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POTJ

Volume 15, Number 4
October - December 2022

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Original Article

Physiotherapy and Occupational Therapy Journal
Volume 15 Number 4, October - December 2022
DOI: http://dx.doi.org/10.21088/potj.0974.5777.15422.1

To Study the Immediate of Myofascial Decompression Cupping Therapy and Conventional Stretching on Hamstring Tightness and Balance in Physiotherapy Students: A Comparative Study

Amit S. Patel[1], Tanzeem Dhamdachhawala[2], Sonali Patel[3], Bhargavi Patel[4]

How to cite this article:

Amit S. Patel, Tanzeem Dhamdachhawala, Sonali Patel, *et al.*/To Study the Immediate of Myofascial Decompression Cupping Therapy and Conventional Stretching on Hamstring Tightness and Balance in Physiotherapy Students: A Comparative Study/ Physiotherapy and Occupational Therapy Journal. 2022;15(4): 147-155.

ABSTRACT

Background: Myofascial decompression (MFD), or cupping therapy and Conventional stretching are common techniques utilized to improve hamstring tightness and balance. MFD is a negative pressure soft tissue treatment technique using suction to manipulate the skin and underlying soft tissues. Stretching is also usually incorporated as pre-exercise as it has been suggested to improve muscle flexibility, prevent muscle injury and enhance physical performance.

Purpose of the Study: Aim of this study was to assess whether Myofascial Decompression or Conventional Stretching techniques was more reliable in improving hamstring flexibility and balance improvement in Physiotherapy students.

Method: The present study was conducted in M.B Gohil Institute of Medical Science and Research Center, Navsari, Gujarat. The study includes 50 physiotherapy students divided into two groups using convenient sampling who have age between 18-25 years. One group undergone MFD technique and the other group undergone conventional stretching, the study was conducted for only one day. The AKET was performed before and after the treatment to observe the improvement in range of motion and hamstring flexibility, likewise the SEBT was performed before and after the treatment to observe the improvement in balance.

Outcome Measures: Active knee extension test (AKET) and Star excursion balance test (SEBT).

Statistical Analysis: Statistical analysis was done using SPSS 26 software.

Results: Study was done among 50 students, in which 25 students were undergone MFD technique and other 25 were undergone conventional stretching technique. The hamstring muscle flexibility increased in both the groups i.e., 2.55% in cupping group and 2.49% in stretching group. So, both the techniques are very effective to relieve hamstring tightness. The balance improves in each direction of both the groups i.e., anterior, anteromedial, medial, posteromedial, posterior, posterolateral, lateral and anterolateral. So, both the techniques are equally effective to improve balance.

Conclusion: This study indicates that both the techniques are very effective to improve hamstring tightness. Here, myofascial decompression technique has slightly better improvement result than conventional stretching, but it is not significant enough to state that MFD is far better than Conventional stretching. Considering the limitation of MFD is very good alternative with similar results on hamstrings according to our research.

Keywords: Hamstring tightness; Active knee extension test (AKET); Star excursion test (SEBT); Myofascial decompression (MFD); Conventional stretching.

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Recieved on 12.10.2022 **Accepted on** 08.12.2022

INTRODUCTION

The hamstring muscle complex is comprised of three individual muscles and plays a critical role in human activities ranging from standing to explosive actions such as sprinting and jumping. The semitendinosus, semimembranosus, and biceps femoris muscles comprise the hamstring muscle group.[1]

The hamstring muscle group plays a prominent role in hip extension (posterior movement of the femur) and knee flexion (posterior movement of the tibia and fibula). Concerning the gait cycle, the hamstrings activate beginning at the final 25% of the swing phase generating extension force at the hip and resisting knee extension. The hamstring muscles also play an essential role as a dynamic stabilizer of the knee joint. Operating in tandem with the anterior cruciate ligament (ACL), the hamstrings resist anterior translation of the tibia during the heel strike phase of the gait cycle.[1]

Hamstring muscles are well known for their great tendency to shortening, which is due to their multijoint condition, their tonic postural character, and considerable amount of tensional forces to which they are constantly submitted.[2]

Hamstring tightness is caused by extended or prolonged sitting at work places and educational institutions, inadequate physical activity, genetic predisposition, previous injury to hamstring. Modern sedentary life style is one of the main reasons for postural abnormality. Most of the work place and educational setups have prolonged sitting hours which can easily hampered flexibility of soft tissues, especially in muscle which has multiple attachments. It is important to study hamstring flexibility in students who have long sedentary hours of studying along with lack of physical activities to create awareness about lack of normal flexibility and preventing complications.[15]

Hamstring tightness may be measured using the active unilateral SLR test, the passive unilateral SLR test; the sit and reach test, and the active knee extension test (AKET). The AKET measures hamstring tightness by the angle subtended by knee flexion after a maximum active knee extension, with the hip stabilized at 90 degrees.[13] The SEBT has been used to assess dynamic postural control. It has been proposed to challenge dynamic postural control because the subject must maintain balance on a single limb, whilst the other limb carries out a series of reaching tasks. Moreover, the SEBT reach distance is correlated with hip range of motion (ROM) and strength.[14]

This study is undertaken as there is lack of literature on prevalence and severity of hamstring tightness among college going students.[11]

The purpose of this study was to examine the immediate effect on hamstring flexibility by comparing two treatments,[1] Myofascial Decompression (MFD),[2] Conventional Stretching. The objectives of this study is twofold. The first objective is to determine if an acute bout of MFD is beneficial in improving flexibility and range of motion (ROM) of the hamstrings compared to Conventional Stretching on patients diagnosed with hamstring tightness. The second objective is to examine patient-reported perceptions of pain, flexibility and impact of a single treatment of MFD on their hamstring.[4]

METHODOLOGY

Study Setting

M.B Gohil Institute of Medical Science and Research Center, College of Physiotherapy, Navsari, Gujarat, India.

Study Population

Physiotherapy students of M.B Gohil college of physiotherapy.

Study Design

A comparative Study.

Study Duration

The study was undertaken for a total of 6 months.

Study Sample Design

Convenient Sampling.

Sample Size

Approximately 50 college going students.[11]

Each group has 25 samples

Materials Used:

1. Padded Plinth
2. Vertical bar
3. Universal Goniometer
4. Cupping Kit
5. Coconut oil
6. Radium Tap
7. Measuring Tap
8. Weight machine
9. Pen and paper

SELECTION CRITERIA

Inclusion Criteria

1. Age group between 18 to 25 years
2. Gender: Males and Females
3. Subjects with at least 150 loss of knee extension, when hip held in 900 flexion were included in the study.

Exclusion Criteria:

1. Subject with any past hamstring injury with in last 2 years.
2. Low back pain since past 2 months.
3. Lumbar and lower limb neurological compromise were excluded.

RESULT

Table 1: Shows mean of Height, Weight and BMI among the participants.

Variable	Group A	Group B
Height	1.62±0.14	1.54±0.14
Weight	59.36±10.82	49.07±9.33
BMI	22.32±3.90	19.55±3.26

Graph 1.1: Shows the average Height of subjects.

Graph 1.2: Shows the average Weight of subjects.

Graph 1.3: Shows the average BMI of subjects.

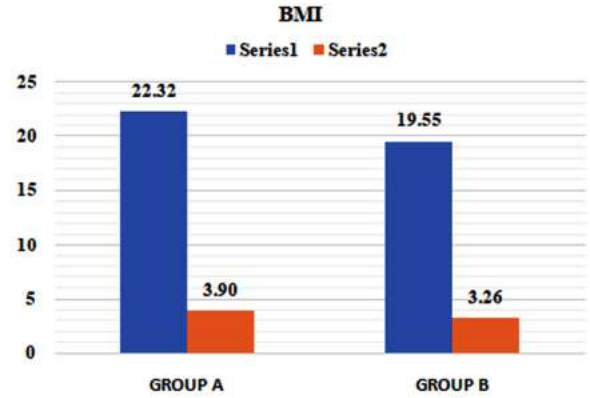


Table 2: Shows the gender distribution of subjects.

–	Female	Male
Group A	13	12
Group B	25	0

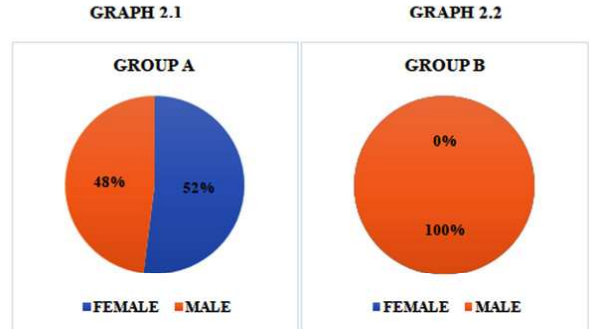
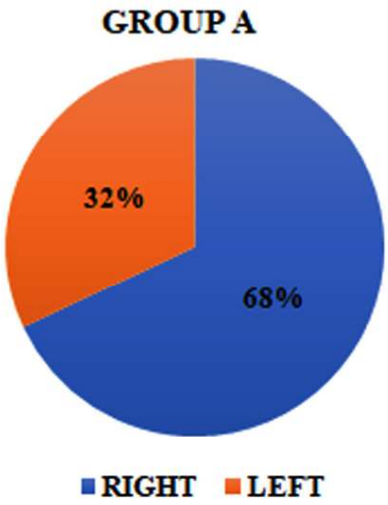


Table 3: Shows the affected side of the subjects.

Affected Side	Group A	Group B
Right	17	20
Left	8	5

Graph 3.1: Shows the affected side of the subjects of Group A.



Graph 3.2: Shows the affected side of the subjects of Group B.

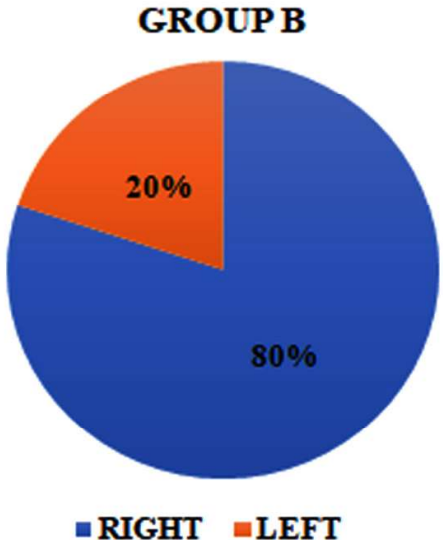


Table 4.1: Intra group comparison of Active Knee Extension Test (Group A).

Variable	Data	Mean ± SD	P- value	t-value	t critical	df
Aket	Pre	2.37±0.15	0.00	11.74	2.06	24
	Post	2.55±0.15				

Graph 4.1: Shows intra group comparison of Active Knee Extension Test (Group A) after immediate effect.

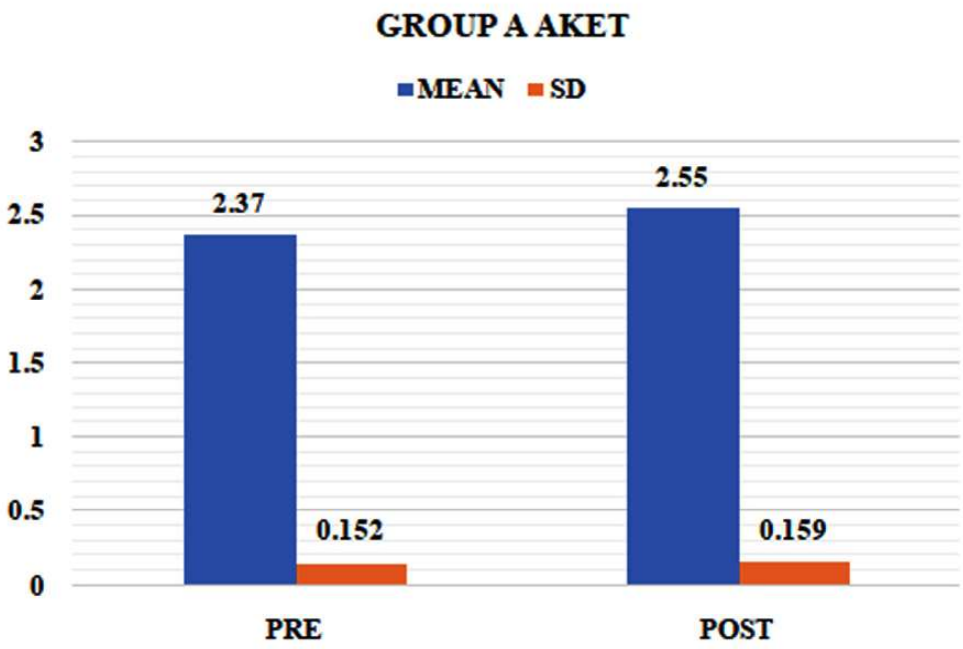


Table 4.2: Intra group comparison of Active Knee Extension Test (Group B).

