsequent surges, this algorithm was used as a teaching tool for other physiotherapist who did not primarily work in the ICU. This improved the consistency of clinical decision-making across all physiotherapists working with this population in the ICU.

Thirty two patients were on mechanical ventilation during the initial physical therapy evaluation. Per the ICU Liberation illustrated in our results, a majority of our patients had 2 or more new complications at the time of hospital discharge, primarily pulmonary and cardiovascular. This is in line with the recent literature published on the adverse effects of COVID-19 along with current literature on the complications of critical illness, including delirium.

This study is one of the studies to describe physiotherapy practice for severe ill patients in ICU with COVID-19, with and without MV. Second, therapy sessions were progressed to a maximal level of mobility within physiological tolerance allowing for various types of intervention (eg, resistance exercise, standing, gait, etc). Third, the clinical decision-making algorithm provides a step-by-step process that may translate to other patient diagnoses and ICU settings.

IV. CONCLUSION

Physiotherapy intervention is an integral component of a patient's course for recovery during and after severe illness due to COVID-19. This algorithm allowed us to provide PT intervention for patients who may not have been seen or for whom intervention may have been delayed based on our previous guidelines. This algorithm can assist clinicians with identifying patients who are appropriate for PT intervention and determining an appropriate time to intervene to maximize the benefits of early mobility in patients with COVID-19 in the ICU.

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Effect of Physiotherapy Management of Patients with Coronary Artery Disease: A Study on Current Practice in Kanpur, U.P

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Abstract
Coronary artery disease (CAD) is worldwide health problem with an increase prevalence in Kanpur Nagar with is situated in Uttar Pradesh. Physiotherapist is involved in the care of these patients from the acute stage following a cardiac event until phase III cardiac rehabilitation is complete. The purpose of this study was to determine the current physiotherapy management of patients with CAD in Kanpur.

Material and Methods: -
*The total 40 Patient suffering from coronary Artery disease was randomly allocated into two groups, Group A (n= 20) treated with Cardio pulmonary physiotherapy techniques along with medical treatment and Group **B**(n=20) treated with only General physiotherapy techniques and medical treatment. In hospital physiotherapy treatment was mostly provided once a daily which is deep breathing exercise, circulatory exercise and manual chest mobilizing exercise with chest clearance technique were mostly used physiotherapy treatment.*

Result: -
Result shows that more cardio-pulmonary physiotherapy provide care (60%)than Group B who didn't received advance cardio pulmonary treatment (32%).Patient in both groups reported significant improvement after 3 weeks of treatment program compared to baseline on all outcome measure. Compared to Group B, Group A showed more improvement. It was three time better results over the Group B.

Conclusion: -
Advance cardio pulmonary physiotherapy techniques along with medical treatment are more effective in Coronary artery disease then medical treatment alone. Evidence based practice was consistent regarding early mobilization but was inconsistent with regard to the use of manual chest clear techniques.

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I. Introduction

Coronary artery disease (CAD), Also Known as coronary heart disease or ischemic heart disease, involves the reduction of blood flow of the heart muscle due to build up of plaque in the artery of the heart.[2,9,13]its a most common of the cardiovascular diease.[4] CAD is a health problem worldwide. It's a leading cause of death internationally and accounts for a third of deaths globally. Types include stable angina, unstable angina, myocardial infarction and sudden cardiac death.[5]A common symptoms is chest pain or discomfort which may travel into the shoulder, Arm, back, neck, or jaw.[1]Occasionally it may feel like heart burn. Usually symptoms occur with exercise or emotional stress, last less than a few minutes, and improve with rest.[1] Shortness of breath may also occur and sometimes no symptoms are present.[1] In many cases first sign of heart 'attack.[1] Other complication include heart failure or an abnormal heartbeat.[2]

Risk factors include high blood pressure, smoking, diabetes, lack of exercise, obesity, high blood cholesterol, poor diet, depression, and excessive alchohal.[3,6,11] About half of the cases are linked to genetics.[7] Smoking and obesity are associated with about 36% and 20% of cases, respectively.[10] Smoking just one cigarette pr day about doubles the risk of CAD.[14] A number of test may help with diagnosis including: ECG, cardiac stress testing, coronary computed tomography angiography, and coronary angiogram, among other.[8]

Chest pain that occurs regularly with activity, after eating, or at other predictable times is termed stable angina and is associated with narrowing of the arteries of the heart. Angina that changes in intensity, character or frequency is termed as unstable. Unstable angina may precede myocardial infarction. In adult who go to emergency department with the unclear cause of pain, about 30% have pain due to coronary artery disease.[12]

The number of categories of adverse childhood experiences (psychologically, physical, or sexual abuse: violence against mother: or living with household member who were substance abusers, mentally ill, suicidal or incarcerated) showed a graded correlation with the presence of adult disease including coronary artery disease.

Nationally, physiotherapist treat patient with CAD in the acute stage following a coronary event/or following coronary artery bypass grafting (CABG) surgery. These patients are than subsequently followed up as out-patient during cardiac rehabilitation in order to improve function and quality of life and to delay occurrence of coronary events.

II. MATERIAL AND METHOD

There was carried out 40 patients with 20 patients in each group. Both of the study Group received medical treatment but one group (Group A) received advance cardio pulmonary physiotherapy techniques along with medical treatment. The trial duration was 14 days.

The patients enrolled in the study on the following eligibility criteria 1) male and female patient 20 45to 60 year age 3) hospitalized patients diagnosed by a medical 4) patient with pronounce symptoms of sputum retention and coughing 5) Ability to tolerate advance cardio-pulmonary physiotherapy technique 6) well oriented patients. The patients were excluded on the following criteria 1) severe attack with longer expected hospital stay up to 2 weeks 2) Severe cardiac heart attack or any other condition that contra-indicated for chest physiotherapy 3) pain with more than 2 point on visual analogue scale while doing active technique 4) patient with history of any thoracic surgery 5) any other pathological condition.

The patients were assessed on inclusion and exclusion criteria by a medical doctor who was the part of the study. The entire patient was treated at cardiac medical ward. A previous medical history was taken for previous problems and associated with length of hospital stay. There was outcome measure used in this study.

The group A was treated with advance cardio-pulmonary physiotherapy along with medical treatment. The technique was delivered to the patients in the sitting comfortable position or half lying or lying position on the hospital bed. The technique was applied in the following steps.

1. Deep breathing exercise includes segmental breathing or relaxed breathing exercise followed by huff and cough.
2. Circulatory exercise which helps improve circulation or flow of blood throughout our bodies is good for health. These include ankle toe movement or ankle pump, knee isometric exercise, active SLR and range of motion exercise.
3. Manual chest clearance techniques include airway clearance techniques, facilitating airway clearance technique with effective coughing techniques, technique to facilitate ventilation pattern and chest mobilization exercise.

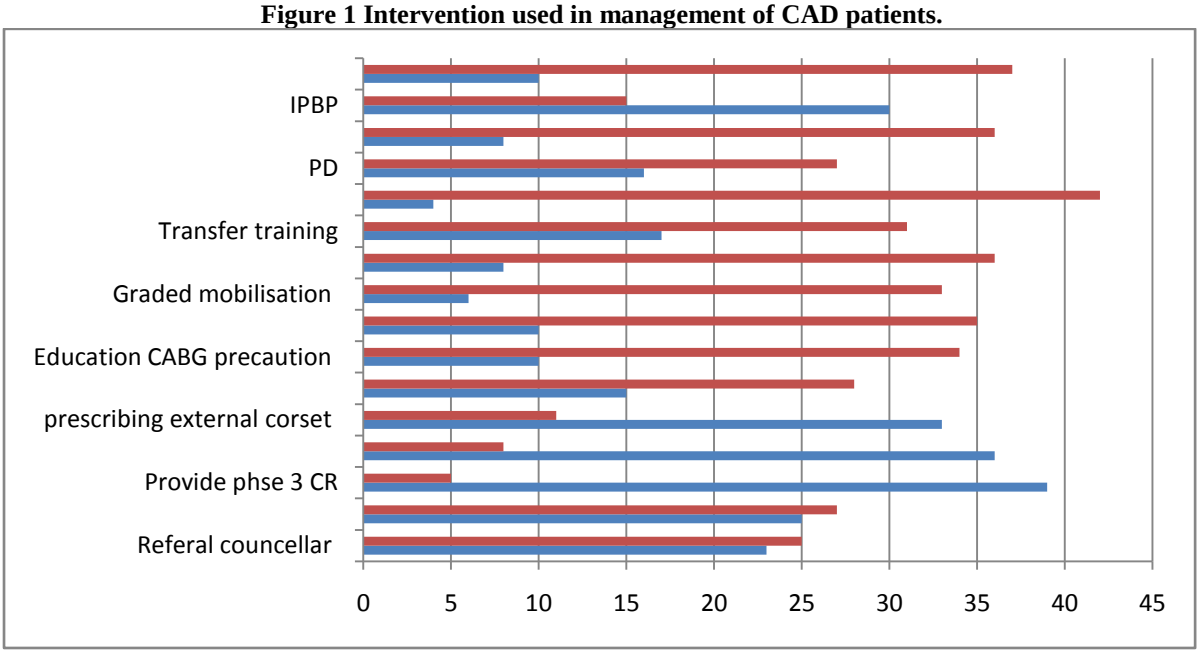
The patient allotted in to 2 groups randomly by making computer sequences. An observational cross-sectional study was conducted. A questionnaire was developed following a literature review of chest clearance and rehabilitation methods used in the management of patients with coronary artery disease. A review of the cardiac procedure performed in individual diagnosed with CAD was also done. It was discussed with both groups to verify its contents, to establish the time require to complete the whole procedure.

III. RESULT

The intervention used by the physiotherapist when treating patient with coronary artery disease. It is important to note that deep breathing exercise, circulatory exercise, manual technique with postural drainage, graded mobilization and education components (home exercise program, exercise guidance and CABG precaution) were commonly included as treatment modesties. Intermittent positive pressure breathing was not commonly used as chest clearance technique. Only 5 physiotherapist referred patient to a phase III out-patient cardiac rehabilitation program 5 cardiopulmonary physiotherapists offered such program at the hospital.

Most patient received treatment in hospital once or twice daily. Physiotherapists who did provide physiotherapy intervention to patients in an outpatient capacity did so once weakly. **(Table 1)**

Figure 1 Intervention used in management of CAD patients.

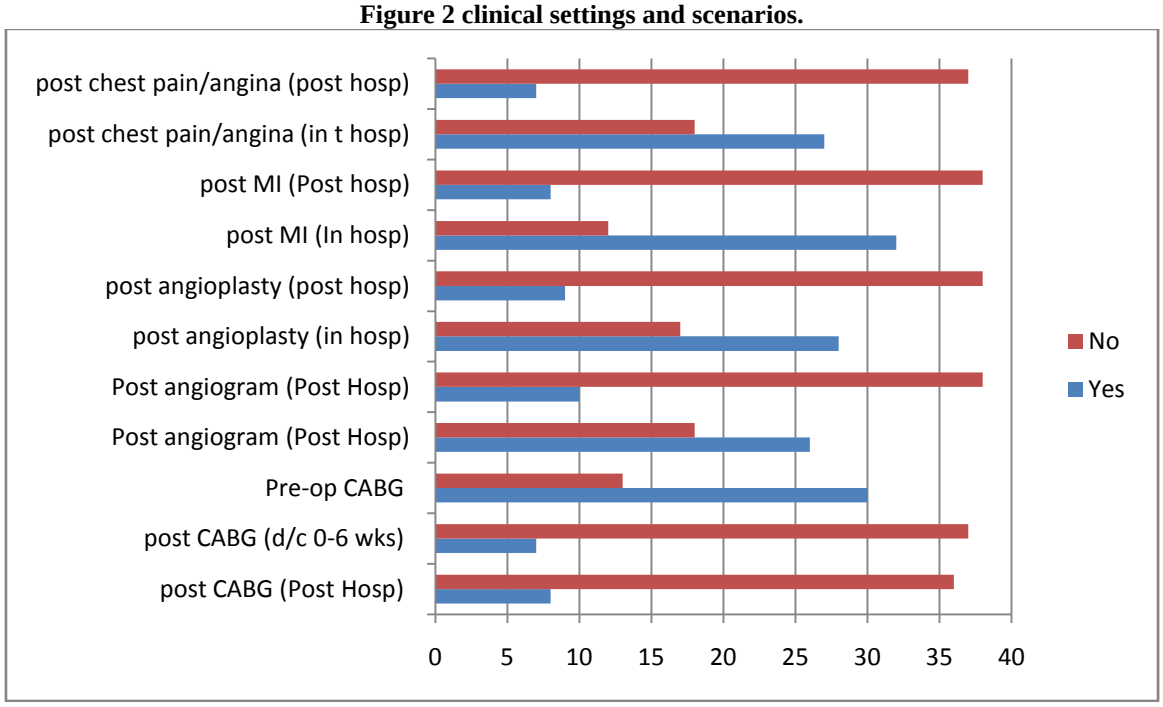


- Red = NO
- Blue= Yes

Data expressed as number of physiotherapist using intervention. CR, cardiac rehabilitation; PD, postural drainage; IPBP, intermittent positive pressure breathing; ACBT, Active cycle of breathing technique.

Most patients were most commonly seen in hospital prior to and following CABG surgery and after myocardial infarction. Following physiotherapist treated patients following admission for chest pain/ angina pain or angioplasty intervention. (Figure 2) The reason for the referral of these patients to physiotherapy is unknown. Few physiotherapists continued with patient's care following discharge from the hospital.

Figure 2 clinical settings and scenarios.



Data expressed as number of physiotherapist working in clinical setting scenarios. MI, myocardial infarction; CABG, coronary artery bypass graft.

The mean improvement found significant in both group A and B. Result shows that more cardio-pulmonary physiotherapy provide care (60%)than Group B who didn't received advance cardio pulmonary treatment (32%).Patient in both groups reported significant improvement after 3 weeks of treatment program compared to baseline on all outcome measure. Compared to Group B, Group A showed more improvement. It was three time better results over the Group B.

