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Effect of retro walking on hamstring flexibility in normal healthy individual

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Abstract
Aim: To find out the effects of retro walking on hamstring flexibility in normal healthy individual.
Objective: To study the effects of retro walking on hamstring flexibility in normal healthy individual by sit and reach test.
Procedure: 50 samples were taken as per inclusion and exclusion criteria, The training was for 4 weeks period and hamstring tightness pre and post implementations were assessed by sit and reach box. The data was collected and analysed using paired t test.
Result: After 4 week increase in hamstring flexibility was seen with p value $P<0.0001$.
Conclusion: The study indicates that retro walking training in young adults with below average hamstring tightness who underwent backward walking training protocol for 4 weeks, showed significant improvement in the hamstring flexibility.

Keywords: Hamstring flexibility, sit and reach box, retro walking, 4 week protocol

Introduction
Humans generally learn to walk and run in a forward direction with little difficulty. This is inherently logical since our field of view is in the forward direction. The ability to move backwards is necessary for normal daily activities and allows the body to be positioned to accommodate various tasks. Athletic trainers and coaches have used backward running (BR) drills to increase the athlete's coordination and endurance. Backward walking causes both isometric and concentric activity of the quadriceps femoris muscle, while the muscle's action during forward walking is mainly eccentric (Flynn and Soutas-Little 1993; Kramer and Reid 1981; Mackie and Dean 1984; Thorstensson 1986; Threlkeld *et al*. 1989; Vilensky *et al*. 1987). Backward walking is an activity that results in joint kinematic patterns different from those experienced during forward walking. The functionality of both backward and forward walking in rehabilitation is quite obvious. However, it has been suggested that backward walking may offer some benefits beyond those experienced through forward walking alone. Gray reported his observation that backward walking appeared to create "more muscle activity in proportion to effort" than forward walking [6].This observation is supported by research demonstrating that the energy cost of backward walking is greater than that of forward walking [7].
The mechanism of backward walking are different from forward walking stance phase during gait begins with heel strike and ends with toe off in forward walking on the contrary, in backward walking toes contact the ground first and the heel is lifted off the ground in early stance is sustained by co-activation of several limb muscles flexors and extensors at the hip knee and ankle joint in forward walking whereas the same event is accompanied by activity in knee extensors and ankle plantar flexors in backward walking. The comprehensive analyses of the kinematics and kinetics of forward walking have allowed for a better under- standing of the same parameters during backward walking [8, 9] Thus, numerous studies have examined a variety of locomotion parameters to determine the unique differences between backward walking and forward walking [1, 2, 7, 10, 12]. Kramer and Reid concluded that backward walking was different from forward walking. They reported that backward walking was associated with increased cadence and decreased stride length when compared with forward walking. These authors also observed that the joint kinematics involved in backward walking were substantially different from those of forward walking [2].

Another benefit of retro motion includes practice and training of skills used in specific sports. Many court and field sports, such as basketball, American football and soccer all incorporate backward running during competition. Performing the activity during

Training may allow one to improve performance and/or reduce potential for injury. Acute musculoskeletal injuries can lead to a myriad of secondary problems during recovery and rehabilitation [16]. Backward walking is a translatory and dynamic activity with documented cardiovascular benefits [14]. In our study, however, we sought to examine whether backward walking could elicit benefits relative to flexibility of the hamstrings in sedentary lifestyle population

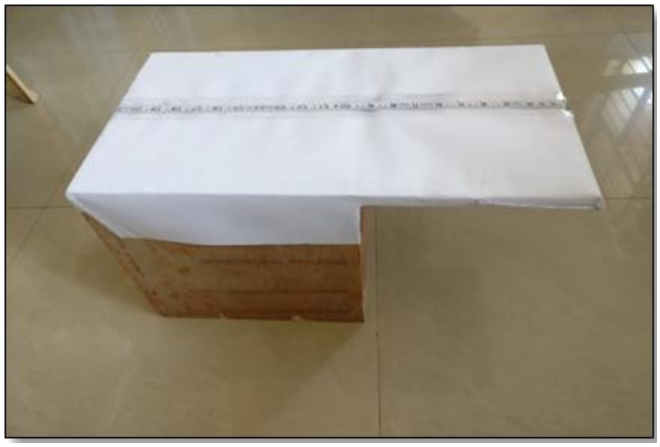
Materials and Methods

Method

- Study design: Experimental
- Study Place: physiotherapy opd in Mumbai central
- Sample size: 50
- Duration of study: 4 weeks

Materials

- Sit and reach test Box
- Pen
- paper



Results

In the study, the results supported our alternate hypothesis, it showed significant increase in Hamstring flexibility after retro walking. Graph showed the comparison of pre and post hamstring tightness.