Variable	Data	MEAN±SD	P value	t-value	t critical	df
Aket	Pre	2.95±0.17	0.00	14.53	2.06	24
	Post	2.42±0.18				

Graph 4.2: Shows intra group comparison of Active Knee Extension Test (Group B) after immediate effect.

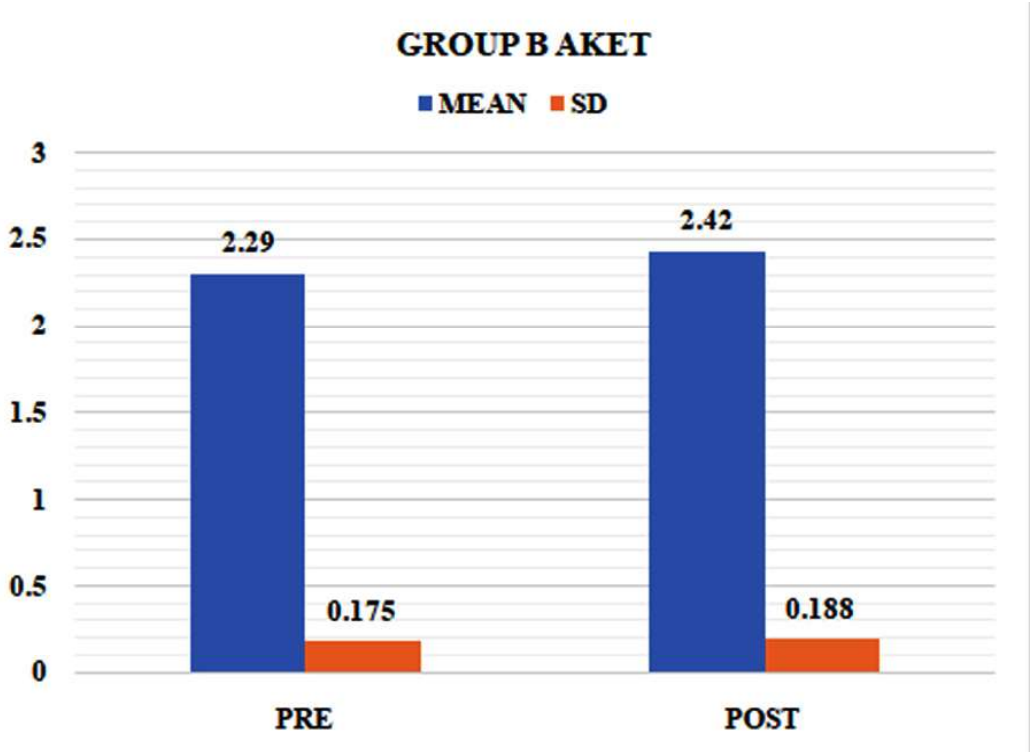


Table 5.1: Intra group comparison of Star Excursion Balance Test (Group A).

Direction	Level	MEAN±SD	P value	t critical	/t/ value	df
Anterior	Pre	81.42±0.08	0.00	2.06	6.26	23
	Post	88.8±0.05				
Anteromedial	Pre	84.36±0.06	0.00	2.06	4.07	23
	Post	89.6±0.05				
Medial	Pre	81.37±0.09	0.02	2.06	2.45	23
	Post	86.99±0.07				
Posteromedial	Pre	78.7±0.09	0.00	2.06	3.09	23
	Post	83.78±0.07				
Posterior	Pre	72.7±0.08	0.00	2.06	5.04	23
	Post	81.4±0.09				
Posterolateral	Pre	75.08±0.1	0.00	2.06	3.23	23
	Post	79.24±0.09				
Lateral	Pre	73.81±0.09	0.09	2.06	1.74	23
	Post	77.14±0.11				
Anterolateral	Pre	79.09±0.07	0.00	2.06	4.20	23
	Post	85.04±0.08				

Graph 5.1: Shows intra group comparison of Star Excursion Balance Test (Group A) after immediate effect.

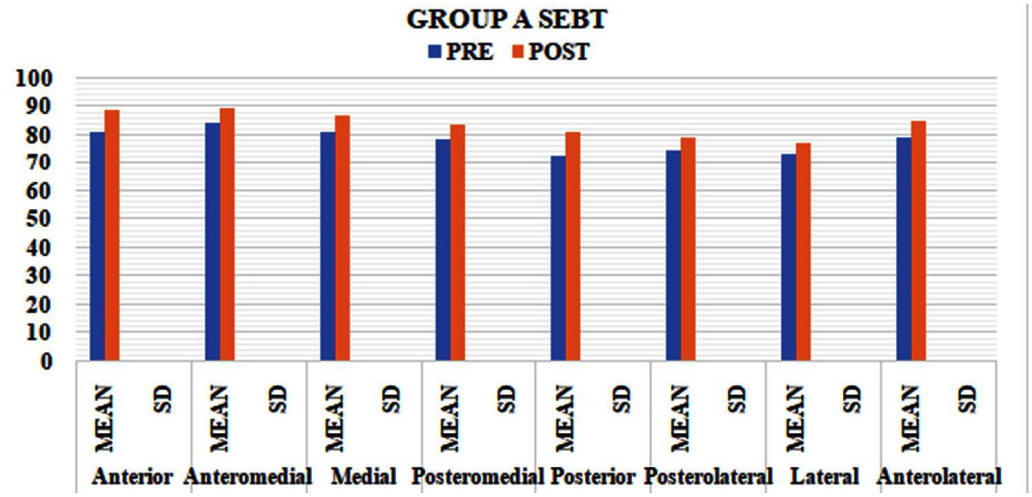


Table 5.2: Intra group comparison of Star Excursion Balance Test

Direction	Level	MEAN±SD	P value	t critical	/t/ value	df
Anterior	Pre	81.78±0.06	0.00	2.06	4.87	23
	Post	88.59±0.08				
Anteromedial	Pre	83.82±0.07	0.00	2.06	3.50	23
	Post	89.87±0.08				
Medial	Pre	84.98±0.07	0.00	2.06	4.92	23
	Post	91.02±0.09				
Posteromedial	Pre	81.73±0.09	0.00	2.06	5.57	23
	Post	87.47±0.09				
Posterior	Pre	73.18±0.09	0.00	2.06	4.59	23
	Post	79.73±0.1				
Posterolateral	Pre	70.67±0.09	0.00	2.06	4.56	23
	Post	78.4±0.1				
Lateral	Pre	69.12±0.1	0.00	2.06	3.39	23
	Post	75.74±0.12				
Anterolateral	Pre	75.54±0.09	0.00	2.06	3.56	23
	Post	81.82±0.1				

Graph 5.2: Shows intra group comparison of Star Excursion Balance Test (Group B) after immediate effect.

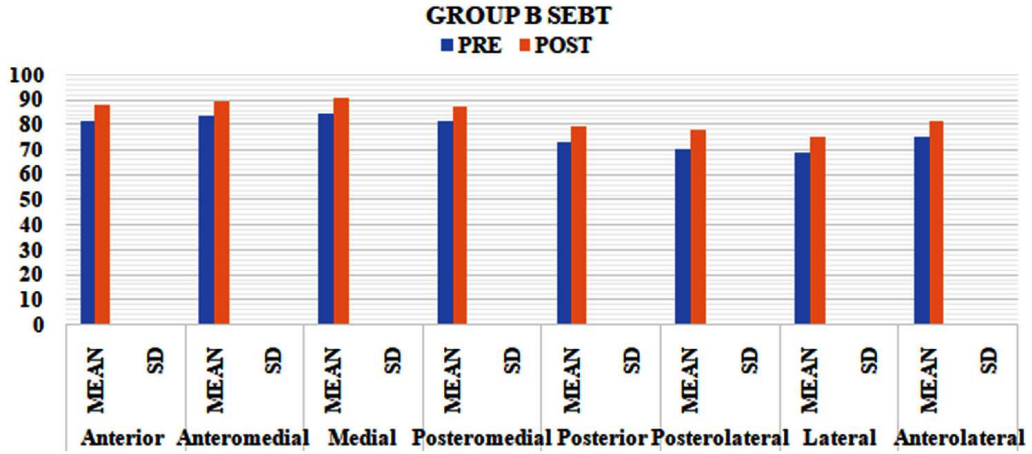


Table 6.1: Inter group comparison of Active Knee Extension Test.

–	MEAN±SD	P-value
Group A	2.55±0.15	0.01
Group B	2.42±0.18	

Graph 6.1: Shows inter group comparison of Active Knee Extension Test of Group A and Group B after immediate effect.

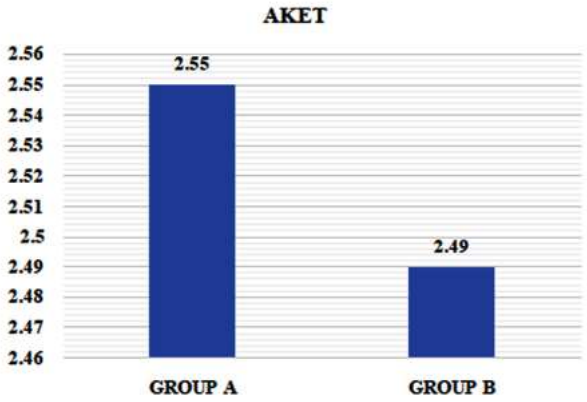
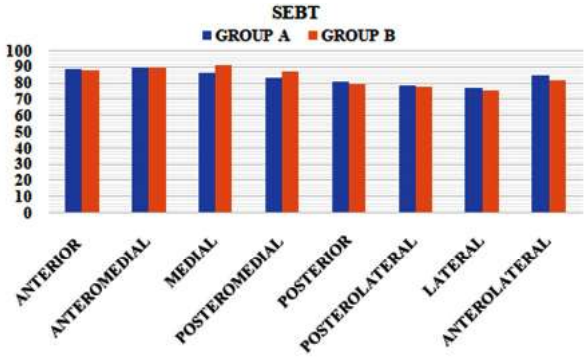


Table 6.2: Inter group comparison of Star Excursion Balance Test

Direction	Group A	Group B	P-value
Anterior	88.80±0.05	88.59±0.08	0.91
Anteromedial	89.60±0.05	89.87±0.08	0.89
Medial	86.99±0.07	91.02±0.09	0.10
Posteromedial	83.78±0.07	87.47±0.09	0.14
Posterior	81.40±0.09	79.73±0.1	0.55
Posterolateral	79.24±0.09	78.40±0.1	0.76
Lateral	77.14±0.11	75.74±0.12	0.67
Anterolateral	85.04±0.08	81.82±0.1	0.23

Graph 6.2: Shows inter group comparison of Star Excursion Balance Test of Group A and B after immediate effect.



DISCUSSION

The current study was conducted for a comparison between the immediate effect of MFD Cupping Therapy and conventional stretching on hamstring tightness and balance on physiotherapy students – a comparative study.

There are a multiple of physiological changes that are speculated to occur with cupping therapy that influence tissue change. The orthopaedic effects of an application of cupping therapy could include: an increase in blood circulation, 16 alleviate pain, 17, 18 reduce swelling, 18 regulate body temperature, 16 increase skin temperature, 19 decrease blood pressure, 19 irritate the immune system causing local inflammation, 20 and improve neurophysiological performance, 21 Furthermore, cupping has been theorized to loosen connective tissue, which could result in increased flexibility. 22An increase in blood flow and tissue temperature has been proposed to increase flexibility following other tissue mobilization techniques.[36, 37]

Aric J warren PhD, ATC et al. 2010 concluded that MFD is beneficial in making an acute clinically relevant difference in hamstring flexibility after a single treatment in patients with complaints of hamstring pathology symptoms. MFD can be used as an effective treatment modality to address limitations in hamstring flexibility.

The improvements in ROM observed after static stretching training might be explained by the fact that in static stretching there is a great possibility of increasing the number of sarcomeres in series (muscle length) due to longer exposure to the stresses generated in the specific degree of stretching, which remains constant (Bandy and Sanders, 2001). In addition, stretching increases viscoelasticity and decreases stiffness of muscular and connective tissues. Stretching itself enhances blood supply in joints and muscles, helping to warm them up, which improves functional performance during sports and activities of daily living (Savelberg and Meijer).

Winter et al. 2004 reported that passive stretching is characterized by the external addition of stretch stimulation on muscle contraction. Holding the stretch position, the excitatory spinal motor neurons overcome gamma inhibitory neuron impulses.

The result of the study shows that which technique is better between MFD and conventional stretching on hamstring tightness and balance. Here in the result the difference between two technique outcomes is not significant to state one technique is better than the other one. The hamstring muscle flexibility increases in both the groups. So, both the techniques are equally effective to relieve hamstring tightness and balance. According to our research we can say that MFD is slightly more effective

than conventional stretching to relieve hamstring tightness but the balance is equally improved in both the groups.