IV. DISCUSSION

Coronary artery disease is a projected to be the leading cause of death in developing countries by $2030_{1.}$ This study investigated the current level of involvement of cardiopulmonary physiotherapist in the management of patient with CAD in Kanpur, India. It was encouraging to note that more cardiopulmonary physiotherapists provided care to patients living with CAD then those who did not. Primary prevention strategies such as education concerning living a healthy lifestyle and secondary management for reoccurrence of cardiac event such as cardiac rehabilitation are important component in attempting to decrease the burden of CAD.[15] Education consisting of preoperative precaution of CABG (wound care and temporary restriction in physical activity), exercise guidelines (including frequency, intensity, time and type of exercise and red flags), general CAD pathophysiology and risk factors modification was done by physiotherapists in the acute care sitting. This is commendable because of motivation of patients with CAD to be active appears to be greatest in the early post discharge period.[16] Physical activity in patients are reported to decline two to six months following hospital discharge after a CAD event.[16] Intervention to assist with increasing physical activity level during the period, such as phase III cardiac rehabilitation, should be encouraged.

Manual technique was frequently used by physiotherapist in the current study. Postural drainage was also commonly used. Head down postural drainage is considered a relative contraindication in patient with severe cardiovascular disease.[17] A short term 30 degree head down postural drainage session in healthy adult resulted in decrease heart rate, mean arterial blood pressure, diastolic duration.[18] in healthy adult these changed may have no serious consequence but in individual with known CAD and reduce cardiac it could result in significant side effect. This research found no significant differences in respiratory response in participants when position in a modified or head down PD position. There were significant a difference in CVS response the two positions were compared and modified PD was better tolerated. It is therefore advisable to use a modified PD position is patient with CAD if indicated. Close monitoring of the patients response while the specific position should be maintained.|

Activity based intervention such as circulatory exercise and graded mobilization were commonly used by physiotherapist in this study. Mobilization exercise includes percussion, hacking, clapping, rib spring and range of motion exercise of the limb to prevent CABG. Circulatory exercise includes upper and lower extremity exercise may be useful for people with musculoskeletal problems in their extremity. Walking simple and low impact exercise that can help the patients create a more active and healthy lifestyle and may promote proper circulation of the body. Walking at any pace is beneficial to increase blood flow throughout the body, as it the best way to the lower the blood pressure and increase and increase muscles circulation in the legs. Early mobilization in hospital is encouraged following CABG surgery and acute coronary event if patients are medically stable. In this study patients with CAD were most commonly seen physiotherapist once or twice daily while in the hospital.

V. CONCLUSION

The study confirmed that most physiotherapists working in the cardiopulmonary field involved in the management of patients with CAD during hospitalization. However the use of evidence based intervention in the clinical care of patient with CAD was inconsistent. There is currently limited involvement of physiotherapist in outpatient cardiac rehabilitation in Kanpur. This is just because of limited awareness of the patient and also the poor population who lived in Kanpur. Most of the patients come here to treat such cardiac problems from outside from the Kanpur or villagers surrounding to the city. The main focus of the physiotherapists should be on prevention of risk factors such hypertension through education and exercise as well as implementation of programmes (cardiac rehabilitation) for the long term management of individuals diagnosed with CAD.

Chest physiotherapy is more effective in improving breathlessness and pain, remove secretion from the chest with standard medical treatment than medical treatment alone. The estimate effect of cardiac rehabilitation program in CAD patients are about three times more pronounced with medical treatment compared to medical treatment alone.

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Quick Change: Post-Transcriptional Regulation in Pseudomonas

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Abstract- *Pseudomonas species have evolved dynamic and intricate regulatory networks to fine-tune gene expression, with complex regulation occurring at every stage in the processing of genetic information. This approach enables Pseudomonas to generate precise individual responses to the environment in order to improve their fitness and resource economy. The weak correlations we observe between RNA and protein abundance highlight the significant regulatory contribution of a series of intersecting post-transcriptional pathways, influencing mRNA stability, translational activity and ribosome function, to Pseudomonas environmental responses. This review examines our current understanding of three major post-transcriptional regulatory systems in Pseudomonas spp.; Gac/Rsm, Hfq and RimK, and presents an overview of new research frontiers, emerging genome-wide methodologies, and their potential for the study of global regulatory responses in Pseudomonas.*

Keywords- translational control; Pseudomonas; post-transcriptional regulation; regulatory responses; signalling pathway; ribosomal modification

I. INTRODUCTION

POST-TRANSCRIPTIONAL REGULATORY MECHANISMS

One of the most well-understood pathways responsible for integrating external stimuli into post-transcriptional control in *Pseudomonas* is the Gac/Rsm signalling pathway (Coggan and Wolfgang 2012). Gac/Rsm is a widespread system that controls biofilm formation, virulence, motility and external stress responses in many different bacterial species (Brencic and Lory 2009; Chambers and Sauer 2013), and represents a major de- terminant of the switch between chronic and acute lifestyles in *Pseudomonas aeruginosa*. While many of the core network compo- nents and their functions in the signalling cascade have been de-scribed in detail (Brencic *et al.* 2009; Goodman *et al.* 2009) (Fig. 1), in recent years Gac/Rsm has also been shown to regulate several downstream signalling pathways including transcriptional regulators, quorum sensing and the second messenger cyclic (Brencic and Lory 2009; Chambers and Sauer 2013), markedly in- creasing the complexity of the system.

At the heart of the Gac/Rsm pathway are the small RNA molecules RsmY and RsmZ. The abundance of these sRNAs ultimately dictates the output of the Gac/Rsm system, and as such their transcription is subject to tight and complex regulation by the GacAS two-component signalling system. GacS is a transmembrane histidine protein kinase (HPK), and activates its cognate response regulator GacA by phosphotransfer (Goodman *et al.* 2009). Upon phosphorylation, GacA promotes transcription of RsmY/Z (Brencic *et al.* 2009), which contain multiple GGA trin-ucleotides in exposed stem-loops of their predicted secondary

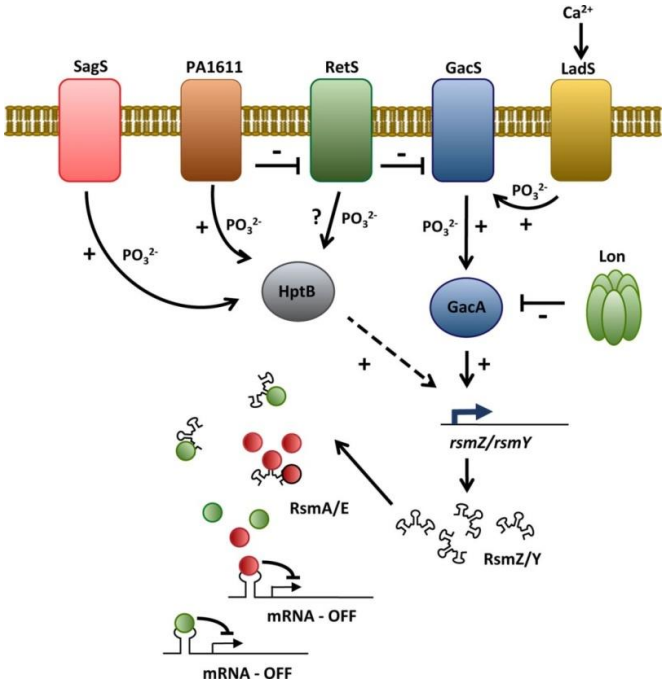


Figure 1. The Gac/Rsm regulatory network in *P. aeruginosa*. An integrated response from multiple membrane-bound histidine kinases controls the activity of the response regulator GacA, which in turn controls expression of the RsmZ/Y sRNAs. These sRNA molecules inhibit the translational regulatory proteins RsmA and RsmE (red and green circles), leading to altered translation of their target mRNAs. Other proteins that influence Gac/Rsm function include the

phosphotransfer protein HptB and the Lon protease complex structures (Schubert *et al.* 2007; Lapouge *et al.* 2013). RsmA and the related protein RsmE (Reimmann *et al.* 2005) are small (7 kDa) proteins that specifically recognise and bind to conserved GGA sequences in the 5r leader regions of target mRNAs. RsmA/RsmE binding affects mRNA stability, and/or prevents interactions be- tween the 30S ribosomal subunit and the ribosomal binding site, thus inhibiting translation initiation (Heurlier *et al.* 2004; Reim- mann *et al.* 2005). RsmA/E activity is in turn inhibited by RsmY/Z, which titrate RsmA/E away from the 5r mRNA leader sequences in their target mRNAs (Heurlier *et al.* 2004) (Fig. 1). The rela- tionship between *Pseudomonas fluorescens* RsmE and RsmZ has recently been defined at the molecular level, with RsmE pro- tein dimers assembling sequentially onto the RsmZ sRNA within a narrow affinity range (100–200 nM K_d in *P. fluorescens*), and showing positive binding cooperativity (Duss *et al.* 2014). The GacAS system is itself controlled by three additional HPK hy- brid proteins: RetS, PA1611 and LadS (Ventre *et al.* 2006; Kong *et al.* 2013) (Fig. 1). These HPKs are present in most pseudomon- ads, although the regulatory network can vary between individ- ual species (Chatterjee *et al.* 2003; Wei *et al.* 2013). In *P. aerugi- nosa*, RetS functions as an antagonist of GacS, and suppresses RsmZ/Y levels (Goodman *et al.* 2004). However, rather than operating via a conventional HPK phosphotransfer mechanism, RetS binds to and inhibits GacS, blocking its autophosphorylation and preventing the downstream phosphorylation of GacA (Goodman *et al.* 2009). Conversely, PA1611 interacts directly with RetS in *P. aeruginosa*, thus enabling the activation of GacS (Kong *et al.* 2013; Bhagirath *et al.* 2017). LadS positively controls *rsmY*/*Z* expression through a phosphorelay resulting in phosphotransfer to the Histidine phosphotransfer (HPT) domain of GacS (Cham- bonnier *et al.* 2016). In *P. aeruginosa*, although interestingly not in other tested *Pseudomonas* species, LadS activation occurs follow- ing calcium binding to its periplasmic DISMED2 domain, which activates its kinase activity (Broder, Jaeger and Jenal 2016) (Fig. 1). Several additional signalling proteins, sRNAs and other path- ways are implicated in the control of Gac/Rsm (Chambers and Sauer 2013). For example, BswR, an XRE-type transcriptional reg- ulator in *P. aeruginosa*, controls *rsmZ* transcription (Wang *et al.* 2014). The histidine phosphotransfer protein HptB indirectly controls *rsmY* expression under planktonic growth conditions. HptB is the phosphorylation target of four HPKs, including RetS, PA1611, PA1976 and SagS (Lin *et al.* 2006; Hsu *et al.* 2008). SagS also controls the Biofilm Initiation two-component system BfiSR, a key regulator of the initial stages of biofilm formation, and itself a repressor of *rsmZ* expression (Petrova and Sauer 2011). In addition to RsmY/RsmZ, other small RNAs can also i- RsmA/E function. In *P. aeruginosa*, the sRNA RsmW specifically binds to RsmA *in vitro*, restoring biofilm production and reducing swarm- ing in an *rsmYZ* mutant. RsmW expression is elevated in late sta- tionary versus logarithmic growth, and at higher temperatures (Miller *et al.* 2016). RsmY and RsmZ are also differentially regu- lated by the conditions in the growth environment (Jean-Pierre, Tremblay and Deziel 2016). Finally, the ATP-dependent protease Lon negatively regulates the Gac/Rsm cascade, with *lon* mutants showing increased stability and steady-state levels of GacA in late exponential growth (Takeuchi *et al.* 2014).

The Gac/Rsm system shows extensive regulatory overlap with a second major post-transcriptional regulator; Hfq. Hfq is a small, hexameric RNA-binding protein with several discrete regulatory functions (Fig. 2) (Vogel and Luisi 2011). Hfq function is dictated in large part by the abundance of its various sRNA binding partners. Unlike RsmA/E, which has only two or three cognate sRNAs, Hfq binds to many different sRNA molecules that are expressed under different conditions (Vogel and Luisi 2011; Chambers and Sauer 2013). It functions as an RNA chap- erone, facilitating binding between regulatory sRNAs and their mRNA targets (Moller *et al.* 2002; Maki *et al.* 2008). Hfq also tar- gets the specific degradation of selected mRNAs (Moll *et al.* 2003; Afonyushkin *et al.* 2005; Morita, Maki and Aiba 2005) and can act as a direct repressor of mRNA translation (Desnoyers and Masse 2012). Hfq binding also acts to protect sRNAs from degradation by polynucleotide phosphorylase (PNPase) and other enzymes (Andrade *et al.* 2012). Finally, it can regulate gene expression by influencing mRNA polyadenylation (Valentin-Hansen, Eriksen and Udesen 2004), or through direct interaction with DNA (Fig. 2) (Cech *et al.* 2016). Hfq binds to and stabilises RsmY in *P. aerugi- nosa* (Sonnleitner *et al.* 2006), while the RsmA homologue CsrA represses Hfq translation in *Escherichia coli* (Baker *et al.* 2007). Fur- thermore, *E. coli* CsrA and Hfq share at least one regulatory sRNA (Jorgensen *et al.* 2013). Similarly to GacA (Takeuchi *et al.* 2014), Hfq levels increase in a *P. aeruginosa lon* mutant background (Fer- nandez *et al.* 2016). Regulation of oxidative stress response pro- teins (Zhang *et al.* 1998; Fields and Thompson 2008) and the Fis global transcriptional regulator (via the sRNA RgsA; Lu *et al.* 2016) have also been linked to both Hfq and Gac/Rsm. This regulatory connection is reflected in the large number of shared pheno- types between *rsmA/E* and *hfq* mutants in *Pseudomonas* species, with disruption of either gene leading to increased surface at- tachment, reduced motility and disruption of virulence (Brencic and Lory 2009; Irie *et al.* 2010; Little *et al.* 2016).

