



A COMPARATIVE STUDY OF RETRO WALKING AND ACTIVE STRETCHING ON HAMSTRING FLEXIBILITY IN STUDENTS FROM AGE GROUP 18 TO 24 YEARS

Physiotherapy

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ABSTRACT

BACKGROUND: The Hamstring muscles are found to be the most prevalent for the tightness in the body. Muscular flexibility is an important aspect of normal human function. Limited flexibility has been shown to predispose a person to several musculoskeletal overuse injuries and significantly affect a person's level of function. The purpose of this study was to compare effectiveness of retro walking along with active stretching and just active stretching on hamstring tightness among college going students age 18 to 24 years.

OBJECTIVE: Objective of the study is to determine the effect of retro walking along with active stretching and just active stretching in students from the age group of 18 to 24 years.

METHODOLOGY: Simple Random Sampling was done for 40 college students, at Dr.A.P.J. Abdul Kalam College of Physiotherapy, Loni. The subjects were taken in the age range of 18-24 years. Students were randomly allocated to either of the two groups, based on the inclusion and exclusion criteria. Pre-intervention assessment i.e. Sit and Reach Test was done before and after the intervention and then intervention was given for 10 minutes, over a span of 3 days per week for 4 weeks and then post-intervention assessment was done and their scores were noted. And then the scores in both the group were analyzed and compared using student's 't' test.

RESULTS: The post intervention Sit and Reach Test mean scores for Group A i.e. Retro walking along with Active stretching i.e. were 13.15 ± 1.694 and Group B i.e. Active stretching were 10.6 ± 1.586 respectively. There was statistically difference found between the groups, which showed both were beneficial ($p < 0.001$ extremely significant), the 't' value was removed using paired "t" test. The value of t in Group A is ($t=7.51$) and Group B is ($t=2.93$).

DISCUSSION AND CONCLUSION: The study concluded that Retro-walking with active stretching is more effective in comparison to active stretching in increasing hamstring flexibility in college students from age group 18-24 years.

KEYWORDS

Hamstring Flexibility, Retro Walking, Active Stretching.

INTRODUCTION

Hamstring muscles located on posterior compartment of thigh comprises of three large muscles namely semitendinosus, semimembranosus and biceps femoris. The muscles cause hip extension and knee flexion indicating that it is one of the two joint muscle of the body. When it comes to the injury rate within hamstring muscle, it is the long head of biceps femoris that is frequently injured and accounts for approximately 80 % of all hamstring injuries.¹⁻³

Normal hamstring flexibility is affected by numerous factors which includes age, gender, race, tissue temperature, strength training, stiffness, awkward posture and reduced warm up period during exercise.⁴ Muscle tightness is caused by a decrease in the ability of the muscle to deform, resulting in a decrease in the range of motion at the joint on which it acts.¹ Inability to achieve greater than 160° of knee extension with hip at 90° of flexion is considered as hamstring tightness.⁵

Various Physiotherapy treatment techniques like manual therapy and electrical agents are available to treat hamstring tightness. The techniques namely include various types of stretching techniques, muscle energy technique, position release technique, myofascial release techniques.

Backward walking and running (sometimes referred to as retro running, retro locomotion, reverse running) have been thought to be used already for several decennia in China and Japan not only to get a good physical work-out, but also to stay mentally fit. While running or walking backward, one has to rely more on other senses than the visual system (like the auditory and sensory system), since one does not have a complete view of the road and obstacles ahead. In the last decade interest in backward running and walking has risen in other parts of the world as well (e.g. United States, United Kingdom, Italy), as backward running races and championships are increasingly popular. Furthermore, backward walking and running are used as a preferred (rehabilitation) exercise under some conditions, in particular when the impact of heel strike needs to be avoided.^{6,7}

Backward walking and Backward running have been used as part of specific training modalities in different athletic sports for different reasons. For instance, in several sports, e.g. tennis and American foot ball, at some point in a match player will need to run backwards,

therefore, the implementation of backward walking and backward running in their individual work-out allows for task-specific training. Backward walking at different slopes have been suggested as an alternate training exercise for tennis players to complement their sport training modality.⁸

Stretching is a general term used to describe any therapeutic manoeuvre designed to extend the extensibility of soft tissues, thereby improving flexibility and range of motion by elongating (lengthening) structures that have adaptively shortened and became hypomobile over time.^{16,17} Active stretching is a type of stretching procedure a participant carries out independently after instruction and supervised practice. Active stretching enables a participant to maintain or increase the range of motion gained as the result of direct intervention by the therapist. This form of stretching is often an integral component of a home exercise program and is necessary for long-term self-management of many musculoskeletal disorders.⁹

AIM OF THE STUDY

1. To compare the effect of Retro walking along with Active stretching and just Active stretching on hamstring flexibility in students from age group from 18 to 24 years.