CONCLUSION

Present study was done at M.B Gohil Institute of Medical and Research center among the physiotherapy students to determine which technique is better to improve hamstring tightness and balance. Both the techniques are very to improve hamstring tightness. Here, myofascial decompression technique has slightly better improvement result than conventional stretching, but it is not significant enough to state that MFD is far better than Conventional stretching. Considering the limitation of MFD is very good alternative with similar results on hamstrings according to our research.

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Original Article

Physiotherapy and Occupational Therapy Journal
Volume 15 Number 4, October - December 2022
DOI: http://dx.doi.org/10.21088/potj.0974.5777.15422.2

The Efficacy of FIFA 11+ Warmup Program and Resistance Tube Exercises on Physical Performance and Agility in Football Players

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How to cite this article:
Obair Ahmad Haroon, Purnima Singh/The Efficacy of FIFA 11+ Warmup Program and Resistance Tube Exercises on Physical Performance and Agility in Football Players/Physiotherapy and Occupational Therapy Journal. 2022;15(4): 157-164.

ABSTRACT

Objective: To study the Efficacy of FIFA 11+ Warmup Program and Resistance band Exercises on Physical Performance and Agility in young Football Players.

Design: Experimental Study design.

Method: The study was approved by Institutional Ethics Committee. A total of 20 subjects were selected on convenient sampling. All participants underwent two measurements, one on the entry to the study (pre-test) and one after the 6 weeks of intervention (post-test). Outcome Measures used were 10 meter sprint test, 20 meter sprint test, Illinois agility test, T test, Vertical jump test & Wall volley test.

Results: The FIFA 11+ Warm up program and Resistance band exercises showed significant results with respect to performance and agility on all the 6 evaluation parameters. The Correlation Matrix of the Pre and Post intervention outcome measures for 10m Sprint, 20m Sprint, T Test and Illinois Agility Test, gave a high correlation coefficient (≥0.89) implying that the intervention was highly effective on these 4 parameters. The Wall Volley test and the Vertical jump test showed a positive correlation coefficient (>0.4) with a reasonably high level of statistical significance implying the positive effectiveness of the overall intervention program.

Conclusion: From the statistical analysis it is evident that players who had undergone FIFA 11+ warm-up program along with resistance tube exercises showed improvement in all the 6 evaluation parameters and should be considered as an effective option for warm up exercises in football players for their optimum performance.

Keywords: The FIFA 11+ Warm up program; Resistance band exercises; Physical performance; Agility; Football players.

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Recieved on 04.10.2022

Accepted on 08.12.2022

INTRODUCTION

Football is one of the most popular sports in the world. Football players require a moderate to high levels of aerobic and anaerobic power, good agility, and a variety of technical and tactical skills to bolster the likelihood of their success in the sport. In order to respond to the physical demands of play, training components such as anaerobic power, speed, and agility should be incorporated

into training. Prior to participation, warm-ups are generally required to "ready" oneself for training or matches.[1]

Warm-up programs essentially constitute mild or moderate exercise types that are geared toward enhancing performance. Widely used soccer specific warm-up program is the FIFA 11+ (2010) designed for soccer players. The FIFA Medical and Research Centre (FMARC) developed the 11+ warm-up program for soccer players. The 11+ program, includes running, strength, plyometric and balance components.[1]

The FIFA 11+ injury prevention program was developed in 2006 to address this matter, under the leadership of the FIFA Medical Assessment and Research Centre and in collaboration with the Oslo Sports Trauma Research Center and the Santa Monica Orthopedic and Sports Medicine Center. The program comprises a complete warm-up procedure aimed at injury prevention in soccer players. It includes 15 structured exercises, is available as printed material or online, and is easily executed. The exercises consist of core stabilization, eccentric thigh muscle training, proprioceptive training, dynamic stabilization, and plyometric exercises, all performed with proper postural alignment.[2]

The power-producing capability of an athlete is often considered the key performance indicator for successful sports performance. Strength and conditioning specialists use a variety of methods to enhance the production of human power. Resistance training is commonly used to develop and enhance athletes 'ability to produce force, a major contributor to athletes' ability to produce power.[3]

Resistance exercise (RE) is an intervention modality characterized by a muscle work against an external force and commonly used for strength and functional benefits. As muscle strength improvements are related to disability and fitness, RE could be used as an effective intervention to improve muscle function in players.[4]

Resistance tubes or elastic bands have been commonly employed in resistance training. The basic difference between resistance bands and other forms of resistance training is that bands are used to generate a controlled and consistent force depending on the needs of the individual. The band provides a resistive force during exercise with a low or high load stretch. They are made of natural rubber latex and are available in progressive levels of resistance (yellow, red, green, blue, black and silver, respectively).[5]

Agility is the ability which helps the athlete change directions, make quick stops and perform fast and smooth repetitive movements. Several factors are known to affect the level of agility, some of them being joint mobility, flexibility, dynamic balance, power, energy resources and muscle strength.[6]

Palazón 2016, studied the acute and chronic effects of the FIFA 11+ on several physical performance measures in adolescent football players and the findings of the study reported that the FIFA 11+ might be considered an appropriate warm-up inducing improvements in physical performance comparable with those obtained with other warm-up routines in football players.[7]

Barengo,[8] & da Costa Silva[9] in 2015 also studied the effect of "FIFA 11+" program to prevent football injuries in various player groups worldwide andon vertical jump performance in soccer players respectively. They concluded that it can, not only trigger core and hip musculature activation, but also promoted significant improvement in jump performance.

Studies on resistance tube exercises effects were done even on elderly[10], competitive football players[5], and novice lifters.[11]

Another study concluded that variable resistance is superior in increasing strength and power, force, lean body mass and overall EMG activity when compared to typical resistance training.[12]

The aim of the study is to evaluate the effectiveness of FIFA 11+ warm-up and resistance band exercises during warm-up to improve physical performance and agility in young football players.

MATERIALS AND METHODS

This Quasi experimental study was approved by Institution Ethics Committee and then conducted in one Football Academy for the period of 3 months from September to November 2018. 20 players were recruited on convenient sampling of only male players, with mean age 23.52 ± 5.02, who volunteered to participate after giving written informed consent. Players were eligible if they were semi-professional football players and involved in regular practice for more than 1 year.Subjects were excluded when they had any lower limb instability or injury or surgery, and if they had undergone FIFA 11+ warm up and resistance band training before the study.

Outcome Measurements

10m Speed Test: 10-m Speed Time is a good reflection of acceleration capabilities and test can be used to estimate maximum speed capabilities.[13,14]

Procedure: After warming up with ball based exercises, the players perform a 20m shuttle run without a ball to assess their coordinated dribbling under time pressure and speed. Five cones are placed in a straight line 2.8, 4.8, 6.0, 8.0 and 10.0m from the start line (perpendicular to the line). The players are instructed to dribble around alternate obstacles until the fifth cone was circled, and then return through the course in a similar fashion as fast as they could. The starting position is from an upright position. The test to be completed when the player in control of the ball, will cross the finish line.[1] (Fig. 1)

Fig. 1: 10 m Sprint test

Agility T-test: Agility is one of the key factors in improving performance in the game for football players. Various tests are available to measure agility. One of the most used tests is Agility T test. It is proved to be valid and reliable for measuring agility in many sports group.[15-17]

Procedure: Subjects start with both feet behind the starting line. Four cones are arranged in a T-shape, with a cone placed 9.14 m from the starting cone and 2 further cones placed 4.57 m on either side of the second cone. Each subject accelerates to a cone and touch the base of the cone with the right hand. Facing forward and without crossing feet, subjects then have to shuffle to the left to the next cone and touch its base with the left hand, shuffle to the right to the next cone and touch its base with the right hand and shuffle back to the left to the last cone and touch its base. The cones height is 30 cm. Finally, subjects run backwards as quickly as possible to return to the starting/finish line. The test to be repeated if athletes cross 1 foot in front of the other, failed to touch the base of the cone, and/or failed to face forward throughout the test. The time needed to complete the test will be used as performance outcome.[6] (Fig. 2)

Fig. 2: Agility T test

20 m Single Sprint Test

Following a standardized warm up consisting of light jogging, dynamic stretches and sub-maximal sprint efforts, players will complete three maximal sprints with three minutes rest between attempts. Subjects start each sprint from a two point start, precisely 50 cm behind the first timing gate, with players instructed to set off in their own time and run maximally through the final 20 m timing gate. Players will be verbally encouraged to run as fast as possible through the 20 m timing gate, and only decelerate after this. The best of the three times for each split will be taken for analysis with times measured to the nearest 0.01 s on each occasion.[18]

Vertical jump test: A Critical Review concluded that vertical jump testing has numerous sport applications; but there are many different protocols being used to assess vertical jump ability and explosive power in athletes. Depending on the equipment used, the vertical jump can be considered a field or laboratory test.[19]

Procedure: The subject stand facing a smooth, dark wall with both feet flat on the floor and toes touching the wall. He or she then reaches as high as possible with either hand and makes a mark on the wall (or wall mounted jump board/chalkboard) with a piece of chalk or chalk dust. Holding the desired jump position with the preferred side to the wall, the subject jumps as high as possible and makes another mark at the peak of the jump.[9] The vertical jump score is the difference between the

two marks (recorded in inches or centimetres). (Fig. 3)

Fig. 3: Vertical Jump Test

Illinois Change of Direction Test: This test results support the use of the Illinois change of direction test as a standard measure for quantifying change of direction ability in soccer players.[6]

Procedure: The length of the course (distance between A and B) is 10 m and the width (distance between A and G) is 5 m. The test consists of sprinting between A and B, sprinting from B to C, slalom running in between C-D-E-F, then again slalom running in the opposite direction (F-E-D-C), sprinting between C and G, and final sprinting between G and H. The cones are used to mark all points (A to H). Cones C-D-E-F are spaced 3.3 m apart.[20] (Fig. 4)

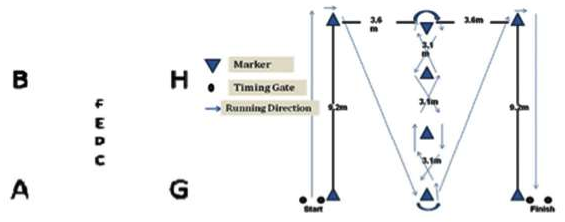

Fig. 4: Illinois Change of Direction Test

Wall Volley Test: This test is a standard test with high reliability (ICC=0.97) in terms of assessing soccer players' skill and accuracy in kicking a ball. Players will be required to kick a ball from a wall and then trap or kick the ball on the rebound as many times as possible within a 30 second period. The subjects will be allowed to kick the ball from the air or ground while avoiding the use of their arms or hands. Each subject performed 3 sets of this test, with the best attempt will be used for the analysis.[21]

Interventions

All the players selected for the study were given FIFA 11+ warm up program and 6 resistance band exercises for 8 weeks thrice weekly.

Players were under direct supervision and instructed on how to perform each exercise.

Prior to the commencement of the intervention programs, all players attended a workshop to learn the correct methods to perform the exercises.

The outcome assessment was conducted one week prior to the first day of training, while the post-intervention data was recorded three days after the final training session.

All tests were conducted in the same order for each player during the pre and post-tests.

FIFA 11+

The FIFA 11+ consisted of three parts (Fig. 2). The first partinvolves running exercises. The second part covers six exercises, all of which comprise of three levels of difficulty and aim at improving strength, balance, muscle control and core stability. The third and the final part consists of advanced running exercises. (Table 1) In addition to FIFA 11+ warm up exercises 6 resistance band exercises will be performed immediately after finishing FIFA 11+ warm up exercises.

Table 1: FIFA 11+ warm-up exercises

FIFA 11+		
Part 1- 8 mins	**Part 2 – 10 mins**	**Part 3 – 2 mins**
Running exercises:	Strength, Plyometric & Balance:	Running exercises:
Straight ahead 2 sets over 30m each exercise.	1. The bench: alternate legs 3 sets x 40 s (lifting 2 s each leg in turn)	1. Across the pitch 2 sets x 30m (70±80% maximum pace)
1. Hip out	2. Sideways bench: raise and lower hip 3 sets x 20 repetitions each side	2. Bounding 2 sets x 30 m

2. Hip in	3. Hamstrings: intermediate 1 set x 7 repetitions	3. Plant and cut 2 sets x 5 repetitions (80±90% maximum pace)
3. Circling partner	4. Single-leg stance: throwing ball with partner 2 set x 30 s each leg	
4. Shoulder contact	5. Squats: walking lunges 2 set x 10 repetitions each leg.	
5. Quick forward & backwards	6. Jumping: lateral jumps 2 set x 15 jumps (30 s approximately)	

Table 2: Resistance Tube exercises

Resistance Band Exercises			
Band Above Knees	**Band Below Knees**	**Band Around Ankles**	**Band Around Feet**
Bodyweight Squats	Monster Walks Over-Stride Slide	Straight Leg Walks forward & backwards	Hip Flexion
		Straight Leg Walks lateral	Hip Rotation

DATA ANALYSIS

The data was analysed with non-parametric tests, as the sample size was less. Within group analysis was done using paired "t" test and Pearson's Correlation Coefficient at 95% confidence interval using SPSS 20.