Hfq controls a wide variety of phenotypes, with common reg- ulatory targets emerging from studies of closely related bacte- ria. In *Pseudomonas* and other proteobacteria, Hfq controls car- bon catabolite repression (Sonnleitner and Bla¨ si 2014), and neg- atively regulates both amino acid ABC transporters (Sonnleitner *et al.* 2006; Gao *et al.* 2010; Sobrero *et al.* 2012; Little *et al.* 2016), and pathways underpinning biofilm formation (Jorgensen *et al.* 2012; Thomason *et al.* 2012). Conversely, Hfq mRNA stabilisa- tion exerts complex, but generally positive, effects on motility (Mulcahy *et al.* 2008; Gao *et al.* 2010) and virulence (Sonnleitner *et al.* 2003). Hfq has also been implicated in the control of iron homeostasis (Sobrero *et al.* 2012) and enables the environmental stress-tolerance super-phenotype in *Pseudomonas putida* (Arce- Rodriguez *et al.* 2016). In *P. fluorescens*, Hfq plays an important role in niche adaptation, with reduced Hfq levels resulting in pheno- types including reduced motility, increased surface attachment, and compromised rhizosphere colonisation (Little *et al.* 2016). Hfq and its target sRNAs have been the subject of intensive research in several bacteria. As well as structural/biochemical studies of Hfq–RNA complexes (Mikulecky *et al.* 2004; Link, Valentin-Hansen and Brennan 2009), a number of recent stud- ies have examined the relationship between Hfq and RNA using global methods such as CLIP-Seq analysis to identify Hfq-bound RNAs (Sittka, Rolle and Vogel 2009; Holmqvist *et al.* 2016) and transcriptional and proteomic surveys of *hfq* deletion mutants (Sonnleitner *et al.* 2006; Gao *et al.* 2010; Sobrero *et al.* 2012; Boudry *et al.* 2014). Global proteomic and transcriptomic analyses have been conducted for *hfq* mutants of *P. putida* (Arce-Rodriguez *et al.* 2016) and *P. aeruginosa* (Sonnleitner *et al.* 2006), respectively, and implicate Hfq in the control of pathways including acetoin and metabolism, ABC and MFS transporters, quorum sensing, and siderophore and phenazine production. These global analyti- cal methods promise to greatly increase our mechanistic under- standing of post-transcriptional regulation by the well-studied Gac/Rsm and Hfq pathways, and are discussed in more detail in the final section of this review.

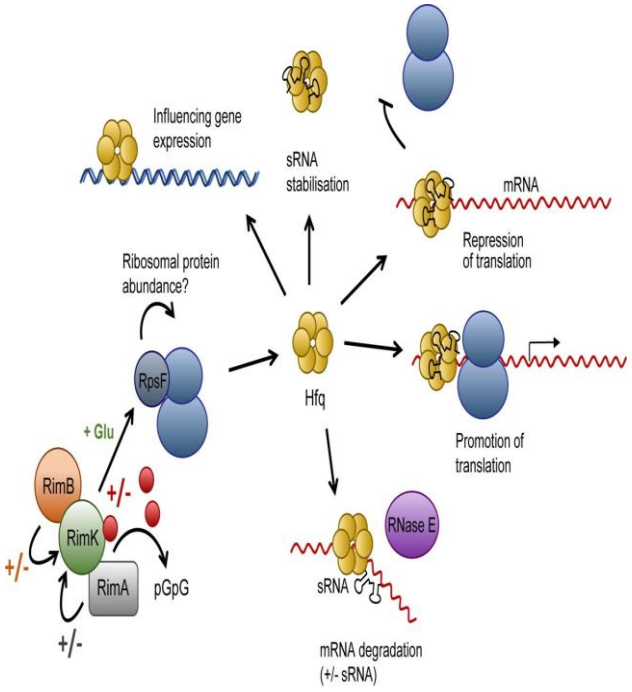


Figure 2. The Rim and Hfq regulatory networks in *Pseudomonas* spp. The RimK glutamate ligase sequentially adds glutamate residues to the C-terminus of ribosomal protein S6 (RpsF). RimK activity is tightly controlled through direct interaction with the second messenger cyclic-di-GMP (red circles), RimB and the cyclic-di-GMP phosphodiesterase RimA. RpsF glutamation affects ribosome function, which leads to altered Hfq abundance via an as-yet unidentified mechanism. Hfq is a pleiotropic regulator of mRNA/sRNA stability, mRNA translation and gene transcription. These processes are mediated through a diverse series of Hfq–RNA/DNA interactions.

NOVEL MECHANISMS OF TRANSLATIONAL REGULATION

In addition to these well-studied pathways for post-transcriptional control, entirely new regulatory mechanisms are still being discovered. The specific alteration of ribosome function by post-translational modification of its associated proteins represents a significant, and to date largely unexplored, regulatory process (Little *et al.* 2016). Fifty-seven proteins have been identified in the bacterial ribosome, many of which are es- sential, and 34 of which are universally conserved (Bubunenko, Baker and Court 2007). Intriguingly, multiple ribosomal proteins are subject to post-translational regulation by acetylation, methylation, methylthiolation, and the removal or addition of C-terminal amino acid residues. While the purpose of such modifications is in most cases still unknown (Nesterchuk, Sergiev and Dontsova 2011), their existence strongly suggests that aspects of ribosomal behaviour may be subject to dynamic regulation through a

process of ribosomal specialisation. It is tempting to posit that changes to the ribosome will result in corresponding changes to the cellular proteome as a con- sequence of altered ribosome–mRNA recognition, changes to translational efficiency, or other post-transcriptional mecha- nisms. Until relatively recently this has been difficult to test, as technological limitations coupled with a lack of searchable peptide sequence databases have rendered quantitative char- acterisation of cellular proteomes difficult, if not impossible. Advances in liquid chromatography-coupled mass analysis, sample labelling methods (Unwin 2010), and a critical mass of genome sequence data have revolutionised the field of proteomics. A recent study by our laboratory (Little *et al.* 2016) has exploited these advances to probe the consequences of a particular ribosomal modification, revealing unexpectedly large and specific alterations in the cellular proteome. In this work, we examined the effects of post-translational modification of the ribosomal protein RpsF. RpsF is located in the central domain of the 30S ribosomal subunit, where it inter- acts with both the ribosomal RNA and the protein S18 (Agalarov *et al.* 2000). RpsF is modified by RimK, a member of the ATP- dependent ATP-Grasp superfamily, by the addition of gluta- mate residues at its C-terminus (Kang *et al.* 1989). This mod- ification is associated with profound effects on the structure and function of the *Pseudomonas* ribosome. Quantitative Liquid chromatography–mass spectrometry (LC–MS/MS) analysis of la- belled peptides revealed that *rimK* deletion leads to significantly lower abundance of multiple ribosomal proteins, alongside in- creased stress response, amino acid transport and metal iron- scavenging pathways. No significant alterations were detected in the levels of rRNA, or the mRNAs of differentially translated proteins in the *rimK* mutant, suggesting that RpsF modification specifically changes ribosome function in some way, and this leads to altered proteome composition.

In the mutualistic plant-growth-promoting rhizobacteria *P. fluorescens*, the *rimK*-encoding operon is highly upregulated dur- ing early stage colonisation of the rhizosphere, suggesting an important role for RimK function in this period (Little *et al.* 2016). This transcriptional regulation is reinforced by the tight control exerted on RimK protein activity, both transcription- ally and through interactions with the other components of the Rim operon (RimA, RimB) and the signalling molecule cyclic-di- GMP. RimA/B and cyclic-di-GMP interact directly with the RimK enzyme and substantially influence its ATPase and glutamate ligase activities, although the mechanistic details of the sig- nalling network are currently poorly defined (Fig. 2) (Little *et al.* 2016). In any event, modification of RpsF correlates with a post- transcriptional output favouring a motile, virulent state. This fits with the increase in *rimK* expression seen during the early stages of plant root colonisation, when cells need to rapidly colonise the spatial environment of the rhizosphere. Conversely, lack of RpsF modification is associated with protein changes that prioritise long-term rhizosphere adaptation, such as surface at- tachment, resource acquisition and stress resistance. In addi- tion to controlling phenotypes associated with colonisation and metabolic adaptation, RimK also plays an important role in the virulence of both human and plant pathogenic pseudomonads (Little *et al.* 2016). A number of unanswered questions remain relating to the regulation and mechanism of action of the Rim pathway. Firstly, we do not yet fully understand how exactly RimK is controlled. How does the external environment influence RimK activity? What is the role of the widespread signalling molecule cyclic- di-GMP in RimK regulation? Related to this, how does control of RimK link into the wider network of post-transcriptional regu- lation in *Pseudomonas*? RsmA has a complex regulatory relation- ship with cyclic-di-GMP, both controlling its metabolism (Cham- bers and Sauer 2013) and subject to cyclic-di-GMP regulation it- self (Moscoso *et al.* 2014). This raises the possibility that RsmA and RimK may form part of a single, integrated pathway under the ultimate control of cyclic-di-GMP. A second major research area concerns the mechanistic function of RimK. How does RimK ribosomal modification lead to altered proteome compo- sition? Is this a consequence of altered translation, or mRNA recognition by the modified ribosomes, or possibly a combina- tion of both? Many of the proteomic changes producing Δ*rimK* phenotypes could be rationalised by the observed reduction in levels of the RNA-binding post-transcriptional regulator Hfq (Lit- tle *et al.* 2016). Thus, it is important to determine the extent to which Rim tunes the proteome by controlling Hfq levels, and ex- actly how this control takes place.

The determination of RimK function highlights an intrigu- ing new mechanism for post-transcriptional control that links changes in ribosome function, and hence proteome composi- tion, to the dynamic, controlled modification of ribosomal pro- teins (Little *et al.* 2016). In turn, this finding raises major im- plications for studies of other ribosomal modifications, several of which may also represent novel post-translational regulatory systems. If this turns out to be the case, it will further transform our understanding of post-transcriptional regulation in bacte- ria. In the final section of this review, we will discuss some of the emerging genome-wide methodologies that are allowing re- searchers to examine new aspects of post-transcriptional regu- lation in bacteria, and may give us answers to the outstanding questions raised above.

EMERGING GENOME-WIDE METHODOLOGIES FOR INVESTIGATING TRANSLATIONAL REGULATION

While advances in quantitative proteomics enabled us to ex- amine the impact of RimK on the *Pseudomonas* proteome, the development of additional, novel technologies are expanding our ability to probe other important mechanisms of transla- tional regulation to a finer resolution than has previously been possible (Fig. 3).

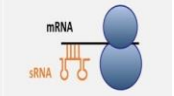
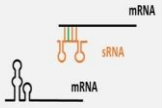
Technology	Protocol	Applications	
Ribo-seq	Crosslink RNA to ribosomes, purify and degrade unprotected RNA. Reverse transcribe ribosome-protected RNA to cDNA and sequence.	Profiling sRNA effects on translation Deciphering the sRNA-target interactome (alongside computational analyses)	
High Throughput Point Mutagenesis	FACS sort cells containing library of target gene mutants fused to GFP. Amplify and sequence interesting targets.	Determine the effect of sRNA variants on protein expression Examination of mRNA riboswitches	
RIP-seq	Immunoprecipitate target protein crosslinked to RNA interaction partners. Degrade unbound RNA. Reverse transcribe protected RNA to cDNA and sequence.	Capturing the sRNA-protein interaction network	
RIL-seq	As RIP-seq but with additional RNA ligation and computational analysis steps.	Identifying protein-mediated sRNA-mRNA interactions	

Figure 3. Emerging genome-wide methodologies. Overview of the new technologies developed to study mechanisms of translational regulation to a finer resolution. The subject, methodology and range of applications for each technique are summarised in each case.

Translational regulation of gene expression is a ribonucleoprotein-driven process, which involves both non-coding RNAs and RNA binding proteins (RBPs). A large complement of non-coding RNAs affect gene expression by employing multiple distinct regulatory mechanisms, at the level of translation initiation by modulating ribosome recruitment, and/or at the level of transcript abundance by modulating transcript degradation (Barquist and Vogel 2015). Deciphering the sRNA–target interactome is an essential step toward under- standing the roles of sRNA in the cellular network. However, computational identification of sRNA targets can be challeng- ing. sRNA–mRNA hybridisation is frequently influenced by sRNA secondary structure, and base-paired regions between RNAs are generally short and can include multiple discon- tinuous stretches of sequence (Wang *et al.* 2015). To identify the regulatory targets of RyhB, one of the best-studied sRNAs in *Escherichia coli*, at the genome level Wang *et al.* established ribosome-profiling experiments (Ribo-seq) in bacteria (Fig. 3). Ribo-seq is a state-of-the-art technology that [illegible] hensive and quantitative measurements of translation. Like many recent high-throughput techniques, it adapts an estab- lished technology to take advantage of the massively parallel measurements afforded by modern short-read sequencing. In the case of Ribo-seq, ribosomes bound to actively translated mRNAs are purified from cell lysates. Following digestion of the unprotected RNA fraction, the protected, ribosome-bound RNA is reverse transcribed to cDNA and sequenced. By identifying the precise positions of ribosomes on the transcript, ribosomal profiling experiments have unveiled key insights into the composition and regulation of the expressed proteome (Ingolia 2016). Ribo-seq is a powerful approach for the experimental identification of sRNA targets, and can reveal sRNA regulation both at the level of mRNA stability and at the translational level. However, while Ribo-seq can identify target mRNAs, it cannot reveal precise sites of sRNA:target hybridisation. Moving forward, sRNA target prediction algorithms could be combined with Ribo-seq datasets to facilitate guided target site identification, where predictions are focused on a subset of mRNAs rather than the whole transcriptome.

Many bacterial sRNAs are at least partially dependent on RBPs, such as the previously introduced RNA chaperone Hfq, for their function (Van Assche *et al.* 2015). Approaches combin- ing *in vivo* crosslinking and RNA deep sequencing have been in- creasingly used to globally map the cellular RNA ligands and binding sites of RBPs *in vivo* (Holmqvist *et al.* 2016). Recent ap- proaches include a UV crosslinking step, which offers several ad- vantages over traditional co-immunoprecipitation (Zhang and Darnell 2011). These large-scale methods provide a global view of the RNA molecules bound to individual RBPs, although spe- cific sRNA–target pairs can only be indirectly deduced by ad-ditional, sequence-dependent predictive schemes. To overcome this limitation, Melamed and colleagues (Melamed *et al.* 2016) developed a broadly applicable methodology termed RIL-seq (RNA interaction by ligation and sequencing, Fig. 3). RIL-seq in- corporates an additional RNA ligation step into the workflow of a conventional RNA pull-down experiment to create sRNA-mRNA chimeric fragments, followed by advanced computational analy- sis of the resulting cDNA library to identify interacting RNA pairs from the dataset of protein interaction partners. Applied to the *in vivo* transcriptome-wide identification of interactions involv- ing Hfq-associated sRNA, this technique enabled the discovery of dynamic changes in the Hfq-mediated sRNA interactome with changing cellular conditions (Melamed *et al.* 2016).