OBJECTIVE OF THE STUDY

1. To study the effect of Retro walking along with Active stretching on hamstring flexibility in student from the age group of 18 to 24 years.
2. To study the effect of active stretching on hamstring flexibility in students from the age group 18 to 24 years.
3. To compare the effect of Retro walking along with Active stretching and Active stretching on hamstring flexibility in student from the age group of 18 to 24 years.

METHODOLOGY AND RESEARCH DESIGN

Ethical clearance was obtained from the Institutional Ethical Committee Ref no.PIMS/DR.APJKCOPT/IEC/2019/460. The study was a comparative Study which involved Simple Random Sampling. The samples were the students of Dr. A.P.J. Abdul Kalam College of Physiotherapy, Pravara Institute of Medical Sciences, Loni. A sample size of 40 within the age group of 18 years to 24 years with below average score on sit-and-reach test (below 15 inches) were included. All the participant were assessed for hamstring flexibility by Sit and

Reach Test, as a pre-intervention assessment and their scores were taken. The participants were randomly allocated to one of the two techniques (Retro walking along with Active stretching and Active stretching) were given for 3 times per week for 4 weeks. After a 4 week of this intervention the participants were re-assessed using the Sit and Reach Test and their scores were noted and compared to those taken pre-intervention and then conclusion was carried out accordingly.

OUTCOME MEASURES

• Sit and reach test

It is used to assess hamstring flexibility.

This test was administered following Young Men's Christian Association (YMCA) recommended procedures.

For the YMCA Sit-and-Reach Test, a yardstick is placed on the floor and tape is placed across it at a right angle to the 15 inches mark. The client/patient sits with the yardstick between the legs, with legs extended at right angles to the taped line on the floor. Heels of the feet should touch the edge of the taped line and be about 10 to 12 inches' apart. (Note the zero point at the foot/box interface and use the appropriate norms.) The client/patient should slowly reach forward with both hands as far as possible, holding this position approximately 2 seconds. Be sure that the participant keeps the hands parallel and does not lead with one hand. Fingertips can be overlapped and should be in contact with the measuring portion or yardstick of the Sit-and-Reach the score is the most distant point (cm or inches) reached with the fingertips. The best of two trials should be recorded. To assist with the best attempt, the client/patient should exhale and drop the head between the arms when reaching. Testers should ensure that the knees of the participant stay extended; however, the participant's knees should not be pressed down. The client/patient should breathe normally during the test and should not hold her/his breath at any time¹⁰

PROCEDURE

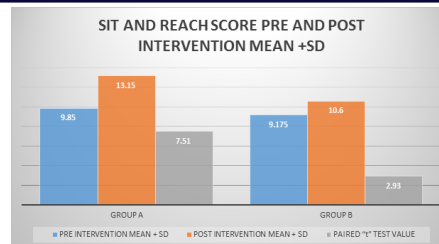
A sample of 40 physiotherapy students were recruited for the study. Subjects were randomly allocated in to two groups, Group A [Retro walking along with Active stretching] [n=20] and Group B [Active stretching] [n=20]. For Group A provided an opportunity to acclimate with backward walking on a treadmill by three supervised 10 minutes practice sessions at 0 degree of inclination. During interventional period the treadmill velocity will be self-selected. Treadmill will be on 0-degree inclinations for 10-minute period of retro walking 3 times a week. And, Active hamstring stretching was given to lower extremities of the subjects, with stretch hold duration of 30 seconds, 5 times per session with 10 sec rest in between each repetition, 4 minutes per session, total duration 14 minutes per session ,3 times per week. For Group B active hamstring stretching was given to lower extremities of the subjects, Subject sitting with leg to be stretched straight out in front of body with the knee full extended. While maintaining the neutral position of the spine and flexing at the hips, the subject reaches forward with both hands as far as possible down the leg until a mild tension is felt in the posterior thigh. Subjects should lean forward by bringing the chest forward. Flexion of the lumbar spine should be minimal. Subject must maintain position for 30 seconds to hold the stretch 5 times per session with 10 sec,4 minutes per session. At end of the exercise program each participant will be assessed for hamstring flexibility by Sit and Reach Test.^{11,12}

STATISTICAL ANALYSIS

Statistical analysis was done using the Microsoft Excel. Various statistical measures such as mean, standard deviation [S.D.] and test of significance such as Student Paired 't' test were utilized to analyze the data. The results were concluded to be statistically significant with $p = 0.001$. Paired 't' test was used to compare the difference in scores between the pre-intervention and post-intervention values in groups.