RESULTS

The Fifa 11+ Warm up program and Resistance band exercises showed significant results with respect to performance and agility on all the 6 evaluation parameters. The mean time taken to perform the tests between Pre and Post intervention samples for 10m Sprint ($\mu = 0.061$), 20m Sprint ($\mu = 0.1045$), T Test ($\mu = 0.187$) and Illinois Agility Test ($\mu = 0.513$) decreased, whereas the mean scores for Wall Volley test ($\mu = -3.8$) and Vertical jump test ($\mu = -3.15$) increased post intervention, thereby confirming the positive impact of the program. (Table 4, Fig. 2)

The Correlation Matrix of the Pre and Post intervention outcome measures for 10m Sprint, 20m Sprint, T Test and Illinois Agility Test, gave a high correlation coefficient (≥0.89) implying that the intervention was highly effective on these 4 parameters. The Wall Volley test and the Vertical jump test showed a positive correlation coefficient (>0.4) with a reasonably high level of statistical significance implying the positive effectiveness of the overall intervention program.

The comparative study between Pre and Post intervention results of 10m Sprint, 20m Sprint, T Test, Illinois Agility Test, Wall Volley and Vertical jump were found to be highly significant (p value<0.01) confirming the effectiveness of the intervention with Fifa 11+ Warm up program and Resistance band exercises in the above-mentioned sample category. (Table 3)

DISCUSSION

Table 3: Frequency distribution of age group foot-ball players

Age Group	Frequency	% (Frequency)
18-23	11	55%
24-28	9	45%

Table 4: Mean and SD of Pre-post-intervention

Pre & Post Intervention		Mean	Std. Deviation
Pair 1	*M10_Pre	2.6485	0.25069
	M10_Post	2.5875	0.23133
Pair 2	**M20_Pre	4.567	0.32674
	M20_Post	4.4625	0.29595
Pair 3	***T_Test_Pre	9.898	0.5362
	T_Test_post	9.711	0.39735
Pair 4	****Illinois_pre	18.89	0.64494
	Illinois_post	18.377	0.58354
Pair 5	***** VJ_Pre	50.75	3.22613
	VJ_Post	53.9	2.93616
Pair 6	******WV_Pre	9.2	4.5607
	WV_Post	13	3.62738

*M10 – Sprint 10m

**M20 – Sprint 20m

***T_Test – Agility T Test

****Illinois Test – Illinois Change of Direction Test

*****VJ Test – Vertical Jump Test

******WV Test–Wall Volley Test

Table 2.3: Correlation Coefficients between the Pre and the Post intervention Pairs/Outcomes.

Pre & Post-Intervention		Correlation (r)	P-Value
Pair 1	M10_Pre & M10_Post	0.984	0.0001
Pair 2	M20_PRE & M20_Post	0.969	0.0001
Pair 3	T_Test_Pre & T_Test_Post	0.870	0.0001
Pair 4	Illinois_pre & Illinois_post	0.892	0.0001
Pair 5	VJ_Pre & VJ_Post	0.414	0.0700
Pair 6	WV_Pre & WV_Post	0.614	0.0040

Table 2.4: t-value and corresponding P-value

Pre & The Post InterventioN		Paired Differences			t - Cal.	d f	P-Value
		Mean	Std. Deviation	Std. Error Mean			
Pair 1	M10_Pre - M10_Post	0.0610	0.04712	0.01054	5.790	19	0.0001
Pair 2	M20_Pre - M20_Post	0.1045	0.08370	0.01871	5.584	19	0.0001
Pair 3	T_Test_Pre - T_Test_Post	0.1870	0.27344	0.06114	3.058	19	0.0060
Pair 4	Illinois_Pre - Illinoiis_Post	0.5130	0.29187	0.06527	7.860	19	0.0001
Pair 5	VJ_Pre– VJ_Post	-3.1500	3.34467	0.74789	-4.212	19	0.0001
Pair 6	WV_Pre - WV_Post	-3.8000	3.69352	0.8259	-4.601	19	0.0001

The present study used resistance tubes and FIFA 11+ Warmup Program on Physical Performance and Agility for 6 weeks in Football Players. Its purpose was to see the effects of resistance tube exercises and FIFA warm program on 10m sprint, 20m sprint, vertical jump height, agility and change of direction test pre nd post-intervention, with the results finding significant improvements in all the measures.

Many Studies dealings with the effects of the FIFA 11+ in football have reported improvements in agility and jump height[1], balance[21] and muscle strength.[22]

The present study used resistance bands as a form of strength training as a way to develop strength, balance and coordination. According to a study by Patterson et al.[23] such Band provides for controlled stretching and strengthening of muscle tendon units and joints and allows for a pre-stretching effect as well as controlled repeatability throughout the movement.

The current study revealed a significantly significant increase in the vertical jump between pre-intervention and post-intervention values. 35 female basketball players participated in a study by Adibpour et al. comparing the effects of plyometric and weight training on vertical jump height. The researchers found that both types of training significantly increased girls' vertical jump height.[24] The present study's increase in vertical leap height, which was roughly 8 cm overall, demonstrated a significant improvement in the football players' vertical jump height, with a difference of at least 8 cm seen before and after the intervention. This finding may be related to a study by Wisloff et al.[25] on elite male football players, which revealed that in order to increase vertical leap height, football players should concentrate on building maximal strength with a concentration on concentric motions. A similar conclusion can be reached in the present study, which also used maximal and controlled concentric and eccentric exercises such as the one leg press. This mid range semi knee flexion to a full knee extension movement of the quadriceps and hamstrings may have promoted strength development in these muscle groups.

The limitations of the study are the short time available to investigate the effects of the FIFA 11+ program and resistance tube exercises (6 weeks), and the absence of follow-up. The benefits of the FIFA 11+ warm-up routine and resistance tube workouts on maintaining physical performance may have been covered in a subsequent evaluation of the physical performance. A further drawback is that it is impossible to determine whether the findings apply to female football players because the study only involved male football players. Future research should also use randomised control trial designs to examine the effects of both over a longer period of time on a number of physical performance indicators.

The present study's strength, however, is that it showed the potential benefits and applicability of the FIFA 11+ warm-up programme combined with resistance band workouts in enhancing football players' physical performance. This study supports earlier findings suggesting, given FIFA 11+'s greater impacts on physical performance, typical warm-up routines for male youth soccer players could be replaced with resistance tube workouts. Additionally, this warm-up programme doesn't call for any special equipment, improves the performance growth of young football players, and thus considerably lowers the chance of injury.

CONCLUSION

The present study's findings imply that a 6 weeks resistance band training regimen plus the FIFA warm-up programme had a favourable impact on young male football players' physical performance, vertical jump height, and agility. Furthermore, our study would recommend for the introduction of these crucial movement competency qualities in all football players given the gains in jump performance, agility, and sprinting. Finally, the

FIFA 11+ warm-up program's primary target group might be broadened to recreational athletes and kids in a school setting, while striving to promote public health, given to the evidence based health advantages of resistance band workouts.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

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Original Article

Physiotherapy and Occupational Therapy Journal
Volume 15 Number 4, October - December 2022
DOI: http://dx.doi.org/10.21088/potj.0974.5777.15422.3

The Effect of Proprioception Training with and without Visual Input on Single Limb Standing Balance Time in Deaf Students: A Pilot Study

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How to cite this article:

Amit S. Patel, Divya S. Ahir, Heli Y. Kansara, et al./The Effect of Proprioception Training with and without Visual Input on Single Limb Standing Balance Time in Deaf Students: A Pilot Study/Physiotherapy and Occupational Therapy Journal. 2022;15(4): 167-171.

ABSTRACT

Background: Proprioception and balance are the key and inseparable components of daily activities and exercises. Hence this study was undertaken to find out the effect of proprioception training on single limb standing balance time in deaf students of Navsari by measuring their activated angle reconstruction test and the single limb standing test.

Purpose of The Study: Aim of this study was to examine the effectiveness of 4 weeks proprioception training with and without visual input on single limb standing balance time in deaf students and objective is to examine the effect of proprioception training with and without visual input in deaf students, to examine how the proprioception training with and without visual input affects proprioception of the knee joint, ankle and single limb standing balance in deaf students, to examine how the rehabilitation programs improve postural control and balance in the deaf on restricting vision and engaging other senses.

Methods: A pilot study was conducted in a local school in Gujarat (Shri Chimanlal Laxmichand Parikh Mamta Mandir, Manav Kalyan Trust, Dist. Navsari) from which 15 students were volunteered for this study including both male and female of Navsari district based on inclusion and exclusion criteria, out of which 5 were excluded. Outcome of the study that is the activated angle reconstruction test and the single limb standing test were assessed for each student with prior informed consent form signed by the guardian of the student. Effect of proprioception training is done statistically.

Outcome Measure: The angle reconstruction test and The Single Limb Standing Test.

Statistical Analysis: Statistical analysis was done using Microsoft Office Excel 2007.

Results: Study was done among 10 students who completed the full training protocol in which 5 students were undergone with proprioception training with visual input and other 5 students were undergone with proprioception training without visual input. The balance and proprioception were improved in both the groups. So, proprioception training with as well as without visual input is very effective to improve balance and proprioception in deaf students.

Conclusion: The present study showed that both the treatment groups attained significant improvement in SLS and AART after 4 weeks of proprioception training ($p < 0.05$). However, there was no significant difference in SLS and AART between Group A and Group B after 4 weeks of proprioception training ($p > 0.05$).

Keywords: Single Limb Standing balance Time; Deaf students; Navsari, Proprioception training.

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Recieved on 12.10.2022

Accepted on 08.12.2022

INTRODUCTION

Hearing deficit is the third most common chronic disorder that affects the health status largely and seriously, leading to stress in the patient and the family.[1] The vestibular system is an organ that detects the sensations of physical balance and plays an important role in the spatial relationship between the human body and the space it occupies.[7]

According to World Health Organization (WHO) in 2005 about 278 million people suffered from moderate to profound hearing impairment, of which 80% of them live in low and middle income countries.[7]

Proprioception was defined as "the perception of joint and body movement as well as position of the body, or body segments, in space" and it is considered as the most important sensory system in the maintenance of postural stability.[11] Studies indicate that balance disorder, motor development problems, and weak postural control are likely to occur in children with severe to profound hearing deficits.[3] Proprioception is a key component of the somatosensory system and transmits information to the central nervous system about motion and the position of the body in space. As hearing impaired children mature, they learn to compensate partially for vestibular[10] damage through the refinement of the visual, proprioceptive, and kinesthetic senses.[8]

METHODOLOGY

Study Setting

Shri Chimanlal Laxmich and Parikh Mamta Mandir, Manav Kalyan Trust, Dist. Navsari, State: Gujarat, India.

Study Design

Pilot study.

Study Sample Size

10 deaf students of Mamta Mandir school of Navsari as per inclusion criteria.

Study Sample Design

Convenient Sampling.

Study Population

Deaf students of Mamta Mandir school of Navsari District.

Study Duration

The study was undertaken for a total of 6 months.