Integral features of individual mRNAs can also influence translation efficiency, and in many cases are directly involved in altering gene expression in response to changing

cellular conditions or environmental stimuli (Meyer 2017). Specific motifs in the 5r untranslated region (UTR) of certain mRNAs can regulate gene expression in response to temperature, metals and small metabolite ligands. Such structures, known as riboswitches regulate metabolism and virulence by altering mRNA secondary structure to block ribosome access or in- duce early transcription termination (Fang *et al.* 2016). In addition to this role, riboswitches are also involved in the regulation of non-coding RNA expression, representing a novel mechanism of signal integration in bacteria. In both cases, high-throughput point mutagenesis has enabled the identification of functional post-transcriptional regulatory elements. This method uses fluorescence-activated cell sorting (FACS) to categorise cells containing a mutant library based on the gene of interest fused to green fluorescent protein (GFP). This enables researchers to associate all possible mutations (including synonymous single-nucleotide polymorphisms (SNPs) that in- duce structural changes in the transcribed RNA) in a selected sequence with changes in gene expression (Holmqvist, Reimega˚ rd and Wagner 2013).

The plasticity of bacterial regulatory networks confers both versatility and efficiency, as multiple signals can be integrated to control the expression of common responses. To probe the intersecting contributions of the various inputs to bacterial gene expression, future analyses of post-transcriptional regulation are likely to involve the integration of several omics methods to pro- duce comprehensive models for bacterial adaptation to external challenges. A recent demonstration of this approach com- pared relative changes in total mRNA with translational changes (polysome fractions) and protein abundance to provide a comprehensive study of bacterial stress responses in *Rhodobacter sphaeroides* (Berghoff *et al.* 2013).

II. CONCLUDING REMARKS

Despite the insights we have gained to date, the list of unresolved questions within the field of *Pseudomonas* post-transcriptional regulation remains very long. Many more RNA regulators are likely to be discovered, alongside novel reg-ulatory mechanisms and refinements of existing pathways. Recent advancements in high throughput sequencing and bioinformatics, combined with novel approaches including quantitative proteomics, Ribo-seq, RIL-seq and various other omics techniques (Schulmeyer and Yahr 2017) present significant opportunities to discover and define exciting new mechanisms of post-transcriptional control.

Conflict of interest. None declared.

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Technologies and Techniques in Total Knee Replacement Surgery: A Comprehensive Review"

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ABSTRACT:

Background: In severe osteoarthritis, trauma, diseased knee joint and others conditions, total knee arthroplasty or total knee replacement is assigned as most favorable surgical procedure when others conservative managements become fails. It corrects the associated knee joint deformities, restore alignment, enhance balance, get free from pain and improve and recover functionality. Now a day's different advanced surgical techniques and technologies are executed more compared to conventional or manual TKA/TKR surgeries such as; robotic assisted, computer assisted, computer navigated. In these surgeries, surgeon use to prefer some of the latest technologies to enhance the standard of the surgical procedure and getting maximum patient satisfaction following surgery. The aim of this review is to find out most favorable techniques and technologies performed in terms of TKA surgeries.

Methods: Appropriate subjected data has been collected from PubMed and Google Scholar electronic databases. We screened TKA records from 2021 to 2023. Relevant articles are selected by using medical subject heading (MesH) terms, total knee replacement and techniques (phrase) and following PRISMA concept. Duplicates and paid articles have been removed from the gathered data set.

Discussion: After being searched databases in connection with TKA surgical techniques and technologies, estimation was made concerned with more advanced or new surgical techniques. These were compared with old and contemporary techniques and technologies to get which is superior and most common technique/method. For this a narrative review was underwent to achieve optimal facts.

Conclusion: This current review suggest that new robot assisted and computer assisted surgical techniques along with latest technologies such as artificial intelligence based, smart sensors, MARS CT imaging, VISIONAIRE guides, circular external fixators, skywalker, point-light

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display observation, deep convolution neural network (CNN) through transfer learning, deep learning (DL) have been favored against conventional and others.

Key words: TKA/TKR, techniques, technology, robotic assisted system (RAS), computer assisted system (CAS)

INTRODUCTION:

Progression of knee joint osteoarthritis does occur if Knee becomes misaligned due to change in biomechanical factors. [1] Total knee arthroplasty (TKA) is a technique with reliable results that is both safe and efficient to manage the patients with severe osteoarthritis. [2] TKR, usually executed surgery has various interventional methods such as one, two or three-compartment prostheses. Patellar replacement in TKR has contradictory statement if it will be done. [3] New implantable smart biosensors are found highly relevant to collect data regarding decisions, complex-trauma-treatment, and performance of osseo-integrated prostheses. [14, 5] patient-specific instrumentation (PSI), computer-assisted surgery (CAS) included with robotic assisted system (RAS), are techniques with surgical perfection. [6, 7, 24] Load sensors are used to balancing soft tissue and calculating loads of medial and lateral compartments of knee along with information about knee kinematics. [8] CAS began to gain popularity from the beginning of 2000 while RAS is the newest assistive technology with huge popularity. [9] AI is a broad concept, involving virtual (computing) and physical (robotic) elements. [10] It improves accuracy in terms of diagnosis, decision making, to improving conditions, identifying resources, along with early intervention. [11, 12] Joint surgery using artificial intelligence (AI) is set to advance quickly in China. [13]

Giving coating, pattern, design, performance, high flexion, stability, except incapability in osseo-integration and aseptic loosening of implants, the single radius (SR) ultracongruent, (UC), Endoprosthesis design, Physica KR's tibial insert, mega prostheses, Uncemented knee implants, Circular external fixators have greater value in TKR surgeries. [14, 15, 16, 17, 18, 19].While arthrodesis or knee fusion is a primary or last resort for many complicated issues, such as tubercular joint and poliomyelitis. offer the advantages of gradual length or alignment correction and improved mechanics. [20] The long-term success of distal femur implants continues to be jeopardized by wear and severe deterioration to polyethylene components. [19] Metals like cobalt chromium molybdenum, titanium, ceramic, and, more recently, poly-ether-ether-ketone (PEEK) which is preferred now have different ways in which biomaterials can interact with the body exist. These metals have been around for a while because of their durability and inertness.[21, 22]

Two surgical procedures; high tibial osteotomy (HTO) in young and active patients and unilateral knee arthroplasty (UKA) for older patients in case of moderate or severe osteoarthritis have been found crucial. [1] Nevertheless, strict patient screening and technological advancements have allowed for 10-year survival rates for prosthesis to surpass 90% for patients

receiving lateral UKA that is more difficult and less repeatable than medial unicompartmental replacement.[23] CAS can be divided into three categories: passive systems, hybrid systems, and active systems. In this bone cuts are still made manually and decided by surgeon in passive systems, however, saw jig orientation is checked through computer system. With hybrid systems, the surgeon still performs the actual bone cut while using robotic arms to follow a predetermined and intraoperatively determined cut orientation. In case of active systems, the computer system uses robotic arms to conduct both the cut orientation and the actual bone cut. [24] To improve surgical perfection, radiological images using computed tomography (CT), magnetic resonance imaging (MRI), x-ray, and fluoroscopic x-ray sequences are some of the current 3D reconstruction techniques. Reconstruction methods such two-stage optimization method and Statistical shape modeling are carried out for patient knee anatomy during kinematic motion and bone shape successively. [25]

In order that uncertainty regarding ideal prosthetic alignment in the sagittal plane, femoral component be placed slightly off-center. Flexed femoral-component with a posterior reference are supposed to show in a computer simulation research to improve kinematics and biomechanical effects in TKA.[26] Another popular PSI is the VISIONAIRETM Cutting Guides from Smith + Nephew Inc. in Memphis, Tennessee, USA. [27] The fixation technique in the case of stemmed implantation may not be enough with merely conventional lateral. [28] Using item response theory and computerized adaptive testing, the widely-used full-length (42-item) HOOS and KOOS instruments were transformed into the HOOS-12 and KOOS-12 to produce three domain scores and an overall summary score in a condensed style. [29] The recently created multi-energy spectral photon-counting computed tomography (MARS) allows for high efficiency detection within the human diagnostic energy range (30-120 keV). A "colour" image of the object of interest with high resolution structural data and some compositional data can be created from this multi-energy data. [30]

Good implant position, mechanical alignment and balancing may cause implant-survivorship of 82.3% at 25 years. [31] If proprioceptive instability and incorrect alignment are found leading to patients' dissatisfaction. Thus, biomechanical corrections can be achieved through the Bicruciate-retaining (BCR) TKA process. [32] The use of RAS and PSI that provide incredibly precise alignment is growing now [33] However, CAS is not perfect since the implant positioning objective is not met is 5% of cases. For this we need 3D printing, patient-specific cutting guides. Nevertheless, 30% of procedures cannot be completed with navigation due to intraoperative hurdles. [34, 35] To prevent early failure of TKR surgeries, disruptions in the extensor mechanism of the knee and improper axial alignment will be considered. [36] For this, correct augmentation of damaged host tissue is made possible by the allograft that should be tightly tensioned in full extension for optimal outcomes. [37]

The polyethylene inlay of FB and MB implants provide a wider range of motion. Out of these, no one is given preference over another. [38] Enhanced recovery after surgery (ERAS) has attained huge popularity. [39] However, RAS uses dynamic referencing and precision

instrumentation for patient-specific bone cuts and implant placement. [40] Therefore, accurate implant location, implant sizing, restoring the joint line, and balancing soft tissue are all being taken into consideration during TKR. RAS reduce the margin of error connected to component and osteotomy placements. [41]whereas wearable sensors, including Inertial Measurement Units (IMUs), offer a low-cost, portable option for gathering functional metrics, such as spatiotemporal gait characteristics, that are recorded using three-dimensional gait analysis. [42]

Periprosthetic loosening is the chief cause for TKR failure. In revision TKR the gap between the bone and each of the two components is the defect that needs to be addressed to prevent loosening. [43, 44] Machine learning is the answer not only for this but also for implant size, placement, and ligament balancing. Variables influencing revision rates are patient characteristics, surgical technique, surgeon expertise, and the number of instances is examples of non-device-related problems. The variance in revision rates between different prostheses may be also caused by device-related factors. [45, 44] Plain radiography, scintigraphy, arthrograms, fluodeoxyglucose-positron emission tomography (FDG-PET), and magnetic resonance imaging are only a few of the imaging techniques utilized for diagnosis like implant loosening.[45]

An efficient physical preventative technique for deep vein thrombosis is intermittent pneumatic compression.[46] Tourniquet was linked to a higher risk of major adverse events, higher pain thresholds, and longer hospital stays. The safe execution of this in TKA has been made possible by procedures such anemia screening, controlled hypotension, knee flexion via surgery, implantation of a bone plug in the femoral canal, pulse lavage, swab packing, CO2 gas application, and computer navigation. [47] Following computer-assisted navigation (CAN) and robotic-assisted (RA) knee arthroplasty, pin-related problems are rather rare. [48, 49] Effective hemo-stasis, such as tissue adhesives and sealants, is extremely important in clinical therapies and has the potential to save lives in the pre-hospital scenario. [50] Mid-level inserts had a low incidence of post-TKA instability or aseptic loosening at mid-term follow-up and are helpful for patients with severe deformity and ligamentous laxity. [51] To control increased intraoperative coronal plane laxity that cannot be resolved with conventional ligament balancing procedures and a posterior-stabilized (PS) insert. [41] Large osseous deficiencies in the tibia and the detrimental effects they have on fixation are a frequent and difficult issue that arises during rTKA. When there are significant osseous abnormalities present, trabecular metal (TM) tantalum cones (Zimmer, Warsaw, IN, USA) are one method for establishing metaphyseal (zone 2) fixation. Long stems have historically been utilized to offload the insufficient metaphyseal bone and enhance implant. [52] This study aims to review that which one of the surgical techniques is preferred and executing most currently.

METHODS:

SEARCH STRATEGY:

PUBMED DATABASE SEARCH:

A literature search for scientific articles on the Technologies and Techniques in Total Knee Replacement Surgery: A Comprehensive Review “was performed using PubMed and Google

scholar from 2021 to 2023 (for 3 years). The applied search strategies of the databases can be found in Table1. A total of 4719 PubMed-results were found without time frame. And with filer (2021-23) it was 706 results. Of these studies, 198 were subsequently excluded after title and abstract screening and duplicate removal. Thus 84 results out of 282 articles were selected for the study.

GOOGLE SCHOLAR DATABASE SEARCH:

The following keywords or their combinations were used for Google scholar search: With topic-[emerging techniques and technologies in total knee replacement surgeries] and time filters: {2021-23]; Results were 17400 articles. And with phrases "total knee replacement surgery" AND "techniques" and time limit 2021-23, 1100 articles were identified (any type). In which, 896 were detected as free full text (any type). Out of 896 articles, 238 results were considered as review articles. And after screening 67 review articles out of 238 articles were selected for the current study. Search filters of the databases were used to identify RCTs if applicable. No language restrictions were applied. The reference lists of the relevant articles were manually reviewed for additional studies. Screening for relevance was performed based on title and abstract initially, and then by reviewing the full text.