TABLE NO.1 SIT AND REACH SCORE PRE AND POST INTERVENTION MEAN + SD

Heartrate	Pre-intervention Mean + Sd	Post Intervention Mean + Sd	Paired "t" Test Value	"p" Value And Significance
Group A	9.85±2.128	13.15±1.694	7.51	$p < 0.001$ significant
Group B	9.175±1.907	10.6±1.586	2.93	$P < 0.001$ significant



DISCUSSION AND RESULT

Table no .1 shows the mean and standard deviation readings of Sit and Reach test pre and post testing, pre and post intervention for GROUP A (Retro walking along with active stretching) which are 9.85 ± 2.128 and 13.15 ± 1.694 , GROUP B 9.175 ± 1.907 and 10.6 ± 1.586 (Active stretching) which are respectively. And the student paired "t" test value pre intervention pre testing was 7.51 and post intervention post testing was 2.93 which shows it is extremely significant.

In the present study results showed that Retro-walking with Active stretching was effective in increasing hamstring flexibility ($t = 7.51$, $p < 0.001$) which is in accordance to the study conducted by Whitley and Dufek, which suggested that hamstring flexibility increased (measured with the Sit-and-Reach Test) after a four week Backward-walking intervention. The study stated that there was evidence supporting retro walking as an effective tool in preventing knee injuries. Both Group A and Group B showed significant improvement in hamstring length in post intervention. And in post intervention, a significant difference exists between two groups. Whitley et al (2009) reported retro locomotion may be a practical means to improve flexibility of the low back and hamstrings as evidenced by improved Sit and Reach scores.¹¹ One explanation for this may be improvement in hamstring flexibility by the retro-walking can be explained by reduced range of motion at the hip joint with greater flexion and lesser extension and a combination of maximum knee extension with hip flexion as stated by Shaji John in his study on efficacy of retro walking and passive static stretching on hamstring tightness and balance.¹³ Cipriani et al (1995) showed an increased activity of rectus femoris muscle as during backward walking, the normal eccentric contraction of rectus femoris is replaced by a concentric contraction. Due to this increase in concentric activity of rectus femoris, hamstring may be loaded under eccentric stretch and could be a reason in the gains of the hamstring length. These results could explain the gain in hamstring length in current study as well.¹⁴

The present study showed that the mean for Sit and Reach Test scores Group B (Active Stretching) before and after the intervention was 9.175 and 10.6. There is a significant effect on increasing the hamstring flexibility ($t = 2.93$, $p < 0.001$) which might be due to the changes in visco-elastic properties of human tendon structures, which states that stretching decreases the viscosity of tendon structures but increases the elasticity (Kubo et al 2001). The neurophysiological component is explained by the inhibition of muscles exposed to stretching. Inhibition decreases the activity of the contractile component and results in an increased extensibility of the muscles and an increase in range of motion (ROM) of the joint. The biomechanical component is described by the properties of muscles tissue undergoing stretch. Elastic behaviour refers to the property of a structure to elongate when a force is applied, and to return to its original length when force is taken away. Viscous behavior refers to property of a structure to elongate when a force is applied, but where the elongation is dependent on rate change. Hence, it appears that the elongation of a muscle is determined by the exerted force and force rate. When a structure is stretched to a fixed length either once or repeatedly in cyclic succession, the acting force at that length will decrease over time. Creep is the behavior of structures under a fixed force when the force is either held or reached successively in a cyclic manner (Halbertsma et al 1999).¹⁵

CONCLUSION

The study concluded that Retro-walking along with Active stretching and Active Stretching are both effective in increasing hamstring flexibility in college students from age group 18-24 years. However Retro-walking along with active stretching proved to be more effective in increasing hamstring flexibility in this study.

LIMITATIONS OF THE STUDY.

1. The intervention was given only for 4 weeks i.e. a short-term study.

2. The sample size was limited.
3. The sample were taken from only one area.

FUTURE SCOPE OF THE STUDY

1. To conduct the study on different population.
2. To use more than one outcome measures to make the data statistically more significant
3. To conduct the study on large sample size

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