Materials used:

- Pen and pencil
- Stopwatch
- Goniometer
- Weight machine
- Measure tape
- Balance board
- Physioball
- Parallal bar

SELECTION CRITERIA

Inclusion Criteria

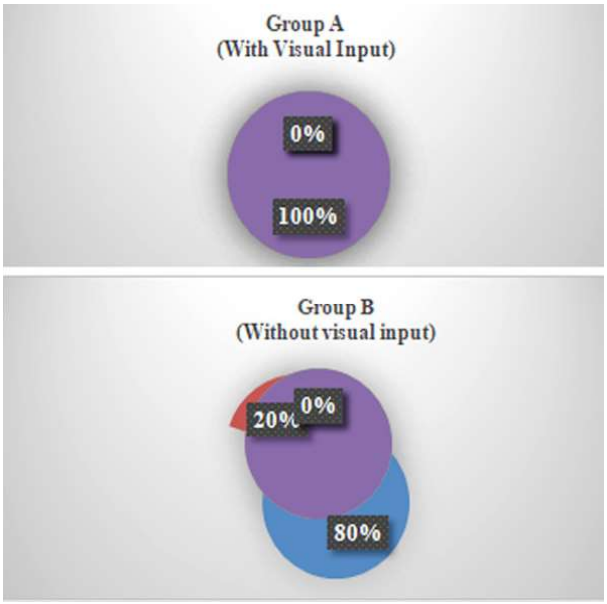
- Age: 14 to 16 years
- BMI(kg/m²): 18.5 to 24.9
- Hearing range: Greater than 75 decibels

Exclusion Criteria

- Use of any neurological drugs
- Use of cochlear implant
- History of lower extremity injury prior a year before the study
- Any visual disorders
- Any postural deformities
- Surgery or fracture within a year before the study

RESULT

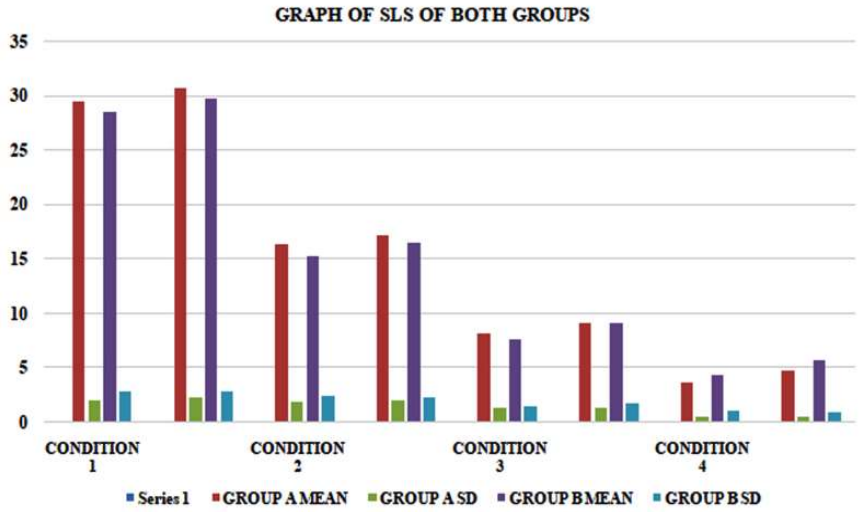
In total, 10 participants were evaluated from which 100% of participants were males in Group A and in Group B-80% were males and 20% were female.



Graph 1: Graph of Gender Distribution

Table 1: Sls for both Groups

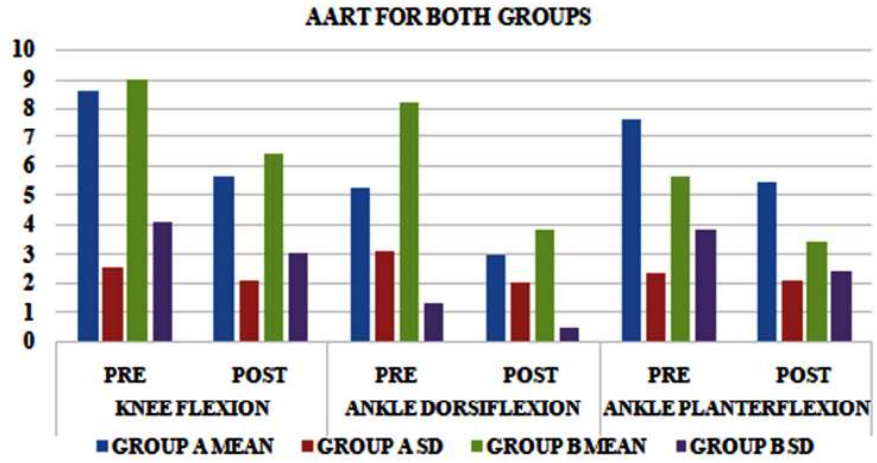
Variables	Level	Group A MEAN±SD	Group B MEAN±SD	P Value	DF	T Stat
Condition 1	Pre	29.562±2.11	28.588±2.93	0.566	7	0.603
	Post	30.696±2.32	29.806±2.93	0.609	8	0.532
Condition 2	Pre	16.424±1.98	15.344±2.45	0.466	8	0.766
	Post	17.238±2.07	16.554±2.37	0.640	8	0.486
Condition 3	Pre	8.158±1.35	7.674±1.57	0.615	8	0.524
	Post	9.162±1.43	9.13±1.72	0.975	8	0.032
Condition 4	Pre	3.636±0.48	4.43±1.13	0.209	5	-1.44
	Post	4.734±0.51	5.742±0.92	0.075	6	-2.15



Graph 2: Graph of Sls for Both Grpoups

Table 2: Aart For Group-A (With Visual Input) and Group-B (Without Visual Input)

Knee Flexion	Pre	8.6±2.51	9±4.06	0.857	7	-0.187
	Post	5.6±2.07	6.4±3.05	0.642	7	-0.485
Ankle Dorsiflexion	Pre	5.2±3.11	8.2±1.30	0.537	5	-0.662
	Post	3±2	3.8±0.45	0.432	4	-0.873
Ankle Planterflexion	Pre	7.6±2.30	5.6±3.78	0.346	7	1.010
	Post	5.4±2.07	3.4±2.41	0.197	8	1.407



Graph 3: Graph of Aart for Both Groups

Between group Comparison of AART was done between pre and post values of Group A and Group B by using unpaired t-test on the basis of outcome measures. In this comparison the result shows no significant difference between pre and post values of the outcome measures ($p > 0.05$).

DISCUSSION

The aim of this study was to determine the effects of 4 weeks of proprioception training with and without visual input on knee and ankle proprioception and single leg balance performance with four conditions in deaf students.

The results of the study are discussed in context of statistical analysis of present data and also compared with the previous studies. The possible explanations for the results are also discussed below according to supporting literature.

The study was carried out on 10 students having severe to profound hearing loss, so this study reveals the results of proprioception training with and without visual input in male and female students having age between 14 to 16 years.

The present study showed that both the treatment groups attained significant improvement in SLS and AART after 4 weeks of proprioception training ($p < 0.05$). However there was no significant difference in SLS and AART between Group A and Group B after 4 weeks of proprioception training ($p > 0.05$). In present study Group A and Group B showed significant improvement in SLS and AART when pre and post values were compared within group using paired t-test. But there was no significant difference in SLS and AART when between group comparison was done.

Proprioception training stimulates propriocep -tion receptors and encourages postural strategies such as hip and ankle strategies, thereby improving single limb standing balance time and the individual's performance at maintaining balance. In proprioception training without visual input, the participants used all their potential somatosensory and vestibular systems to maintain their balance.

CONCLUSION

The present study shows that proprioception training with visual input as well as without visual input improves the proprioception of knee, ankle and single limb balance time. Within group comparison of Group A (with visual input) and Group B (without visual input) shows that there is significant improvement in the proprioception of knee, ankle and single limb balance time in Group B than in Group A. Between group comparison shows less significant difference.

It can be concluded that proprioception training with visual input as well as without visual input is beneficial for the improvement of proprioception and balance in students with severe.

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Original Article

Physiotherapy and Occupational Therapy Journal
Volume 15 Number 4, October - December 2022
DOI: http://dx.doi.org/10.21088/potj.0974.5777.15422.4

Comparison between Dynamic Surya Namaskar and High Intensity Interval Training to Determine their Effectiveness on Cardiorespiratory Endurance among Physiotherapy Students: An Experimental Study

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How to cite this article:

Vikas. M. Dhimmar, Prince T. Ahir, Ravi A. Solanki, *et al.*/Comparison between Dynamic Surya Namaskar and High Intensity Interval Training to Determine their Effectiveness on Cardiorespiratory Endurance among Physiotherapy Students: An Experimental Study/Physiotherapy and Occupational Therapy Journal. 2022;15(4): 173-179.

ABSTRACT

Background: Cardio-respiratory and muscular endurance are thepriority for the field of physiotherapy, this profession demands more physical effortsto treatpatients. So good cardiorespiratory endurance of physiotherapy students is must, in order toimprove cardiorespiratory endurance, there must be exercise training included in thecurriculum which is less time consuming and also have good results, and for the improvement of cardiorespiratory endurance there is two well known exercise protocol is there the Dynamic surya namaskara and High intensity interval training Hence this study was undertaken to compare both the protocol and find which one is good for physiotherapy student by measuring their cardiorespiratory endurance after the training and comparing them from the previous endurance value taken before the training. And the comparison is also made between both groups average value of endurance improvement.

Purpose of the Study: Aim of this study is to compare 6 weeks exercise protocols effectiveness of two different cardiorespiratory endurance trainings namely the Dynamic surya namskara and High intensity interval training and state which training is good for physiotherapy student to have in their curriculum for improve their cardiorespiratory endurance and yet it should not impact their study time and be less time consuming.

Method: A experimental study was conducted in M.B Gohil institute of medical science and researchcentre Navsari, Gujarat. The study has included 32 physiotherapy students, divided into two groups usingconvenient sampling who have normal BMI and no other cardiopulmonary diseases according to our inclusion and exclusion criteria, one groupundergone dynamic Surya namaskar training and other group undergone high intensity intervaltraining, the study was conducted over a period of 6 weeks. Outcome of the cardiorespiratory endurance wasmeasured by using Harvard step test both before and after the training with prior informed consent.

Outcome Measure: Harvard Step Test.

Statistical Analysis: Statistical analysis was done using Microsoft office excel 2010.

Result: Study was done among the 32 students who completed the full training protocol whereas 16 students was undergone Dynamic Surya Namaskar training and other 16 students was undergone High intensity

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Recieved on 12.10.2022

Accepted on 08.12.2022

interval training. Cardiorespiratory endurance of students was measured by performing Harvard step test both previously and after the training protocol then comparison of previous values and post values were done to check the improvement inendurance, the endurance was increase in both the groups, 37.45% in Dynamic Surya Namaskar group and 58.31% improvement in High intensity interval training group so both the trainings are very effective to improve cardiorespiratory endurance. Comparison was done Among the two training Dynamic Surya Namaskar and High intensity interval training but there was no significant difference observed thus both the training are somewhat equally effective to improve cardiorespiratory endurance.

Conclusion: The present study showed that both the trainings are very good to improve cardiorespiratory endurance here high intensity interval training has slightly better improvement result then dynamic Surya namaskar training, but it is not significant enough to state that High intensity interval training is far better than dynamic Surya namaskar training. Considering the limitation of High intensity interval training, dynamic Surya namaskar training is a very good alternative with similar results on cardiorespiratory endurance according to our research.

Keywords: High intensity interval training (HIIT); Dynamic Surya namaskar; Cardiorespiratory endurance; Harvard step test; Navsari; Physiotherapy students.

INTRODUCTION

Physical fitness is a state of health and well being and, more specifically, the ability to perform aspects of sports, occupations and daily activities. Physical fitness is generally achieved through proper nutrition, moderate vigorous physical exercise, and sufficient rest.

Before the Industrial Revolution, fitness was defined as the capacity to carry out the day's activities without undue fatigue or lethargy. However, with automation and changes in lifestyles, physical fitness is now considered a measure of the body's ability to function efficiently and effectively in work and leisure activities, to be healthy, to resist hypokinetic diseases, and to meet emergency situations.[1]

An individual is considered to be fit for a particular task or activity when he can accomplish it with a reasonable degree of efficiency without undue fatigue and with rapid recovery from the effect of exertion. Physiological fitness implies the capacity for skilful performance and rapid recovery. Physiological effort is estimated from the magnitude of the heart rate change during exercise and front the rapidity of return of the heart rate to normal following the exercise.[2]

Physiotherapy students during the course of physiotherapy education is subjected to different kinds of stressors predominantly the pressure of academics leading to the successful completion of the educational course. Physical & mental fitness are the key to such a successful outcome. Physical fitness is used in two close meanings: general fitness-a state of health and well-being and specific fitness a task oriented definition based on the ability to perform specific aspects of sports or occupations. It is the result of regular exercise, proper diet and nutrition, and proper rest for physical recovery. There has been a decrease in physical activity due to a more sedentary lifestyle. However, evolution has not kept pace with automation and humans have not adapted effectively to the sedentary lifestyles. Inadequate physical activity is responsible for approximately 30% of all deaths mainly due to heart disease, diabetes & colon cancer.[4] Rising levels of obesity are also contributing to these diseases. This has reached epidemic proportions in many parts of the developing world and is beginning to affect developing countries like India as well. Obesity, if present in adolescence leads to obesity in adult life. There is substantial evidence that obesity in childhood lays the metabolic groundwork for adult cardiovascular disease. Beginning an active lifestyle could significantly reduce mortality from these events. Regular physical exercise is known to have beneficial effects even in the untrained person and in diseased states like Diabetes, Obesity & Hypertension.[2]

Many studies conclude that Cardiorespiratory fitness of the Physiotherapists students was low therefore there is a need to motivate the students to achieve optimal level of fitness levels. It is recommended that the students should engage in physical activities. Institutions should include the different physical activities in their curriculum.[3] Which is easy and less time consuming, so it could not interfere with the busy schedule life of the physiotherapy students therefore we have found two techniques which consume less time

approximately half an hour per session and gives good results.