TABLE.1 PubMed and Google scholar databases search;

Strategies on PubMed	Google scholar	Key words on PubMed	Total article	Final selected article
1. ("Artificial Intelligence/classification"[Mesh] OR "Artificial Intelligence/history"[Mesh] OR "Artificial Intelligence/standards"[Mesh] OR "Artificial Intelligence/statistics and numerical data"[Mesh] OR "Artificial Intelligence/trends"[Mesh]) OR new OR bleeding edge OR deep OR derivative OR eventual.	Topic:[emerging techniques and technologies in total knee replacement surgeries]	new, bleeding edge, deep, derivative, eventual	4719 on PubMed and 17400 on Google scholar	84 on PubMed and 67 on Google scholar
2. ("Technology/classification"[Mesh] OR "Technology/history"[Mesh] OR "Technology/methods"[Mesh] OR "Technology/statistics and numerical data"[Mesh] OR	Phrases:"total knee replacement surgery" AND "techniques"	innovation, machine, apparatus, instrument, device		

"Technology/trends"[Mesh]) OR innovation OR machine OR apparatus OR instrument OR device.				
3. ("Arthroplasty, Replacement, Knee/adverse effects"[Mesh] OR "Arthroplasty, Replacement, Knee/classification"[Mesh] OR "Arthroplasty, Replacement, Knee/instrumentation"[Mesh] OR "Arthroplasty, Replacement, Knee/methods"[Mesh] OR "Arthroplasty, Replacement, Knee/mortality"[Mesh] OR "Arthroplasty, Replacement, Knee/rehabilitation"[Mesh] OR "Arthroplasty, Replacement, Knee/standards"[Mesh] OR "Arthroplasty, Replacement, Knee/statistics and numerical data"[Mesh] OR "Arthroplasty, Replacement, Knee/trends"[Mesh]) OR total knee arthroplasty OR total knee reconstruction.		total knee arthroplasty, total knee reconstruction		

TABLE.2 summary of various techniques and technologies used in TKR surgeries

Authors	Study-year	Article-type	Topic	Methods/techniques	Conclusion
D. Alesi,	2021	review	Total knee arthroplasty in valgus knee deformity: is it still a challenge in 2021?	Several soft tissue release techniques for knee valgus correction	All STR techniques give satisfactory results
Cécile Batailler	2021	review	Concepts and techniques of a new robotically assisted	the ROSA knee system	Good reproducibility and productivity in TKR

			technique for total knee arthroplasty: the ROSA knee system		
Junren Zhang	2022	review	Robotic-arm assisted total knee arthroplasty is associated with improved accuracy and patient reported outcomes: a systematic review and meta-analysis	robotic-arm assisted total knee arthroplasty (RATKA)	RATKA demonstrated improved accuracy of component positioning and early patient-reported outcomes, though it may not be clinically significant.
Prakash Jayakumar, MBBS, DPhil	2021	RCT	Comparison of an Artificial Intelligence–Enabled Patient Decision Aid vs Educational Material on Decision Quality, Shared Decision-Making, Patient Experience, and Functional Outcomes in Adults	Cohort study with 3 modules; education, preferences and personalized outcomes	AI-enabled decision aid significantly improved decision quality, level of SDM, satisfaction, and physical limitations without significantly impacting consultation times, TKR rates, or treatment concordance in patients with knee OA considering TKR

			With Knee Osteoarthritis		
Jiazheng Xu	2022	RCT	Early Clinical and Radiographic Outcomes of Robot-Assisted Versus Conventional Manual Total Knee Arthroplasty: A Randomized Controlled Study	Comparison between robot-assisted total knee arthroplasty (RA-TKA) with conventional manual total knee arthroplasty (CM-TKA)	RA-TKA requires more time than CM-TKA, however, RA-TKA improved the accuracy of tibial component alignment.
Simon W Young	2022	RCT	A prospective randomized controlled trial of mechanical axis with soft tissue release balancing vs functional alignment with bony resection balancing in total knee replacement-a study using Stryker Mako robotic arm-assisted technology	compare the patient and surgical outcomes of FA to the current gold standard surgical technique, mechanical alignment (MA),	FA delivers superior outcomes for patients than MA
Cheol Hee Park	2021	review	Sensor-Assisted Total Knee Arthroplasty: A Narrative Review	2 sensors available, VERASENSE[mostly used] and eLIBRA	No apparent consensus that loads sensors technology will result in improved functional results.
Régis Pailhé	2021	review	Total knee arthroplasty: Latest robotics implantation	Assessing the types of robot, implantation techniques and steps in	TKA implantation is more accurate when using robotic systems than when using conventional instruments, the

			techniques	surgical procedure	functional outcomes appear better with newer synergistic systems, favor of using robotic systems
Bogdan Uivaraseanu	2022	review	Highlighting the advantages and benefits of cementless total knee arthroplasty (Review)	Comparative study for cemented and non cemented surgeries	Modern cement less TKA has similar survival rates and functional results as cemented prostheses. Non cemented is preferred in young people
Prasoon Kumar	2021	Review	Application of 3D Printing in Hip and Knee Arthroplasty: A Narrative	PubMed search with 30 relevant articles	3D printing in arthroplasty is an evolving field with promising results
E Carlos Rodríguez-Merchán	2022	review	The current role of the virtual elements of artificial intelligence in total knee arthroplasty	Compare the ML and DL of the AI	Deep learning (DL) is more advantageous than machine learning (ML)
Karthikeyan. P. Iyengar [a]	2021	review	Smart sensor implant technology in total knee arthroplasty	Compared the sensor and smart sensor technology	Smart Sensor implant technology in total knee arthroplasty appears to provide superior patient satisfaction rates and improved functional outcomes
Vikas Kulshrestha,	2022	Cohort	Early Outcomes of	prospective cohort study for DP AND	DP knee design had similar knee function to the UC

			Dual-Pivot Total Knee Replacement Compared to an Ultracongruent Design	UC	knee. The DP knee design had significantly better stair climbing ability
Man-Soo Kim	2023	review	Machine Learning for Detecting Total Knee Arthroplasty Implant Loosening on Plain Radiographs	Comparison study through survey for CNN and implant loosening	Deep convolution neural network (CNN) through transfer learning, shows high accuracy for detecting the loosening of TKA implants on plain radiographs.
Zhonghua Xu & Yuan Zhang	2022	review	What's new in artificially intelligent joint surgery in China? The minutes of the 2021 IEEE ICRA and literature review	robotic AND arthroplasty OR replacement	The safety and efficacy of domestic robot-assisted arthroplasty in China are well documented, and its accuracy and short-term clinical efficacy have been reported
Michael B Held	2021	Retrospective cohort	Improved Compartment Balancing Using a Robot-Assisted Total Knee Arthroplasty	Difference between RA-TKA and CM-TKA	RA-TKA resulted in improved intraoperative compartment balancing in flexion with no observed difference in mid-flexion and extension compared with CM-TKA
Rajesh Malhotra	2021	review	Navigated Unicompartmental Knee Arthroplasty: A Different Perspective	computer navigated UKA [unicompartmental arthroplasty]	validates the role of computer navigation in desirable implant positioning and limb alignment

David C. Birkhoff, BSc, Anne Sophie H.M. van Dalen, MD	2021	review	A Review on the Current Applications of Artificial Intelligence in the Operating Room	applications of AI in the OR [operating room]	Currently described applications of AI in the OR are limited to date. They may, however, have a promising future in improving surgical precision, reduce manpower, support intraoperative decision-making, and increase surgical safety
Tao Wen	2023	review	A standardized technique for lateral unicompartmental knee arthroplasty	UKA and its clinical score	lateral UKA protocol was reproducible and the patients had a good postoperative outcomes
Stefano Marco Paolo Rossi[1]	2023	CT	High accuracy of a new robotically assisted technique for total knee arthroplasty: an in vivo study	robotic system (ROSA® Knee System; Zimmer Biomet, Warsaw, IN) with a Posterior Stabilized Total Knee Arthroplasty (Persona® Knee System)	New surgical robot in total knee arthroplasty it is possible to perform accurate bone cuts and to achieve the planned angles and resections.
Christel Bidet-Ildei	2022	RCT	The Added Value of Point-Light Display Observation in Total Knee Arthroplasty Rehabilitation Program: A Prospective Randomized Controlled Pilot	Difference between point light and conventional 3 week rehab. programme	Favoring point-light display observation to improve functional recovery in patients with total knee arthroplasty.

			Study		
Ian A Harris	2022	RCT	Increased early mortality after total knee arthroplasty using conventional instrumentation compared with technology-assisted surgery: an analysis of linked national registry data	Conventional versus technology assisted	The use of conventional instrumentation during TKA is associated with higher odds of early postoperative death than when technology-assisted instrumentation is used.
Runzhi Xia	2021	Clinical trial	Verification and clinical translation of a newly designed "Skywalker" robot for total knee arthroplasty: A prospective clinical study	difference between the actual and the expected resection thickness, and the preoperative and postoperative lower limb alignments	The "Skywalker" system has good osteotomy accuracy, can achieve the planned angles well, and is expected to assist surgeons in performing accurate bone cuts and reconstructing planned lower limb alignments in the relevant clinical applications in future
Brett K Jones	2023	CT	Better flexion and early recovery with medial-stabilized vs single-radius total knee arthroplasty with kinematic alignment: Two-	retrospective cohort single center study for comparison between single-radius (SR) versus medial-stabilized	The MS group had better clinical outcomes than the SR group, with significantly greater knee flexion from six months through two years, better Knee Society Pain scores at six weeks

			year clinical results	(MS) knee devices	through one year, and higher Knee Society Pain/Motion scores at six weeks and one year postoperatively.
Yousef Marwan	2023	Retrospective review	Circular external fixation for knee fusion in complex indication	knee fusion with circular external fixator	Knee fusion using circular external fixation is a reliable surgical option for complex knee problems especially in infected failed revision total knee replacements. circular external fixators provide the advantages of gradual correction of length or alignment and superior mechanical stability
Tizian Heinz	2023	review	Trends in Computer-Assisted Surgery for Total Knee Arthroplasty in Germany: An Analysis Based on the Operative Procedure Classification System between 2010 to 2021	Difference between conventional, navigated and robotic surgery	Computer-assisted surgery, and particularly robotics for TKA, is seeing growing popularity and stepwise translation into routine clinical use in Germany, with a steep increase rate of more than 80% per year since 2018.
Carsten O Tibesku	2023	Systemic review	Comparison of clinical outcomes of VISIONAIRE patient-specific instrumentation with conventional instrumentation in total knee arthroplasty: a	VISIONAIRE, were conducted to assess TKA accuracy, intraoperative outcomes, and postoperative outcomes, compared	VISIONAIRE guides can lead to improved alignment accuracy and surgical efficiency compared with CI,

			systematic literature review and meta-analysis	with conventional instrumentation (CI).	
Lawrence Chun Man Lau	2021	Case report	Multi-energy spectral photon-counting computed tomography (MARS) for detection of arthroplasty implant failure	MARS Versus standard current imaging techniques	MARS CT imaging can detect orthopedic implant failure not detected by standard current imaging techniques
Olga Vl Bitkina, Jaehyun Park	2023	review	Application of artificial intelligence in medical technologies: A systematic review of main trends	AI in healthcare	Useful in medicine and other streams
Bin Zhang	2023	review	Unicompartmental knee arthroplasty versus high tibial osteotomy for medial knee osteoarthritis: A systematic review and meta-analysis	Compared UKA[unicompartmental knee arthroplasty] and HTO[high tibial osteotomy]	UKA produced less postoperative pain, less complications and superior WOMAC score, whereas HTO offered extended range of motion (ROM) and less revision rate
Terence L. Thomas BS [a]	2022	review	Pin-Related Complications in Computer Navigated and Robotic-Assisted Knee Arthroplasty: A Systematic Review	Studied pin-related complication in computer-assisted navigation (CAN) and robotic-assisted (RA) knee arthroplasty	Rare findings

Cheol Hee Park, MD	2021	review	Sensor-Assisted Total Knee Arthroplasty: A Narrative Review	Advantages of sensor based technology	An orthopedic surgeon's experience, adaptability, and technical knowledge of the sensor are crucial to the success of sensor-assisted TKA
Cécile Batailler	2022	review	Artificial intelligence in knee arthroplasty: current concept of the available clinical applications	Advantage of Before surgery, machine learning and During surgery, the robotic-assisted systems	AI-based tools improve the decision-making process, surgical planning, accuracy, and repeatability of surgical procedures

DISCUSSION:

Since its initial use in orthopaedic surgery in the 1980s, robotics has been embraced more frequently to increase the precision of implant location, prosthesis alignment, and to lower the rate of problems compared to manual procedures. Robotic total knee arthroplasty improves the surgeon's preoperative planning skills and real-time intraoperative dynamic referencing to enable ongoing range of motion and ligamentous tensioning assessments. However, robotic TKA is linked to longer operating times and iatrogenic injuries, so this surgical technique has both benefits and drawbacks. [53, 54] The effects of robotic surgery (RAS), kinematic alignment (KA), and computer-assisted surgery (CAS), as well as mechanical alignment (MA), alone or in combination, are unknown. R-TKA showed equal MCID accomplishment to M-TK, according to [55]. [56] To balance the knee and achieve functional alignment (FA) of the components, robotic surgery generates quantitative soft tissue information. Increased pre-resection balancing efficiency, fewer soft tissue releases than with a mechanical alignment technique, and precise bone cuts with robotic help are all advantages of FA. [57] However, the best aim for each patient is still up for dispute. Regarding the placement of a total knee arthroplasty (TKA), there are various schools of thought. The mechanical axis (MA) of the lower limb is used by the most widely accepted school for all patients. In some other research, kinematic axis alignment (KA) is used preferably. [58] Robotic-assisted TKAs may result in better health outcomes due to their decreased annualized revision rates and enhanced postoperative quality of life. [59] The additional surgical trays needed for the techniques and the longer operating times they required had a minimal impact on total expenses, however comparison data are lacking. [60]

With traditional TKA surgery, it is impossible to prevent significant errors of 10% and 30% patient dissatisfaction. It has been discovered that computer navigation systems have improved mechanical axis rotation and component placements compared to conventional TKA, gaining advantages from clinical and imaging procedures. It does not, however, improve functional outcomes. Although CAS was anticipated to improve clinical outcomes, TKA's short-term functional performance, and survivorship, as well as reduce revisions and associated health care costs, along with accuracy and reproducibility in prosthetic orientation with 3°, it is debatable whether CAS has any effect on long-term functional outcomes and implant survivorship. **Table_2.** [61, 54]

One study shown that; by minimizing angular deviation from the preoperatively planned target and by lowering the proportion of outliers from the target zone, both CAS and PSI can enhance the precision of rotational alignment of the tibial base plate. [62] Using jig-based manual procedures, total knee arthroplasty (TKA) exhibits good durability, yet considerable rates of dissatisfaction persist. There are few studies evaluating the relative effectiveness of mTKA and raTKA. When compared to mTKA, raTKA showed significant early clinical advantages, such as lower opioid needs, a shorter length of stay, and fewer PT sessions. [63] All around the United States, RA-TKA and CAN-TKA are increasingly being used. The odds of readmission within 90 days of surgery are reduced when these technologies are used. [64] A small number of studies showed PROM differences that reach clinical relevance, despite the majority of studies comparing RA-TKA and N-TKA with C-TKA demonstrating superior radiographic alignment outcomes. [65]

In the past 70 years, artificial intelligence (AI) has advanced quickly, with computer models and algorithms created to mimic human intelligence and carry out specialized jobs in a variety of sectors. The decision-making process, surgical planning, accuracy, and repeatability of surgical procedures are all improved by AI-based technologies. [66] Given that many issues related to TKA can be resolved quickly and effectively, AI's utility for knee joint replacement procedures cannot be overlooked. Artificial intelligence (AI) applications have typically been used to forecast risk, cost, and results rather than surgical problems. [67] Where conventional pre-operative imaging techniques fall short, multi-energy spectrum photon-counting computed tomography (MARS) can detect knee arthroplasty implant failure. MARS allows for the creation of material-specific pictures while minimizing the beam-hardening artifact frequently present in conventional CT imaging. [68]