THERE ARE TWO TYPES OF TECHNIQUES

Dynamic Surya namaskar

The basic translation of Surya namaskar is salutation to the sun. it is a very ancient tradition which has been in existence since the Vedic age. The physical basic of the practice link together twelve asanas in a dynamically performed series. These asanas are ordered so that they alternately stretch the spine backwards and forwards. When perform in the usual way, each asana is move into with alternated inhalation and exhalation. A full round of Surya namaskar is considered to be two sets of the twelve poses with a change in a second set to moving the opposite leg first through the series. With increasing scientific research in yoga, its therapeutic aspect are also being explored Surya namaskar gives more benefits with less expenditure of time. It is claimed that Surya namaskar practice improves general health and fitness.[4]

High intensity interval training (HIIT)

The fitness industry has recently seen a surge of interest in high intensity interval training (HIIT) a burst and recover cycle that is suggested to be a viable alternative to the traditional approach to enhancing aerobic fitness, namely continuous endurance training. Some studies, however, have suggested that HIIT leads to improvements in both aerobic and anaerobic fitness.[5] The present study is taken with the objective to analyse and compare the effect of dynamic Surya namaskar and high intensity interval training (HIIT) on physical[4] fitness of Physiotherapy students. Physical fitness is the basis of all the activities of our society. If we fail to encourage physical development and powers, we will undermine our capacity for thought and for work.

METHODOLOGY

Study Setting

M.B. Gohil Institute of Medical Science and Research Centre, College of Physiotherapy, Navsari, Gujarat, India.

Study Population

Physiotherapy students of M.B Gohil college of physiotherapy

Study Design

Experimental study

Study Duration

The study will be undertaken for a total 6 months.

Study Sample Design

Convenient Sampling

Sample Size

32 students depending upon availability.

Two groups 16 students each

Materials Used

1. Step Bench- 33 cm
2. Stopwatch
3. Measuring tape
4. Paper and pen
5. Sphygmomanometer
6. Stethoscope
7. Pulse Oximeter
8. Metronome
9. Yoga mat
10. Weight machine

SELECTION CRITERIA

Inclusion Criteria

1. Healthy young male & female Physiotherapy students.
2. Age between 18 to 24 years
3. Body Mass Index (BMI) {18.5-24.9}
4. 6-minute walk test

Exclusion Criteria

1. Student with Locomotor & Musculoskeletal disability
2. History of Cardiovascular disorder
3. History of Respiratory disorders
4. History of Diabetes mellitus, Hypertension
5. History of Major surgery in the recent past
6. History of Alcohol & Smoking

Outcome Mesure

1. Pre and post vital sings (pulse rate, respiratory rate, blood pressure).
2. Physical fitness index score-PFI =Duration of exercise in seconds x 100/2 (pulse 1+2+3)

Procedure: The Subject is advised to step up on the modified Harvard steps of 33cms height once every two seconds (30 per minute) for 5 minutes, a total of 150 steps. At one, three and five minutes during the test, pulse rate was recorded as

(a) PR1 (Pulse Rate 1) – 1 min after exercise

(b) PR2 (Pulse Rate 2) – 3 min after exercise.

(c) PR3 (Pulse Rate 3) – 5 min after exercise.

Classification of fitness according to Harvard index

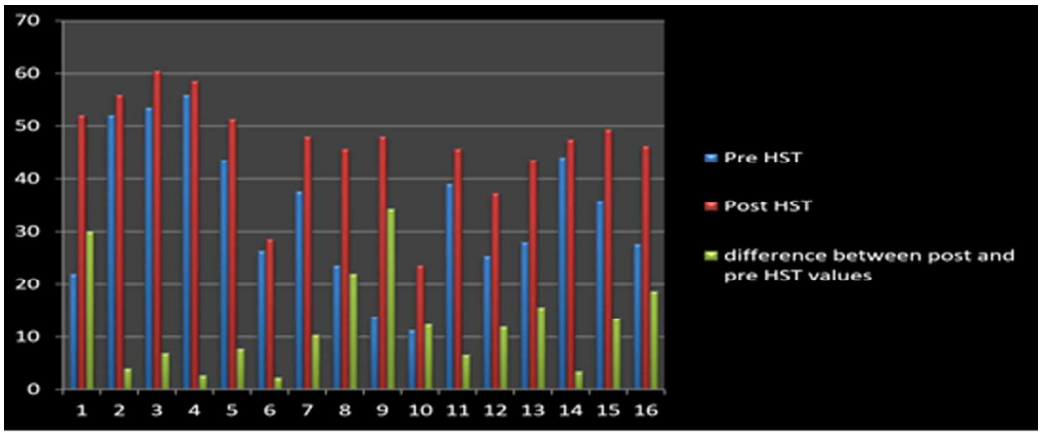
Category	Harvard index
Poor	<55
Low Average	55 – 64
High Average	65 – 79
Good	80 – 89
Excellent	90 & Above

RESULT

In total 32 samples were taken for study where 16 are included in Dynamic Surya namaskar training and other 16 are included in High intensity interval training.

Table 1: Dynamic Surya Namaskar

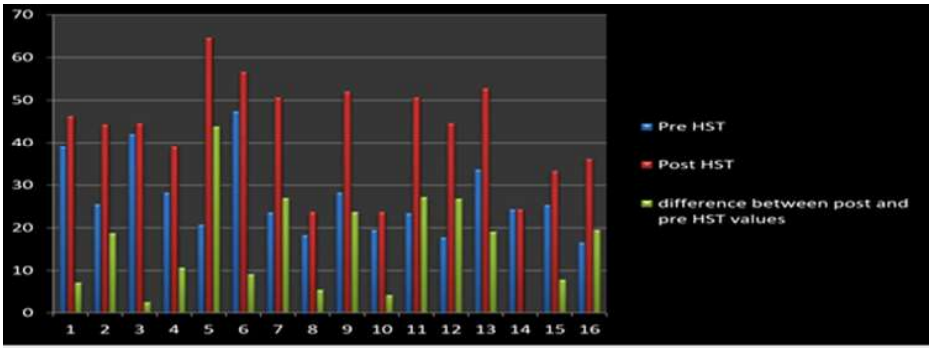
Sample No.	Pre HST	Post HST	Difference Between Post and Pre HST Values
1	22.08	52.08	30
2	52.08	55.97	3.89
3	53.51	60.48	6.97
4	55.97	58.59	2.62
5	43.60	51.36	7.76
6	26.35	28.56	2.21
7	37.68	48.07	10.39
8	23.65	45.73	22.08
9	13.88	48.07	34.19
10	11.28	23.65	12.37
11	39.06	45.73	6.67
12	25.40	37.33	11.93
13	27.98	43.60	15.62
14	44.11	47.46	3.35
15	35.79	49.34	13.55
16	27.64	46.29	18.65
Mean difference	33.75375	46.39438	12.64063



Graph 1: Dynamic Surya Namaskar

Table 2: High intensity interval training

Sample No.	Pre HST	Post HST	Difference between Post and Pre HST Values
1	39.06	46.29	7.23
2	25.59	44.40	18.81
3	42.13	44.64	2.51
4	28.32	39.05	10.73
5	20.78	64.65	43.87
6	47.46	56.66	9.2
7	23.65	50.67	27.02
8	18.34	23.73	5.39
9	28.31	52.08	23.73
10	19.57	23.75	4.18
11	23.45	50.67	27.22
12	17.80	44.64	26.84
13	33.68	52.81	19.13
14	24.35	24.35	0
15	25.40	33.33	7.93
16	16.61	36.16	19.55
Mean difference	27.15625	42.9925	15.83375

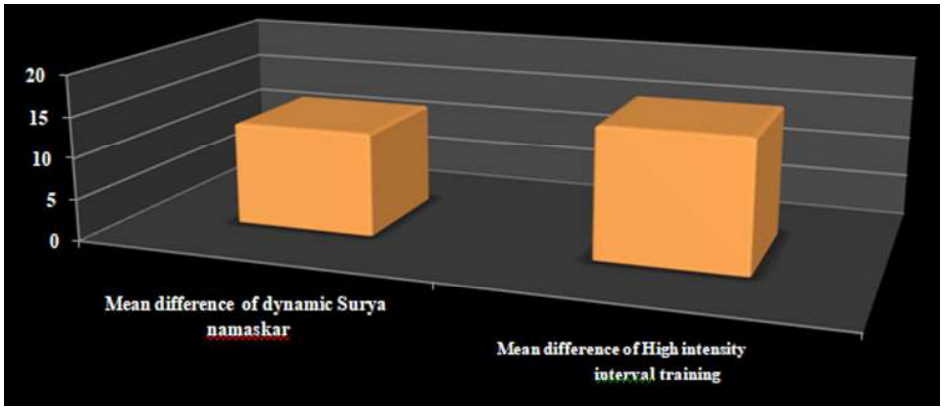


Graph 2: High intensity interval training

Within the group comparison was done first by using paired T test,in both groups' endurance was significantly improved.

Table 3: Comparison between Dynamic Surya namaskar and High intensity interval training.

Dynamic Surya namaskar mean difference between post and pre HST values	High intensity interval training Mean difference between post and pre HST values
12.64063	15.83375



Graph 3: Comparison between Dynamic Surya namaskar and High intensity interval training.

Between group comparison was done by using unpaired T test on the basis of outcome measure values in this comparison result shown no significant difference between two groups ($p > 0.05$).

DISCUSSION

The current study was conducted for a comparison between Dynamic Surya Namaskar and High Intensity Interval Training to determine their effectiveness on cardiorespiratory endurance among physiotherapy students: an experimental study.

The Dynamic Surya Namaskar training is proven to reduce pulse rate when it is performed regularly. Systematic practice of Dynamic Surya Namaskar on regular basis imputed to decrease sympathetic activity and increase vagal tone.[14,15] Surya Namaskar practice interacts with the organs of the body directly, by applying pressure, massaging, stretching and overall toning up the muscles. This aids the eliminative functions as well as stimulating nervous energy. It also enhances our wellbeing. In Surya Namaskar a deep rhythmic breathing process is synchronized with each movement, which empties the lungs more vigorously and refills them with fresh, clean, oxygenated air. All the alveoli of the lungs are expanded, stimulated and then cleaned. The oxygen content of the blood is increased, which improves the overall vitality and oxygenation of whole body especially heart and brain. The cardiac muscles are also strengthened. Microcirculation to the heart is increased which reduces the chances of heart attack, blood vessel disorders and general fatigue can also be eliminated. Hence sluggishness and lethargy are greatly reduced. Pratima M. Bhutkar et al (2008) concluded that regular Surya Namaskar practice improves cardiopulmonary efficiency in healthy adolescents and is beneficial exercise for both males and females. Such yogic practices can be advised to those interested in improving cardiovascular efficiency but cannot undergo strenuous physical exercise.

On the other hand, High Intensity Interval Training boosts the cardiovascular fitness faster by working harder instead of longer. It is proven that systematic practice of High Intensity Interval Training improves hearts structure such as chamber enlargement thus it increases the volume of blood the heart can pump to the rest of the body in each heartbeat. It also help to lower blood pressure and blood sugar, while improving oxygen and blood flow. Christopher Hurst et al (2019) concluded that the efficacy of HIIT as a time efficient tool for cardiorespiratory fitness improvement with emerging data indicating potential beneficial effects on the neuromuscular system. So therefore, HIIT not only have advantageous effect on cardiorespiratory system but neuromuscular system also. The result of the study shows that which training is better and less time consuming between Dynamic Surya Namaskar and High Intensity Interval Training here in the result the difference between two training outcome is not significant to state one training is better than the other one. In the High Intensity Interval Training the average increase in the endurance is slightly greater than of average endurance increase in Dynamic Surya Namaskar Training however considering the limitation of high intensity interval training such as high risk of injury and it also need a break of a day between two session[16] whereas Dynamic Surya Namaskar has no such limitation and it has additional benefit that it improves flexibility of the body so that body became less prone to any kind of injury. During our research we observe that students performing HIIT were feeling more exhausted and tired then the students performing Dynamic Surya namaskar. Dynamic Surya Namaskar training is a viable alternative for improving cardiorespiratory endurance. Because exercise should not be like a burden to the student therefor, we suggest dynamic Surya namaskar to be added in physiotherapy curriculum in order to improve the much-needed cardiorespiratory endurance of students.

CONCLUSION

Present study was done at M.B Gohil institute of medical science and research centre among the physiotherapy students to determine which training is better to improve the cardiorespiratory endurance either dynamic Surya namaskar or high intensity interval training. Both the trainings are very good to improve cardiorespiratory endurance here high intensity interval training has slightly better improvement result then dynamic Surya namaskar training, but it is not significant enough to state that HIIT is far better than dynamic Surya namaskar training. Considering the limitation of HIIT dynamic Surya namaskar training is an incredibly good alternative with similar results on cardiorespiratory endurance according to our research.

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Review Article

Physiotherapy and Occupational Therapy Journal
Volume 15 Number 4, October - December 2022
DOI: http://dx.doi.org/10.21088/potj.0974.5777.15422.5

To Compare the Effects of MFR and Stretching Exercise on Pain and Flexibility in Plantar Fasciitis

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How to cite this article:
Mohammed Aslam/To Compare the Effects of MFR and Stretching Exercise on Pain and Flexibility in Plantar Fasciitis/ Physiotherapy and Occupational Therapy Journal. 2022;15(4): 181-186.

ABSTRACT

30 Patients included in the study as per inclusive and exclusive criteria, subjects were included after ethical committee approval. Informed consent obtained to conduct the study. 30 Subjects were assigned according to inclusion and exclusion criteria. Subjects were divided into 2 groups by simple randomization using lottery method. Each subjects received static stretching, myofascial release therapy of the plantar fasciitis. Each subjects were examined before and after intervention on Foot Function Index and Visual Analogue Scale., Group A had 15 Subjects were received for MFR therapy and exercises for plantar fascia. Group B, had 15 Subject were received static stretching and exercises of the plantar fascia, Results were calculated using 0.05 level of significance. Differences in scores of all outcome measures, obtained by subtracting pre treatment scores from post treatment scores, were analyzed with repeated measures of analysis of variance using SPSS followed by Tukey Post hoc tests. The results were showed that both group A, and group B were effective in the treatment of plantar fasciitis but after comparison group A shown better results than group B.

Keywords: MFR; Foot function index; VAS.

INTRODUCTION

Plantar fasciitis is classified as a syndrome that results from repeated trauma to the plantar fascia at its origin on the calcaneus.[9] It is a common foot disorder affecting more than 2 million individuals in the United States annually.[11] It occurs over a wide age range and is seen in both sedentary and athletic individuals. Although its precise cause remains unclear, the most common theory is repetitive partial tearing and chronic inflammation of the plantar fascia at its insertion on the medial tubercle of the calcaneus.[1] The plantar fascia is a thick fibrous sheet of connective tissue that originates from the medial tubercle of the calcaneous and attaches distally to the metatarsophalangeal joints, forming the medial longitudinal arch.[8] It stabilizes the medial longitudinal arch dynamically, it restores the arch and aids in reconfiguring the foot for efficient toe off and it provide static support of longitudinal arch and dynamic shock absorption.[9,5,3] Degeneration of the plantar fascia at its calcaneal origin is termed plantar fasciitis.[11] Researchers have also reported that faulty biomechanics and plantar fasciitis in subjects with a higher arched foot. A higher arched

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Recieved on 09.10.2022

Accepted on 06.12.2022

foot lacks the mobility needed to assist in absorbing ground reaction forces. Consequently, its inability to dissipate the forces from heel strike to midstance increases the load applied to the plantar fascia, much like a stretch on a bowstring.[8] A previous literature reveals that a person displaying either a lower or higher arched foot can experience plantar fasciitis. Patients with lower arches have conditions resulting from too much motion, whereas patients with higher arches have conditions resulting from too little motion. Therefore, people with different foot types experience plantar fascia pain resulting from different biomechanical stresses.[8] The plantar fascia shortening caused by changes in the collagen matrix of the plantar fascia is the pathophysiological basis of this condition, which evolves to include pain and functional changes of gait. Shortening of the plantar fascia leads to chronic bone traction in the heel and formation of heel spurs.[6] Earlier studies have grouped all forms of non-surgical therapy together. It is, therefore, difficult to determine if one type of treatment is more effective compared with another.[9] Treatment for plantar fasciitis can be divided into numerous categories as Conservative care (chiropractic therapy, electric modalities, patient education, soft tissue therapy massage, acupuncture, taping, night splints, stretching, ice, heat, `strengthening, and orthotics) Extra-corporeal shock wave therapy, Injections and medication.[10]

The preferred treatment for plantar fasciitis is physiotherapy, with the aim of suppressing pain and restoring the mechanical function of the plantar fascia for gait improvement. The use of ultrasound to promote analgesia associated with stretching of the plantar fascia and the posterior leg muscles is one of the most commonly indicated therapeutic alternative and also using focal and radial shockwaves has shown good results with regard to pain reduction and improved function using only a small number of applications.[6] Myofascial release (MFR) is a system of therapy that combines principles and practice from soft tissue technique, MET and inherent force cranio-sacral technique. It includes a highly subjective transfer of energy from the therapist to the patient.[13] MFR is defined by Upledger et al that it is a softening or letting go when resistance melts and the tissue is felts and elongation. MFR techniques can involve deep superficial or deep pressure at the point of restriction or low load prolonged gentle distraction of restricted tissues.[14] Stretching is a general term used to describe any therapeutic maneuver designed to increase the extensibility of soft tissues, thereby improving flexibility by elongating (lengthening) structures that have adaptively shortened and have become hypo mobile over time. Stretching exercises are also thought to be an important element of fitness and conditioning programs designed to promote wellness and reduce the risk of injury and reinjury. When soft tissue is stretched, elastic, viscoelastic, or plastic changes occur. Elasticity is the ability of soft tissue to return to its pre-stretch resting length directly after a short duration stretch force has been removed. Viscoelasticity is a time dependent property of soft tissue that initially resists deformation, such as a change in length, of the tissue when a stretch force is first applied.[2] DiGiovanni et al. assessed the role of Achilles tendon stretching versus plantar fascia stretching in a randomized study of 101 patients. Both Achilles stretching groups and plantar fascia stretching groups appreciated a decrease in pain.[1,7] The Foot Function Index (FFI) Questionnaire was used to assess pain and disability associated with each subject's plantar fasciitis. The FFI is a functional outcome measure that consists of three subsections: pain, disability and activity.[10] The efficacy of soft tissue mobilization (myofascial release and stretching) on plantar fasciitis is well documented in the literature. However, there is lack of literature stating which amongst the two is more beneficial; thus this study has been proposed.

METHODOLOGY

Sample

Total 30 participants residing in around Dehradun were previously diagnosed by orthopedic Physician were included.

Study Design: Experimental study

Inclusion Criteria

- Male and female between age groups 20 - 50 years.
- Subjects having pain more than 3 months over the heel.
- Pain with first steps upon walking (greater than or equal to 3 on a 0-to-10 VAS scale).
- Pain that is worse in the morning during the initial steps, but which decreases after walking continue.

Exclusion Criteria

- Persons who were undergoing corticosteroids injection.
- Receiving plantar non steroidal anti-

inflammatory medications within the previous 3 week.

- Any known radiating pain (lower limb).
- Any other lower extremity injury during the previous 6 months.
- Currently engaging in any Physical therapy within previous 1 week.
- Calcaneal fracture.

Instrumentation & Outcome measures

- Foot function index
- Visual analogue scale

Protocol

After assigning into 2 groups

Group A - MFR

Subjects were received for MFR therapy and exercises for plantar fascia. 10 second MFR technique applied by knuckle on sole. The intervention was followed for 2 times/week for 4 weeks.

Group B - Static Stretching techniques

Subject receives static stretching and exercises of the plantar fascia, hold for 30 seconds with 5 repetition. This intervention was followed 3 sets for 30 seconds per session and 1 session per week i.e., 4 sessions 4 weeks.

Procedure

30 Subjects were assigned according to inclusion and exclusion criteria. Subjects were divided into 2 groups by simple randomization using lottery method.

Each subjects received static stretching, myofascial release therapy of the plantar fasciitis. Each subjects were examined before and after intervention on Foot Function Index and Visual Analogue Scale.

MYOFASCIAL RELEASE TECHNIQUE

Position of subject was prone lying with feet off the end of the table to allow for easy dorsiflexion. Therapist position was sitting on a stool at the end of the table. Technique is using the knuckles, soft fist or elbow to engage the soft tissue just anterior of the calcaneus. Take up a line of tension in an anterior direction. Work progressively through to the ball of the foot as well as into deeper layers in subsequent passes.

Instruct the subject to lift their toes, with direction – Lengthen the bottom of your foot by taking your toes up under the table towards your knee cap'. Dorsiflexion can also be used in conjunction with

Fig. 1: Myofascial Release

this.

Plantar Fascia Stretching Program

Position of the subject was sitting with affected leg cross over the contralateral leg. Technique is while using the hand on the affected side, they were to place the fingers across the base of the toes on the bottom of the foot and pull the toes back toward the shin until they felt a stretch in the arch of the foot. They were to confirm that the stretching was correct by palpating the tension in the plantar fascia

Fig. 2: Stretching for plantar fascia

Flow chart

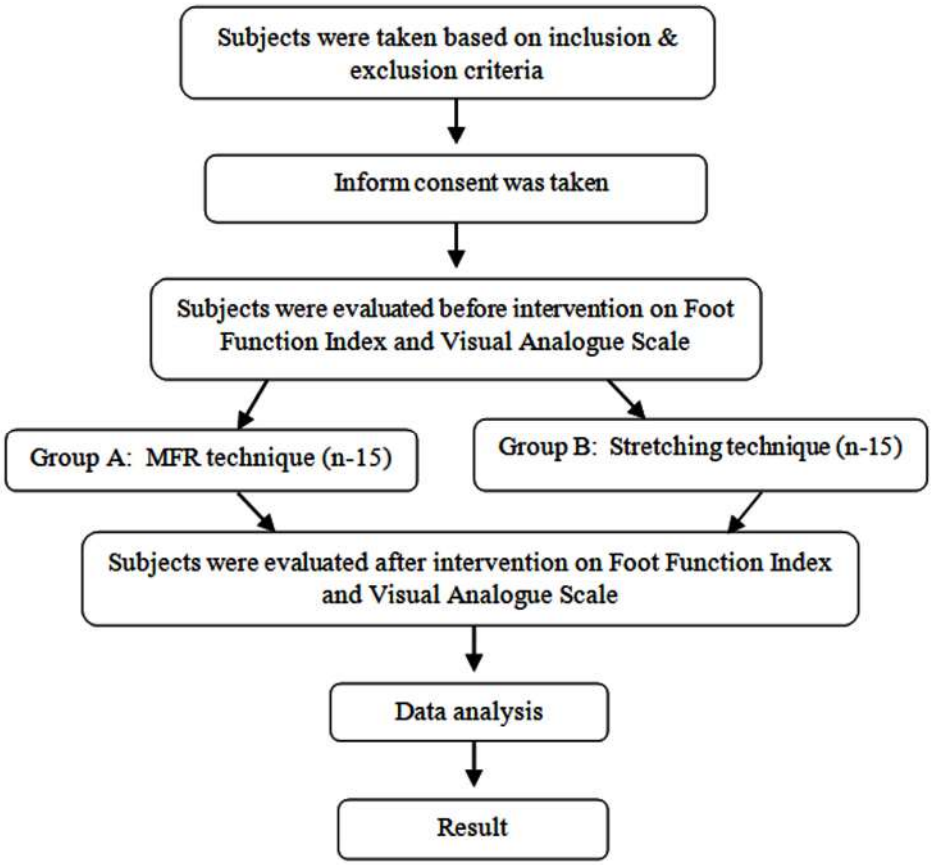

Table 1: Shows Comparison of mean values of Age between Group A and Group B

Demographic	Group A		Group B	
	Mean	SD	Mean	SD
Age (Yrs)	24.00	3.11	26.06	5.7

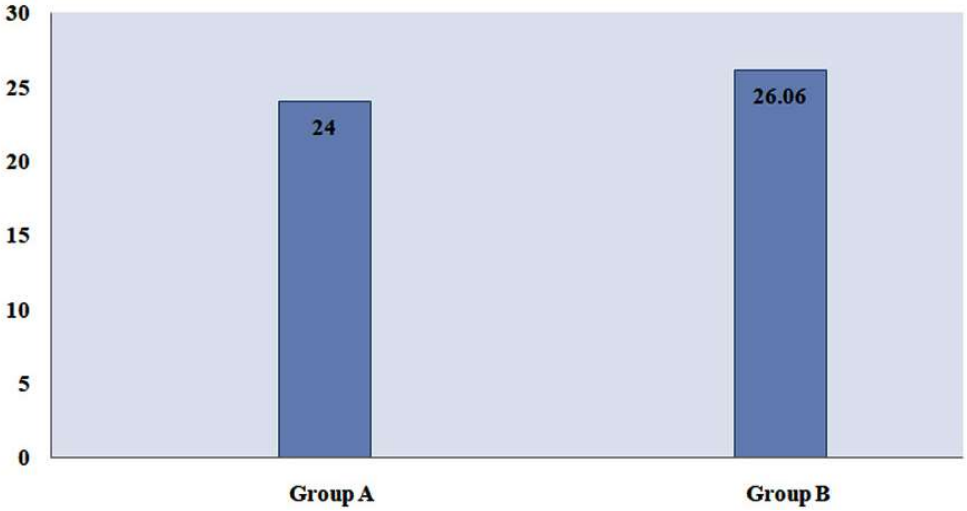

Fig. 1: Comparison of mean values of Age between Group A and Group B

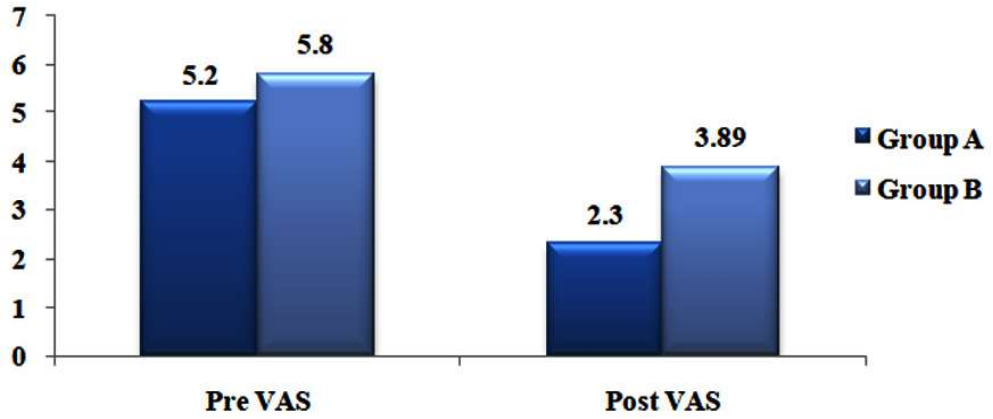

Fig. 2: Comparison of mean values of pre VAS and post VAS between Group A and Group B

with the contralateral hand while performing the stretching.[6]