Patient-specific instrumentation (PSI) is suggested as a solution to the major issues associated with malalignment and the ensuing consequences in total knee arthroplasty (TKA). The relevance of previous PSI studies on TKA outcomes is restricted since they often do not distinguish between PSI systems and only evaluates a small number of outcomes. A PSI system based on X-ray and preoperative magnetic resonance imaging is called VISIONAIRETM cutting guides. Compared to CI (conventional imaging), VISIONAIRE guides can increase alignment

precision and surgical efficiency without compromising postoperative safety and return-to-function outcomes. [69]

Findings from one study offer fresh insights in favour of systematically observing point-light displays to enhance functional restoration in TKA cases. [70] In order to achieve the required kinematic aims after TKA, smart sensor assisted technology can be used intraoperatively to offer an objective assessment of ligament and soft tissue balancing while maintaining the sagittal and coronal alignment. Additionally, it can offer post-implantation data to track the effectiveness of the implant under real-world situations and the clinical progress of the patient during rehabilitation. In TKA, the introduction of Smart Sensor implant technology appears to result in higher patient satisfaction scores and better functional outcomes. [71] A subset of machine learning (ML) and artificial intelligence (AI), deep learning (DL) is increasingly seen as a key technology of the current Fourth Industrial Revolution. A deep convolution neural network (CNN) could be used to precisely identify implants used in total knee arthroplasty on plain radiographs. The CNN algorithm has great accuracy for detecting the loosening of TKA implants on plain radiographs through transfer learning. [72]

Circular external fixators offer the advantages of gradual length or alignment correction and improved mechanical stability in complex circumstances. Additionally, because contact between the implant and the diseased location is avoided, the danger of biofilm formation and infection persistence is reduced. [73]

When opposed to traditional total knee arthroplasty (COTKA), robotic arm-assisted total knee arthroplasty (RATKA) has the advantage of restoring femoral rotational alignment. Although RATKA reduces intraoperative blood loss and postoperative LOS, the short-term clinical efficacy comparison has not yet proven the benefits of robotic technology. The accuracy of femoral rotational alignment reconstructed by RATKA is significantly better than that of COTKA and is more conducive to the recovery of knee flexion function after surgery. [74]

LIMITATIONS:

1. Fast development in robotic technologies made a shift from active to semi-active to passive systems of TKA surgery

2. Availability of short term data reflects that modern techniques and technologies have early positive results rather than long term results.

3. Lack of RCT studies

4. Comparison between robotic and conventional system of TKA surgery is limited and difficult due to use of different implants.

5. Comparison between different implants and same robotic system is also limited since usually one robotic system uses same type of implants.

6. Procedures are carried out in close environment.

7. Lack of homogeneity in collected data set

CONCLUSION:

Numerous studies have advocated the use of various surgical technologies, including robotic assistance and artificial intelligence. The current study reveals that robotic assisted surgery, computer assisted surgery, and guided surgery with intraoperative utilization of sensor technologies are the most frequently employed surgical approaches. Additional classifications for robotic surgery assistance include passive, semi-passive, and active. Robotic aided surgery has been proven to be the most applicable in terms of alignment, balancing, gap management, and bone cutting techniques among these surgical approaches. Orthopaedic surgeons typically favour semi-passive robotic aided surgery since, with this method, the decision to cut the bone stays with the surgeon. As a result, orthopaedic surgeons are in charge of planning and making decisions regarding the surgical operation. However, the practical value of passive robotic aided surgery in relation to total knee arthroplasty cannot be ignored.

The most frequently used technologies in contemporary TKA surgeries include AI-based tools, MARS CT imaging, VISIONAIRE guides, circular external fixators, skywalker, point-light display observation, deep convolution neural network (CNN) through transfer learning, Smart Sensor implant technology, deep learning (DL) and machine learning, DP [dual pivot], etc. Some of these technologies have been shown to be superior than others, but because there is a dearth of comparison data in the literature, it is very difficult to categorize them as being of higher or lower value. Every technology, including imaging, arthrodesis, and fusion surgeries, bone cutting, knowledge of internal changes in ligament tension, implant position, and gap management, unquestionably plays a crucial role in procedures related to TKA surgeries. Some of these technologies are essential for helping with decision-making, diagnostics, and surgical technique. A few of them assist with alignment concerns prior to and following TKA procedures, while others can handle balancing problems and are utilized to handle axis rotation, bone cutting, fusion, etc. However, its equivalent technologies favour MARS, VISIONAIRE guidance, deep leaning, point light display observation, CNN, and smart sensor technologies. These technologies' capacity to focus their goals in the context of total knee replacement surgery has been linked to a high degree of diversity in their usefulness and effectiveness.

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RESEARCH ARTICLE

EFFECT OF DIAPHRAGMATIC BREATHING WITH AND WITHOUT PURSE-LIPS BREATHING IN SUBJECT WITH EMPHYSEMA DISEASE

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Abstract

Background: Breathing exercise such as purse-lop breathing and diaphragmatic breathing play a role in some individual with Emphysema and might be considered for those patients who are unable to exercise. However, in this study is report of some adverse effect of diaphragmatic breathing in patient with Emphysema disease. Thus the purpose of the study was to assess the effect of diaphragmatic breathing and diaphragmatic breathing combined with purse-lip breathing on chest wall kinematics, breathlessness, and chest wall asynchrony in subject with obstructive disease, and also assess the whether the combination of both exercise reduce the adverse effect of diaphragmatic breathing while maintaining its benefits.

Methods: Fifteen Subjects with pulmonary obstructive disease, mean 60 to 65 year age group, with a history of smoking and clinical stability without hospitalization or symptoms of exacerbation in the past 4 week, were evaluated. On day 1, participant's characteristics were collected, and they learnt diaphragmatic breathing. On day 2, the participants were evaluated by spirometery with the participants in the seated position while performing breathing exercise.

Results: Diaphragmatic breathing and diaphragmatic breathing plus pursed-lip breathing promoted a significant increase in chest wall tidal volume of the chest wall. A significant increase in inspiratory-expiratory phase ratio was observed during diaphragmatic breathing and diaphragmatic breathing plus purse-lip breathing compared with quiet breathing, with no difference observed between the exercises.

Conclusion: Despite the increase the inspiratory-expiratory phase volume, both breathing exercise were able to improve chest wall volume without affecting Dyspnea. The combination of exercises maintains the benefit but did not reduce the adverse effect of diaphragmatic breathing.

Introduction:-

It is one of the diseases that make up chronic obstructive pulmonary disease. This is a set of disease where the flow of air in the lungs is obstructed. Emphysema is most often caused by smoking but can be caused by other diseases or has not known cause at all. It occurs when very small air sacs (called the alveoli) at the ends of the airways in lungs start to breakdown from many sacs to form much bigger sacs. The alveoli are the areas of the lungs where oxygen

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and carbon dioxide are exchanged into and out of the blood. Emphysema makes it hard for people to blow air out of the lungs because air gets trapped inside the broken alveoli due to the collapse of the walls. The traps air in the lungs creates the characteristic ‘’barrel chest’’ of emphysema.

Emphysema is characterized by air-filled cavities or spaces, in the lungs, that can vary in size and may be very large. The spaces are caused by breakdown of the walls of the alveoli and they replace the spongy lung parenchyma. This reduce the total alveolar surface available for gas exchange leading to a reduction in oxygen supply for the blood.[2] Emphysema usually affects the middle aged or older population. This is because the disease takes time to develop with the effect of smoking, and other risk factors. Alpha-1 antitrypsin deficiency is a genetic risk factor that may lead to the condition presenting earlier.[3]

It is a typical feature of chronic obstructive pulmonary disease (COPD), types of obstructive lungs characterized by long term breathing problems and poor airflow.[4,5] Even without COPD, the finding of the pulmonary emphysema on a CT lung scan confers a higher mortality in tobacco smokers.[6] A study on the effect of tobacco and cannabis smoking showed that a possibly cumulative toxic effect could be a risk factor for developing emphysema, and spontaneous pneumothorax.[8] there is an association between emphysema and osteoporosis.[9]

There are tree subtypes of pulmonary emphysema- centrilobular, Panlobular and Paraseptal emphysema, related to the anatomy of the lobules of the lungs.[10,11] These are not associated with fibrosis. A Fourth type known as irregularly and is associated with fibrosis.[11] only the first two types of emphysema-centrilobular and Panlobular are associated with significant emphysema around 20 times more common than Panlobular.[11]

Centrilobular Emphysema
Centrilobular emphysema also called centriacinar emphysema, affects the centrilobular portion of the lung, the area around the terminal bronchiole, and the first respiratory bronchiole, and can seen on imaging as an area around the top of the visible pulmonary artery. Centrilobular emphysema is the most type usually associated with smoking, and with chronic bhronchitis.[7] The Disease progresses from the centrilobular portion, leaving the lung parenchyma in the surrounding region preserved.[8]Usually the upper lobes of the lungs are affected.[7]

Panlobular Emphysema
Panlobular emphysema also called panacinar emphysema can involve the whole lung or mainly the lower lobes.[10]This types of emphysema associated with alpha-1 antitrypsin[10] and are not related to smoking.[9]

Paraseptal Emphysema
Paraseptal emphysema also called distal acinar emphysema relates to emphysematous change next to a pleural surface, or a fissure.[12,11] The cystic spaces known as blebs or bullae that form in Paraseptal emphysema typically occur in just one layer beneath the pleura. This distinguishes it from the honeycombing of small cystic spaces seen in fibrosis that typically occurs in layers.[11]This types of emphysema is not associated with airflow obstruction.[12]

Diaphragmatic breathing consist of a smooth and deep nasal inspiration with anterior displacement of the abdominal region, which emphasize the action of the diaphragm.[13,15,16] for the patient of emphysema, the immediate benefits of diaphragmatic breathing are in increase in the tidal volume and oxygen saturation, reduction in breathing frequency, and improvements of ventilation and hematosis.[16] [13]Adverse effect include an increase in the asynchronous and paradoxical movement of the chest wall as well as increase work of breathing and Dyspnea in the subject with the most severe conditions.[13,15,16]

Purse lip breathing consist of a soft exhalation performed for 4 to 6 second against the resistance of partially closed lips and clenched teeth.[13,15,14] It is frequently adopted spontaneously and voluntarily by some subject with emphysema to control and relieve Dyspnea and can be performed at rest or during exercise.[14,16] Several study shown that the benefit of purse lip breathing in subject with emphysema include decrease frequency and lung hyperinflation, improvement of the Pco_2 and oxygen saturation.-[13,15,14,17] However Dyspnea relief remain poorly consistent, because this response is different among subject.

With regards to the combination of these techniques in subject with emphysema, a significant decrease on breathing frequency and oxygen consumption during the combined exercise compared with the spontaneous breathing. The breathing frequency was significantly lower during diaphragmatic breathing plus purse lip breathing, even in

relation in each technique in isolation, although there was no difference in oxygen consumption among 3 exercises.[14] According to these findings, a combination of these techniques seemed to be more effective then performing the exercise separately.

Methods:-

Participation who met the following inclusion criteria: diagnosis of emphyema confirmed by pulmonary function test, history of smoking. Between 40 to 70 of age, clinically stable, no report of neurological or psychiatric disorder, body mass index between 18 and 29.99 kg/m^2,[18] and no previous participation in a pulmonary rehabilitation program. The entire participant signed a written consent form.

Data were collected over 2nd day, with a maximum interval of 1 week between them. Initially, clinical and demographic data were collected. The participants performed the pulmonary function test. After that, the participants learned how to performed diaphragmatic breathing and the diaphragmatic breathing plus purse-lip breathing.

For diaphragmatic breathing, they were instructed to perform a nasal inspiration moving predominantly the abdomen, reducing the movement of the rib cage.[18,19] for diaphragmatic breathing plus purse-lip breathing, they were instructed to perform a diaphragmatic breathing, and then, exhale the air lips partially closed.[20] Initially, tactile stimulus was used by positioning one of the participants hand on his or her abdomen, at the level of the umbilicus, while placing the other hand on the chest, in the sternal notch region, to allow the compression of ventilation between both location.[16] Moreover, during the learning period, 2 bands from the respiratory inductive Plethysmography were placed, one the on the rib cage and another on the abdomen, and participant were positioned in front of a computer screen to follow the movement of the chest wall for the visual feedback. In addition, standard verbal instruction was given to ensure correct techniques performance.

On the second day, the participants were initially reminded about the exercise performance. There are 3 different condition were registered: (1) 6 min of quite breathing (3 sets of 2 min each); (2) 6 min of diaphragmatic breathing (3 sets of 2 min each); (3) 6 min diaphragmatic breathing plus pursed- lip breathing (3 sets of 2 min each).

The exercise was performed in a random order. The dyspnea rating was recorded before and immediately after each condition (quite breathing, diaphragmatic breathing, and diaphragmatic breathing plus pursed-lips breathing) by using the modified Borg scale (o-10 points, with 0, no dyspnea; and 10, maximum dyspnea).[21] Oxygen saturation and heart rate were continuously assessed during the data collection by using the pulse oximeter. A minimum interval of 10 min between the conditions was given to allow the return of clinical parameters (heart rate, breathing frequency, and dyspnea) to baseline value.

Outcome Variables

The breathing pattern variable analyzed were chest wall tidal volume, end-inspiratory chest wall volume, end-inspiratory rib-cage volume, end-inspiratory abdomen volume, end-expiratory chest wall volume, end-expiratory rib cage volume, end-expiratory abdomen volume, minute ventilation, breathing frequency, inspiratory time, expiratory time, and duty cycle. The chest wall motion variables analyzed were pulmonary rib cage percentage contribution, abdominal rib cage percentage contribution. The phase angle that reflects the delay between the excursion of the compared compartment, the inspiratory phase ratio, the expiratory phase ratio that expresses the percentage of time in which the compartment move in opposite direction during the inspiration and during expiration respectively.[22] Perception of dyspnea was assessed by using the modified Borg scale.[21]

Result:-

Initially, 15 participants with emphysema were selected to participate in the study; the demographic, anthropometrics, and clinical characteristic of the participant are shown in the table 1. The sample was composed of subject with moderate to severe emphysema. The breathing pattern data during quite breathing, diaphragmatic breathing, and diaphragmatic breathing plus lips breathing are presented in Table 2. Both breathing exercise promoted significant increases in chest wall tidal volume and end-inspiratory volume of the chest wall and its compartment compared with quiet breathing.