DISCUSSION

The results were showed that both group A, and group B were effective in the treatment of plantar fasciitis but after comparison group A shown better results than group B. In favor with present study Kuhar et. al showed a significant result that the myofascial release is an effective therapeutic option in the treatment of plantar fasciitis 36 also Shea explained a piezoelectric effect produced when pressure is applied to the molecular crystalline lattices that he maintains are in myofascial tissue. Ground substance in extracellular space becomes gelled when injured fascia shortens and dehydrates. But with pressure or stretch, the piezoelectric effect can increase the electrical potential of this tissue to rehydrate the ground substance (Shea). This ground substance, or proteoglycan, provides lubrication for connective tissue and maintains distance between fibers. The idea that applying pressure or stretch to injured tissue can create an environment for connective tissue to move without restriction is implied. Myofascial techniques have been shown to stimulate fibroblast proliferation, leading to collagen synthesis that may promote healing of plantar fasciitis by replacing degenerative tissue with a stronger and more functional tissue.[5] Myofascial release techniques are claimed to cause vasomotor response, increase blood flow to affected areas, increase lymphatic drainage of toxic metabolites, realign fascia1 planes, influence the proprioception of affected soft tissue, alleviate musculoskeletal pain and dysfunction and restore functional ROM in areas of painful restriction. Considering that myofascial release is thought to hydrate dehydrated ground substance of injured tissue and restore functional ROM to areas of painful restriction, perhaps optimal ROM effects can only be expected on subjects with pathologic tissue.[14]

Stretching, regardless of how it is performed, causes a lengthening of the muscles or an increased range of motion in joints involved, even if methods utilizing contractions-relaxation or reciprocal inhibition appear to yield better results,[3] and theStretching exercises aim to relax the neuromuscular system in general. An increase in muscle tone will often lead to pain caused by the irritation of nerve endings or the increase in pressure in and between muscles, which causes slowing of the metabolism.[15] The major goals of the plantar fascia-stretching protocol were to recreate the windlass mechanism and to limit repetitive microtrauma and associated chronic inflammation by performing the exercises prior to the first steps in the morning or after any prolonged sitting or inactivity. This protocol provides a nonoperative treatment option that resulted in a rate of improvement of symptoms that surpassed the responses to more traditional treatment methods for patients with chronic, disabling proximal plantar fasciitis.[4]

MFR is given in a quiet environment and with a slow stretch by the physiotherapist, so it will not elicit stretch reflex, thus while MFR treatment patients is felt more comfortable. Stretching was given passively and then patient was asked to perform as Home based Program as self stretching hence it hinders the study results.

Limitation of Study

Small sample size

No Follow Up

Future Research

Large sample size can be included

Other techniques can be used

Follow up study should be carried out

CONCLUSION

Both myofascial release and stretching exercises are effective in treating patients with plantar fasciitis, however MFR is better than stretching in 4 weeks intervention.

Clinical Relevance

MFR should be recommended in plantar fasciitis subjects for pain relief and functional improvement.

Source of Funding: self

ETHICAL CLERENCE

It is abonified work done by me and I have not taken any part of thesis from anywhere.

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Physiotherapy and Occupational Therapy Journal
Volume 15 Number 4, October - December 2022
DOI: http://dx.doi.org/10.21088/potj.0974.5777.15422.6

Effect of Prenatal Physiotherapy on Rheumatoid Arthritis

Nupur Shah

How to cite this article:
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ABSTRACT

Background and Purpose: Rheumatoid arthritis is a chronic progressive inflammatory joint disease that leads to irreversible damage to the joint. It often affects women of childbearing age. Based on the evidence, the disease activity is undercontrol during pregnancy in many cases. The purpose of this case study was to document the effect of physical therapy interventions (prenatal physiotherapy) on the disease severity in a pregnant lady with rheumatoid arthritis. RADAI 5 scale was used.

Case description: The patient was a 32-year-old pregnant female who was enrolled for virtual prenatal physiotherapy sessions. The intervention of the client included upper and lower limb strengthening, breast lifting or chest toning exercises, pelvic floor muscle training, low impact cardio exercises, postural and flexibility exercises. The patient received physiotherapy thrice a week from her 23rd week of pregnancy to the 35th week.The patient's RADAI 5 score improved from 28 to 15 by the end of the 35th week. There was a reduction in joint stiffness and pain after a few weeks of the sessions.

Conclusion: This case report demonstrated the purpose of how prenatal physiotherapy sessions could be beneficial to help a pregnant lady with rheumatoid arthritis improve her quality of life. Further research should focus on the assessment of fatigue and functional activities in addition to the disease severity for pregnant patients with rheumatoid arthritis.

Keywords: Prenatalphysiotherapy; Rheumatoidarthritis; pregnancy; physical activities.

INTRODUCTION

Rheumatoid arthritis is a systemic autoimmune disease characterized by the involvement of multiple joints. There occurs a chronic inflammatory process that leads to progressive destruction of the osteoarticular system and changes in the organs. RA often affects women more than men. It occurs in approximately 5 in 1000 people and it can lead to severe joint damage and disability. Early diagnosis is very much essential to avoid severe disability.

Pregnancy in patients with RA can be a challenge for some patients. As per the literature, RA is known to improve during pregnancy and it flares up after delivery. Studies have also reported that patients who have seronegative RA are more likely to improve during pregnancy than seropositive patients. Some studies state that pregnancy is the only natural situation where spontaneous

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Recieved on 08.06.2022

Accepted on 05.08.2022

improvement is seen in RA.

Prenatal physiotherapy is proved to be effective. It has several benefits such as it helps in maintaining cardiovascular fitness, combating fatigue, promoting healthy weight gain, enhancing flexibility prevents common conditions of pregnancy such as low back pain and gestational diabetes. Various exercises are performed trimester-wise under the supervision of the physiotherapist.

METHODOLOGY

A client aged 32 years with juvenile rheumatoid arthritis (JRA)(diagnosed at the age of 19) was pregnant for 23 weeks. She had pain in multiple joints of the body and during the time of flare-up, she even got bedridden for a couple of days. She was taking intermittent physiotherapy treatment for all these years. Other modes for managing her symptoms such as Ayurveda and homeopathy were also tried but there was no benefit so she started allopathy management. She is on medical treatment for RA for 12 years. Her doctor prescribed steroids whenever required to manage the disease. She met with a car accident in 2013 during which her cartilage was affected. She reported the symptom of swelling and pain on the right knee joint after it and her mobility was not affected. Slowly the cartilage damage got worsened over the period and she became immobile due to which the decision to undergo total knee replacement was taken in 2019. She believes that her symptoms of RAwere triggered after the accident.

All her ultrasound and blood reports were normal. This was her first pregnancy and all her rheumatology drugs (Methotrexate, Saaz DS) were stopped by her doctor except hydroxychloroquine when she conceived. At present, she was taking this medicine on alternate days for managing the symptoms of rheumatoid arthritis.

Her detailed prenatal assessment was taken during the enrolment on the 23rd weekof pregnancy in the prenatal physiotherapy virtual session. Her last menstrual period was onthe expected due date. She had the flare-up of the disease only once during her pregnancy before she enrolled for the class during which she developed boutonniere deformity in her middle and ring finger of both hands. Splint / stretches/intrinsic muscle exercises/hydrocollator packs were prescribed by her local physiotherapist and thus the deformities did not worsen and the client was functionally independent.

Before commencing the sessions RADAI 5 (rheumatoid arthritis disease activity index) questionnaire was applied. RADAI 5 comprised of 5 items in a Likert format from 0 to 10. It is proved to be a sensitive and reliable tool for routine examination of rheumatoid arthritis. It is self administered and assesses the global activity of the disease in the last six months. It monitors the disease activity in terms of joint swelling, tenderness, morning stiffness, and overall health.

The patient was informed about the study and written consent was obtained.

Prenatal physiotherapy sessions commenced in July 2021. Three sessions were taken every week for about an hour. The sessions lasted till she completed 35 weeks of gestation in mid-October. At the end of her 35th week, RADAI was applied.

INTERVENTION

Prenatal virtual physiotherapy sessions were started from the 23rd week of pregnancy and lasted till the 35th week. Each session consisted of breast lifting exercise, upper and lower limb strengthening using dumbells or therabands, specific back strengthening, chest toning workout flexibility exercises, low impact cardio workout, and quadriceps muscle strengthening. Few positions such as kneeling and quadruped were avoided as the patient had a history of TKR and her knee ROM on the right leg was restricted. The virtual sessions were conducted three days a week for one hourfor 12 weeks and each session was concluded with different breathing exercises like pursed-lip, glossopharyngeal and diaphragmatic breathing. The client was attending prenatal physiotherapy quite regularly throughout her pregnancy. The physiotherapy sessions were not continued after the 35th week as the client was diagnosed with mild mitral valve prolapse and the movements of the baby were also increased significantly which inturn reduced the heart rate of the baby so the doctor advised terminating the prenatal physiotherapy sessions.

RADAI 5 was taken pre and post-session and analyzed further.

RESULT

Prenatal virtual physiotherapy sessions of active exercises and stretches were given to the client who had a history of rheumatoid arthritis for 12 years. RADAI 5 tool was used to know the disease activity before commencing and after completing

prenatal physiotherapy sessions at the 35th week of pregnancy. It is proved to be a useful scale for activity assessment.

Table 1: Treatment protocol:

Week	Treatment	Sets
1-3	**Sitting position:**	
	Warm-up (5min)	5 reps of each
	Active neck exercises	5 reps of each
	Shoulder shrugs and rotation	10 reps of each
	Chest open exercise	10 reps of each
	Side stretch	10 reps of each
	Butterfly stretch (with hold)	10reps of each
	Supine lying:	
	Pelvic bridging (with hold)	10 reps of each
	Quadriceps setting	8-10 reps of each
	Active hip abduction	10 reps of each
	Side-lying:	
	90 degrees leg stretch (withhold b/l))	10 reps of each
4-6	**Sitting position:**	
	Warm-up (5 min)	
	Isometric neck exercises	5-6 reps of each
	Breast lifting exercises	10 reps of each
	Active shoulder exercises	10 reps of each
	Supine lying:	
	Pelvic bridging (with 5-second hold)	10 reps of each
	Isometric hold of hip adductors (pillow press)	10 reps of each
	Elbow against the floor (hold)	10 reps of each
	Side lying:	
	Multiple angle isometrics for hip abductors	10 reps each
	Active leg raise till 60 degrees without hold	10 reps each

Outcome measures:

- RADAI 5 questionnaire

DISCUSSION

This case report describes the client of pregnancy with rheumatoid arthritis who responded favorably to a prenatal exercise program. Antenatal exercises are proved to be effective in the prevention of gestational diabetes, assist to avoid excessive weight gain/preterm labor, enhance cardiovascular strength and overall fitness during pregnancy. In this study, the disease severity scale RADAI 5 is applied on the pregnant lady before commencing the prenatal physiotherapy sessions and after the 35th week of pregnancy who was diagnosed with rheumatoid arthritis before 12 years. This scale has good psychometric properties and is routinely used on RA patients. It has five questions in which each question is graded into 1 to 10 and the total score is divided by 5. The final score is to be categorized into remission, mild, moderate, or severe disease.

CONCLUSION

Prenatal physiotherapy creates a positive effect on the patient with chronic rheumatoid arthritis and improves the quality of life during pregnancy. Further research is needed to check the functional status and fatigue of the patients.

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