A significant decrease in the breathing frequency and a significant increase in inspiratory time and expiratory time were observed for diaphragmatic breathing and diaphragmatic breathing plus pursed-lip breathing when compared with quiet breathing. From diaphragmatic breathing to diaphragmatic breathing plus pursed lip breathing, a significant increase in the breathing frequency. With respect to the duty cycle, a significant decrease was observed during diaphragmatic breathing plus pursed-lips breathing when compared with quiet breathing and with diaphragmatic breathing.

Table 1:- Characteristic of the participants.

S.No	Characteristics	Value
1.	Male sex,%	77
2.	Age, mean ±SD Y	60 ±7
3.	BMI, Mean ± SD Kg/m^2	21.0 ± 2.0
4.	Smoking history, mean ± SD packs/y	55.3 ±30.2
5.	PEV_1/FEC, mean ± SD	0,4 ±0.1
6.	FEV_1 mean± SD % predicted	29.5 ± 8.5
7.	MRC score mean ± SD arbitrary unit	2.2 ± 0.7
8.	$P_{1max'}$ mean ± SD cm H_2o	80 ± 28.5
9.	P_{1max} mean ± SD % predicted	75.5 ± 25.4
10.	$P_{Emax'\ mean}$ ± SD cm H_2O	112.1 ± 38.0
11.	$P_{emax'\ mean}$ ± SD % predicted	90.3 ± 25.2

BMI = body mass index
MRC = Medical Research council dyspnea scale
P_{Imax} = maximum respiratory pressure
P_{emax} = maximum expiratory pressure

The chest wall motion and asynchrony data during quiet breathing, diaphragmatic breathing and diaphragmatic breathing plus pursed lip breathing are presented in Table 3. The contribution of the abdomen compartment was >50% on the 3 conditions. A significant increase in the percentage contribution of the pulmonary rib cage was observed during diaphragmatic breathing and diaphragmatic breathing plus pursed-lips breathing compared with the quiet breathing. No other significant changes were observed among the 3 conditions for any other chest wall contribution variable.

Variable	Quiet breathing	Diaphragmatic breathing	Diaphragmatic breathing combined with pursed lip breathing	P
Chest wall motion				
Pulmonary rib cage % contribution	20.0±5.5	21.2±4.9	28.2±6.0	.01
Abdominal rib cage % contribution	10.5±3.2	11.8±8.2	10.2±8.2	.58
Abdomen % contribution	52,4±9.2	58.5±8.8	55.6±12.4	.20
Asynchrony				
Rib cage × abdomen phase angle, degree	11.0±8.2	18.0±9.4	19.1±10.2	.10
Pulmonary rib cage× abdominal rib cage, phase angle, degree	8.9±6.1	11.5±9.2	15.4±8.3	.07
Inspiratory phase ratio rib cage × abdomen %	11.2±6.0	29.0±15.4	25.4±12.4	<.001
Inspiratory phase ratio pulmonary rib cage × abdominal rib cage %	10.5±3.2	18.2±7.1	18.3±6.7	<.001
Expiratory phase ratio rib cage × abdomen %	5.7±3.1	16.5±8.7	16.8±9.2	<.001
Expiratory phase ratio pulmonary rib cage × abdominal rib cage %	11.0±4.9	20.1±8.5	20.1±7.2	<.001

For the asynchrony variable, no significant differences were observed for the phase angle among the 3 conditions. Whereas the significant increase was observed in the inspiratory phase ratio and expiratory phase ratio between all analyzed compartment during diaphragmatic breathing and diaphragmatic breathing plus pursed-lips breathing compared with quiet breathing, without differences between the breathing exercises. During diaphragmatic

breathing and diaphragmatic breathing plus pursed-lips breathing, the participant shows the significant increase in oxygen saturation compared with quiet breathing.

Discussion:-

The main result of the study were the following:(1) The diaphragmatic breathing and the diaphragmatic breathing plus pursed lips breathing resulted significant increase in chest wall tidal volume compared with quiet breathing, (2) there was no difference in the abdominal contribution among the condition (quiet breathing, diaphragmatic breathing and diaphragmatic breathing plus pursed-lip breathing), (3) there were a significant increase in chest wall asynchrony during breathing exercise, (4) there were no change in dyspnea among the evaluated condition, (5) significant decrease were observed in breathing frequency for both breathing exercise, and (6) diaphragmatic breathing and pursed-lips breathing provided greater changes in breathing parameters, especially for time variables.

The increase in chest wall tidal volume during the breathing exercise were due to significant increases in end-inspiratory rib- cage volume and end-inspiratory abdomen volume, without changes in the end-expiratory chest wall volume. Other study also reported significantly increases in tidal volume during diaphragmatic breathing and during pursed-lips breathing when performed separately. The increase the tidal volume associated with the increase in the end inspiratory chest volume indicates that the subject were able to recruit the inspiratory reserve volume. The same result was observed in a specific group of subject with emphysema who also presented significant increases in tidal volume but no change in the end-expiratory volume. Those subject were considered ‘’responders’’ to the diaphragmatic breathing were less hyper inflated, had grater inspiratory muscle strength, and presented more synchronous chest wall motion during diaphragmatic breathing.

During the pursed lips breathing, the end expiratory chest wall volume is important, once there is an increase in the expiratory time associated with the reduction of the breathing frequency that may contribute to the reduction of this volume. The effect of pursed lips breathing on expiratory chest wall volumes are not constant because studies demonstrated different effect, such increase, decrease, or no changes, in this volume in subject with emphysema.

With regard to chest wall motion, although both breathing exercise duplicate the tidal volume in relation to quiet breathing, there was no increase in the contribution of the abdominal compartment. It is known that subject with emphysema have diminished diaphragmatic motion and a lower diaphragmatic excursion, [23] and, depending on the severity of these alteration, this may interfere the response to diaphragmatic breathing. Moreover, the subject had a great contribution, of 60%, of the abdomen while they are in sitting position at quiet breathing, similar to finding, who also observed a 60% abdomen contribution in male participant with emphysema while in the setting position at rest. Therefore, it is possible that there was a limitation in the response of the diaphragmatic breathing performed by these subjects. The inclusion of the pursed-lips breathing also did not alter the chest wall motion. Some studies that assessed the effect of pursed-lips breathing showed a similar increase in the tidal volume in both the rib cage and the abdomen; however, the contribution of the compartment to the chest wall was not analyzed.

Although there was a decrease in the breathing frequency and an increase in oxygen saturation during both breathing exercise, no significant difference were observed in dyspnea. The effectiveness of diaphragmatic breathing and pursed-lips breathing in relieving dyspnea varies greatly among subject with emphysema. With regard to diaphragmatic breathing, some studies report increase in dyspnea and suggest that the activity of the other respiratory muscle beyond the diaphragm and the chest wall asynchrony could be responsible. There is found an increase in the recruitment of inspiratory accessory muscle during pursed lip breathing, which would be associated with the increase in dyspnea. However, regardless of the level of pulmonary hyperinflation, the increase in expiratory time and total time provided by pursed lips breathing decrease dyspnea. The subject in our study presented a low level of dyspnea during quiet breathing, according to the modified Borg scale score.

Both breathing exercises promoted a decrease in the breathing frequency due to the increase of inspiratory time and expiratory time. In addition, the result of this study has important clinical implication for symptoms management in individual with emphysema. The assessed breathing exercise was demonstrated to improve chest wall volumes and oxygenation, and to reduce breathing frequency without increasing dyspnea. Therefore this exercise might be helpful for individuals who feel anxious and tense when it is difficult to breathe, as well as individual trying to manage sudden emphysema symptoms. The exercise may play a role in care and symptoms management, and thus may be taught in pulmonary rehabilitation and nursing care programs, and be included in routine care of individual with emphysema.

Conclusion:-

Our result showed that diaphragmatic breathing and diaphragmatic breathing plus pursed lips breathing improved chest wall volume and oxygenation as well as reduced the breathing frequency, which provided more volume hematosis without increasing dyspnea. The addition of pursed-lips breathing to diaphragmatic breathing provided greater changes in breathing parameters, especially in relation to time variables. Therefore, this study supported the positive acute effect of this breathing exercise for subject with emphysema. These breathing exercise are low cost and do not require special instrumentation or continuous assistance for a health care provider, which can improve adherence of the patient to their routine.

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An Observational Study of Response of Primary Torticollis to Physiotherapy

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Abstract
Background: *Torticollis is the common term for various conditions of head and neck dystonia which display specific variations in head movements [phasic components] characterized by the direction of movements. Torticollis results in a fixed or dynamic posturing of the head and neck in tilt, rotation and flexion.1 Spasms of the sterno-cleido-mastoid, trapezius and other neck muscles, usually more prominent on one side than the other, cause turning or tipping of the head. 2, 3 Material and Method: Total 10 children with swelling at the side of neck, difficulty in head movement, not feeding on side of breast and with the history of prolonged or difficult labor. Diagnosis of torticollis and or sterno-cleido-mastoid tumor was based on history and physical examination of the swelling in the neck. They were advised physiotherapy and proper position as per protocol for 4 weeks to 24 weeks. Patients were reviewed at 4 weeks interval for response to physiotherapy. Results: Most of the cases were below 4 weeks of age [n 6- 24.8%] with overall male to female of 4:6. The common presentation of torticollis were excessive cry with neck movement [n 4- 42.02%], followed by sterno-cleido-mastoid tumor or swelling on side of neck [n 4- 44.08%], history of prolonged/difficult labor [n 2- 13.9%]. Major physical signs were head tilt on one side in all cases and swelling in right side of neck in 4 [44.08%] cases. 8 [80.50%] patients improved completely within 4 weeks to 4 months of physiotherapy while 2 [19.5%] cases showed partial improvement. Conclusion: Majority of cases completely improved on physiotherapy and rest showed considerable improvement.*

Keywords: *Physiotherapy, Torticollis, Sterno-cleido-mastoid, Swelling.*

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I. INTRODUCTION

Torticollis also known as wry neck is a dystonic condition defined by an abnormal, asymmetrical head or neck position, which may be due to a variety of causes. The term torticollis is derived from the Latin words *tortus* for twisted and *collum* for neck. The most common case has no obvious cause and the pain and difficulty with turning the head usually goes away after a few days, even without treatment.[4] Torticollis or wry neck results from tightness and shortening of one or rarely both sterno-cleido-mastoid[5, 6, 7]. Congenital muscular torticollis is further divided into three groups, sterno-cleido-mastoid tumor group [SMT], those with tightness of the SCM but no clinical tumor as muscular torticollis [MT] [8]. Postural torticollis [POST] is used to describe congenital torticollis patients who have neither all the clinical features of torticollis but no demonstrable tightness nor tumor of the SCM[6, 7, 8]. Usually these patients present with swelling [40-50%]. It often persists until they are aged one year. It is rarely bilateral and may be seen in older children in whom the mass was not previously identified[9, 10]. The mass is generally 1-3 cm. in diameter, a painless swelling in the substance of the SCM and develops in neonates at the age of 2-3 weeks[11, 12]. In infants, the tumor is firm and the patient's head is tilted and flexed to the side of the fibrosis and face turned toward opposite side. About 50-70% of SCM tumors resolve spontaneously during first year of life with minimal residual deficits. Early physiotherapy is initiated if there is any difficulty in rotation from fibrosis and most of the patients respond to it. Surgery is recommended for resistant cases after 6 months of physical therapy.

II. MATERIAL AND METHOD

Patients from birth to one year of age with diagnosis of congenital torticollis without any associated syndrome were included. Patients with torticollis due to other causes like cervical spine anomalies etc were excluded. The diagnosis of torticollis was made on clinical grounds in presence of one or more symptoms like swelling at the side of neck, difficulty in head movement with presence of head tilt etc. All patients were followed up at four weekly interval with documentation of head tilt, active and passive range of rotation and side flexion of the neck, facial asymmetry, and size of the tumor and time of disappearance of tumor and treatment duration. They were subjected to physiotherapy and proper positioning of neck.

III. RESULTS

In this study, total ten patients were present. Most of the cases were below 4 weeks of age [n 6- 24.8%] with overall male to female of 4:6. The common presentation of torticollis were excessive cry with neck movement [n 4- 42.02%], followed by sterno-cleido-mastoid tumor or swelling on side of neck [n 4- 44.08%], history of prolonged/difficult labor [n 2- 13.9%]. Most common observation was SCM tumor or swelling on neck side [44.08%] and common group which caused wry neck was SCM tumor. The most common site of tumor was lower-third of SCM muscle [33.6%] followed by middle third [30.1%]. The cases of difficult labor were [13.9%]. Total 8 [80.50%] cases improved completely within 4 weeks to 4 months through physiotherapy while 2 [19.5%] cases show partial improvement.

S. No.	Signs & Symptoms	Patients	Percentage
1.	Excessive cry with neck movement	4	42.02%
2.	Swelling on side of neck	4	44.08%
3.	Difficult labor	2	13.9%

IV. DISCUSSION

Torticollis occurs in 0.4%-2% of all births.5, 6 A history of difficult birth was found in 30-60% of patients with torticollis. The aetiology is not clearly understood. Many theories are available, like primary myopathy of SCM muscle, compartmental syndrome, and intrauterine crowding.7 Most studies showed that 90%-100% of infants with CMT who received early physiotherapy treatment improved within the first year of life.7, 13 Many studies included left side was involved. In study, left side of the neck was affected in 54.1% over 90% had a head tilt and 2.4% had feeding difficulty as a result of the torticollis.13 Most common site for SCM muscle but in Cheng JC series tumor was found clinically in the lower third of the SCM muscle in 35% and middle third in 40.4%. In Cheng JC series 91.1% cases were completely improved by manual stretch therapy and home treatment protocols.6 In the study of Kumar B, the swelling was noticed in all cases at the age 1-8 weeks.14 In the study Das BK, two cases presented at neonatal age, 7 at infantile age and 5 were >1 year of age.15 Overall prognosis of torticollis, may it be SCM tumor or congenital muscular torticollis or postural torticollis, is excellent. Most studies showed total resolution in 90%-95% of cases.

V. CONCLUSION

In early diagnosis of torticollis, stimulation treatment protocol, home positioning and manual stretching shows good results in most of the patients, while some requires surgical treatment.

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EFFECT OF ADVANCE MANUAL THERAPY VERSUS PULSE ULTRA SOUND THERAPY IN MANAGEMENT OF NON-SPECIFIC KNEE PAIN: A COMPARATIVE STUDY

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Abstract

Background: To evaluate the effectiveness of advance manual therapy in comparison to pulse ultra sound therapy with speedy isometric exercise in nonspecific knee pain patient who had pain with movement, stiffness and swelling. **Material and method**: Patient from suspected cases of non specific knee pain was received in my clinic. Total 20 patients with non specific knee pain were recruited from the Kanpur physiotherapy and rehabilitation centre. Group A or advance manual therapy group received (5 male & 5 female) programmed of myofecial release of quadriceps muscle, dry needling at specific trigger point with cryotherapy (10 to 15 min). They also received stretching exercise of hamstring, gluteus, tendo Achilles and calf muscle. While the group B or electrophysiological group received (5 male & 5 female) a program of in acute stage (0-3 days) pulse ultrasound therapy. Total 7 day treatment session was given to each group with frequency of daily basis. **Result:** By the use of different techniques on group A with dry needling which reduce the pain, stiffness swelling of knee joint. Group B received ultrasound therapy with speedy isometric exercise to reduce pain and swelling but the result of this regimen was not so effective in stiffness and pain of the non specific knee joint pain. **Conclusion**: Non-specific knee joint pain and stiffness continues to be major public health problems with increasing trends. So reduce the pain during movements, stiffness and swelling by the use of myofascial release of quadriceps, dry needling at specific trigger point.

Keywords: Advanced manual therapy, Dry Needling, Knee pain, Non-specific, Pulse ultrasound.

Introduction

Knee pain is major health problems worldwide as well as in India. The burden of problems increases with the advancement of age. WHO report highlight the burden of osteoarthritis as 10th leading cause non-fatal burdens in world.[1] Knee pain prevalence in Asia-Pacific region was found significantly higher in India, Bangladesh, China and other countries.[2]

Knee pain is the most common type of condition in both developing and developed countries. Knee pain is a chronic, progressive musculoskeletal disorder characterized by gradual loss cartilage in joint which result I bon rubbing together and creating stiffness, pain and impaired movement. The knee pain is associated with modifiable and non-modifiable risk factor such as obesity, lack of exercise, genetics problems, predisposition, bone densities, occupation injuries, trauma and gender. Knee pain the second most common rheumatologic problems and is most frequent joint disease with prevalence of 22% to 39% in India. Knee pain is more common in women and its prevalence increases dramatically with age.45% of women over the age of 65 have symptoms.

In developing countries like India, disruptive life style and poor nutrition are prompting to develop knee pain which is non-specific. Squatting repetitive along with lifting heavy weight and kneeling are prominent risk factor for non specific knee pain. Obese people with habit of prolong kneeling or squatting has a greater risk of developing non specific knee pain in contrast to non- obese people. Poor consumption of vitamin D along with their low serum levels seemed to be linked with an increasing risk for developing of non-specific knee pain. The pain can be felt all around the knee or just in a certain places such as front and sides. It might feel worse after moving the knee in a particular way, such as going up and down stairs.

Some time non-specific knee pain can cause the muscle in the thigh to weaken, so the leg may look thinner. Symptoms of non-specific knee pain, depending on the body type and weight. The most common symptoms are pain and stiffness or may be swelling, particularly first thing in the morning or after resting. Some symptoms may present like limitation of range of motion or stiffness due pain that goes away after movement. Mild swelling around the knee joint and pain that is worse after activity or towards the end of the day. Pain, stiffness and swelling may make it difficult to perform ordinary task at work at home like performing Namaz, long standing at kitchen, using Indian toilet etc. For reducing knee pain several conventional treatment methods are used word widely but most extensively used in century are pharmologics and physiotherapy. By putting a glance over physiotherapy treatment approach, several treatment techniques have been used for management of non-specific knee pain to reduce pain and Stiffness and improve quality of life.

The aim of study to explain and identify effectiveness of advance manual therapy technique like MFR, dry needle, joint mobilization and stretching exercise of the main muscle. In comparison to electrophysiological agent like pulse ultrasound therapy, speedy isometric, knee mobilization and stretching exercise of the main muscle for non-specific knee pain.

Material and method

All patient fulfilling inclusion criteria was selected from outpatient department of Kanpur Physiotherapy and Rehabilitation centre. An inclusion criteria was 20 patients (10 male and 10 female) between 20 to 30 year with acute non-specific knee pain.

They were randomly assigned in to two groups with the age and gender matching. The advance manual therapy group (5 male and 5 female) [group A] received program of myofascial release of quadriceps and adductors and IT band muscles, dry needling with specific trigger point at quadriceps muscle with cryotherapy for 10-15 min. They also received stretching exercise of hamstring, gluteus and calf muscle.

Devendra et al [2019][3], While the electrophysiological agent group (5male and 5 female) [group B] received a program of in acute stage for 3 days, pulse ultra sound therapy were at 1 MHz frequency and at intensity of 1.5 watt/cm^2. After 3 days patient received continuous mode of ultrasound at the same intensity and frequency. They also received speedy isometric exercise, knee mobilization and stretching exercises of hamstring, gluteus and calf muscle.

Total 7 days treatment session was given to each with the frequency of daily basis. Group A received dry needling only 3 sessions in whole treatment program. Each session lasted for 30 to 40 min/days.

Most of the patient felt knee pain when ascending or descending stairs may include pathology from patello-femoral joint. There is increase incidence of patello-femoral disorder in women. Some patient felt knee pain during ADL activities like kitchen work, squatting and using Indian toilet. While some patients had pain during office time because of long duration sitting position and avoidance of stretch the legs and body. Age factor also include in this study because non-specific knee pain is very common in adult and old age. Sex factor also a common cause of non-specific knee pain because of calcium and blood loss during delivery & monthly cycle [menstruation], long standing also cause non-specific knee pain, because some occupations like sales-man, field- workers, watchman and females in kitchen are more prone to this condition.

RESULT

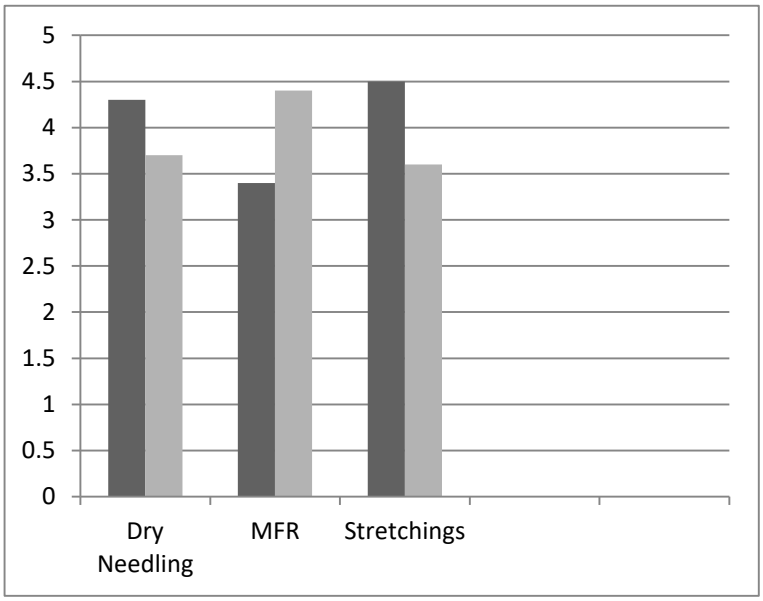
This study include 20 patient with age group 40 to 60 & gender distribution were (n=10) 50% male and (n=10) 50% female enrolled in this study. 10 patients in group A and 10 patients in group B.

Group A received in non-specific knee pain and stiffness and improvement of functional ability was indicated that dry needling in advance manual therapy effectively work. Author applied needle on the surface of quadriceps, adductors muscle at specific trigger point with cryotherapy maximum 10 to 15 minute.

The treatment period include 7 days with 3 sitting of dry needle of whole treatment program. Group A also receives myofascial release for quadriceps, adductors muscle and illio-tibial band and stretching program for hamstring, calf or tendo-achilles and gluteus muscle. With the help of MFR release painful trigger point by applying the pressure by the thumb and IASTM tools. Through stretching, patient limbs get flexible and improve range of motion. It also helps to decrease the knee pain and stiffness. The biggest advantage received by patient by the help of dry needling. It provides relieve in muscular pain and stiffness. In addition, easing the trigger point and also improves flexibility and increase range of motion.

The mean improvement found significant in both group A and B, However advance manual therapy group show greater improvement then electro-physiological group.

Diagram I: Treatment received by group A



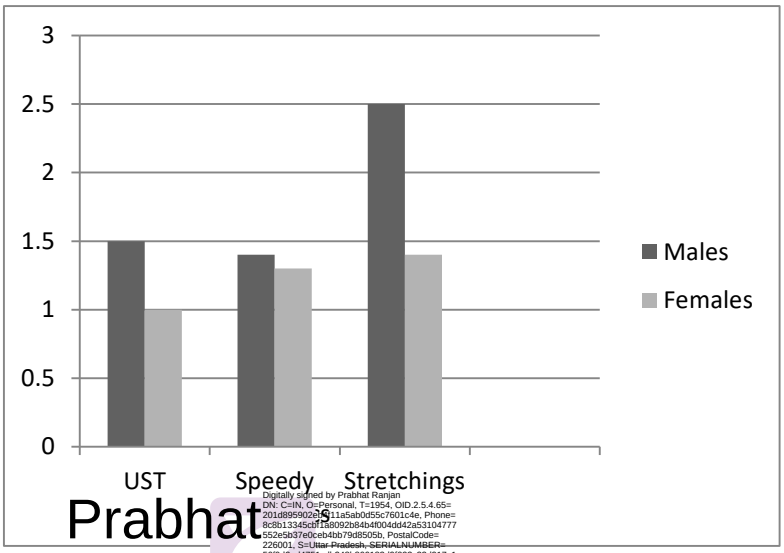


Diagram II: Treatment received by group B

Discussion

This study aimed to evaluate the effectiveness of advance manual therapy group in comparison to electro-physiological agent for non-specific knee pain. The result of this study revealed in symptomatic knee pain develops in 94% female who are obese. This is supported by another study which concluded that development of knee pain is significantly associated with obesity.[4]

Most of the female patient felt knee pain during her activity of daily living like kitchen work, stair climbing and descending, using Indian toilet and also sitting in floor. One of the most Important factor is that poor nutrition and unbalanced diet intake especially for female who live in rural area. Non-specific knee pain also appears who has tight muscle of quadriceps and illio-tibial band. The intra group comparison of both study groups showed considerable mean improvement in pain and stiffness and physical function in non-specific knee pain.

However, the study notifies that significantly reduce in the patient treated with advanced manual therapy group and some other exercises. Among the group A, patient treated with 3 session of dry needling therapy at specific trigger point of the quadriceps, adductors and illio-tibial band with cryotherapy 10 to 15 minute. They are also received stretching exercise hamstring, quadriceps, and adductors muscle. This group also received myofecial release of quadriceps, adductors, illio-tibial band and popliteus muscle. This cause result in reduce pain, stiffness and increase extensibility of the tissue by increase joint lubrication and improve propioception.

Correct mechanical loading and improved joint stability and improvement in strength of the main muscle around knee joint, therefore increased quality of movement, increase self-confidence and motivating factors all contributes to significant improvement in advance manual therapy group. Dry needling for non-specific knee pain was very effective. It doesn't usually cause a lot of pain when used by a trained and perfect provider. In comparison to an injection from a hypodermic needle is much less uncomfortable. One of the reasons dry-needling isn't usually painful is because the dry-needling aren't hollow on the inside, so they cause less tissue damage. Generally all the patient of advance manual therapy group received dry needing between 5 to 7 muscles but it depend on where authors believe what the pain producing areas of the knee pain.

All the advance manual therapy group patient get treated by dry needling on the muscle of Vastus lateralis, Vastus medialis, Rectus femoris, Tensor fascia lata and Adductor Magnus. After the dry needling for knee pain relieves pain very quickly. When the quadriceps muscle get shortened and tight, so this creates unnecessary tension on the surrounding tendon. When the tendons around the knee are contently pulled and overload, then patient experience mild pain. Few treatment sessions of myofascial release can be the magic that will heal the knee.

Another study conduct by Minhaj et al [2019][5] evaluated the efficacy of ultrasound therapy in treatment on non-specific knee pain. After the 7 days of treatment, they found very little significant improvement in pain, stiffness. They suggested the use of ultrasound therapy in the treatment of non-specific knee pain to decrease knee pain. More evidence and significant result have been seen in pain control by ultrasound therapy and speedy isometric exercise, however further improvements in other parameters by ultrasound therapy are still not clear.

After 7 days of intervention, they repeated insignificant improvement in pain and physical function outcome measure. The author found reduction in pain intensity on VAS and improvement in knee pain outcome score.

Deyle et al [2000] has suggested that manual physical therapy and exercise are an effective strategy in reducing pain, stiffness and improvement in physical functional ability.[6] Another study of Pietrosimone et al [2011] RCT evaluated the effectiveness of electrotherapeutic modalities and exercises, exercises alone and placebo in patients with knee osteoarthritis.[7] Another study conducted by Altay et al [2010] evaluated the efficacy of electrotherapeutic modality in the treatment of knee pain.[8] On the other study, Denegar et al [2010], recommended the use of hot, cold and contrast therapy as effective treatment strategy in patients with knee pain.[9] Pearl et al [2004] conducted a randomized control trial on effectiveness of electrotherapy in knee pain. After 10 days of intervention, they reported insignificant improvement in pain and physical function outcomes measures.[10]

According to author, there is no such study of advance manual therapy and pulse ultrasound therapy with speedy isomeric exercise. Both treatments are beneficial in improvement in knee pain, stiffness and physical function as defined by earlier studies but current study highlight advance manual therapy to be superior over pulse ultrasound and speedy isometric exercise and other exercise prove that non-specific knee pain patient may benefit by advance manual therapy more significantly in comparison to pulse ultrasound.

Despite the effectiveness of manual therapy, further studies need to be conduct to see the long term effect of manual therapy hence it is anticipated that follow-up is required to expert more improvement in physical functioning in addition to pain and

stiffness. However, studies supporting the same result have also used other outcome too as VAS and 3 minute walk test. Further studies should confirm the effective of manual therapy on variable tools and long term effect.

Conclusion

The study concluded that the patient treated with advance manual therapy showed an additional benefit as compared to electrophysiological agent demonstrating improvement, which was use as outcome measure. So in this study, the effect of advanced manual therapy is better than the pulse ultrasonic therapy in the management of non-specific knee pain.

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