Discussion

Backward walking exercise has been the point of interest in many studies, this exercise can minimize the burden on joints and increase muscle strength in the lower limbs. In addition, this exercise does not cause adverse effects on the body through the stimulation of the major muscle in a rhythmic and dynamic fashion. This exercise does not require any special tools or equipment, which makes it effective and safe to reduce health risks. The present study investigated the effects of backward walking on hamstring flexibility. Retro walking showed significant improvement in hamstring length in post intervention changes. Whitley *et al*. (2009) reported retro locomotion may be practical means to improve flexibility of hamstrings as evidenced by sit and reach scores [20].

On data analysis Graph that is for the hamstring flexibility when measured by sit and reach test and after comparing the values were $P<$ 0.0001 which is showed significant improvement.

During backward walking, the stance begins with toe contact and ends with heel being lifted off the ground the normal eccentric contractions of the rectus femoris is replaced by propulsive concentric contraction, during the activity at 0 degrees of inclination the knee was flexed approximately 31 degrees during initial contact. By mid-stance, the knee had extended position of approximately 14 degrees of knee flexion. During the same time period, the rectus femoris is also contracting, presumably concentrically to assist with knee extension during backward walking, at the ankle, backward walking produced greater demands on dorsiflexion range of motion. Kumar and Ashraf (2009) also observed a decrease in the angle for the ankle in after backward walking on treadmill [15]. Improvement by the retro walking in hamstring length 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 [16]. 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 [27].

Our results of the study on hamstring flexibility correlates with the previous studies related to the increase in hamstring flexibility on retro walking which have been taken into consideration through the outcome measures of sit and reach test and also by the use of goniometer as stated by whitely *et al*l in her study on a similar topic [20]. However, it is clearly apparent that as a group, there was a significant ($P < 0.001$) increase in Hamstring flexibility as measured by the Sit-and-Reach Test, with all participants showing an increase in reach distance following the backward walking intervention. It is unlikely that this was a 'learning effect' as could be argued, since participants did not regularly practice the Sit-and-Reach Test. However, extraneous kinematic motion which could influence the Hamstring flexibility measurement (i.e., shoulder protraction) was not documented, but visually controlled for during data collection. The measurements of hamstring flexibility have also been assessed pre and post protocol which also showed affirmative results as the value of P is < 0.0001 which showed significant improvement.

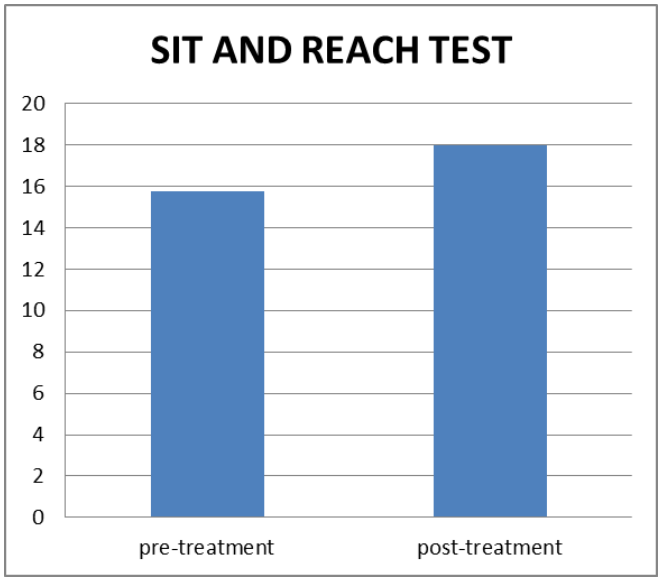
Knowledge of the specific position of the trunk relative to the pelvis could be of importance relative to the pre-stretch necessary to perform backward walking. There is an accepted relationship between LBP and flexibility of the hamstrings [28].

Statistical Analysis

Paired t test

- The Paired t test is the ratio where t is equal to the difference of the sample means of the two groups divided by the standard error of difference of the sample means. A large t indicates that there is a significant difference between the two groups. A small t (near 0) indicates that there is no significant difference between the sample groups.
- It is used when data is in normal distribution and samples are in interval-ratio data.

$$t = \frac{\sum d}{\frac{\sqrt{(n(xd^2)-(xd)^2)}}{n}-1}$$



P value is < 0.0001
t = 5.344 with 49 degrees of freedom.

Parameter	Pre treatment	Post treatment
Mean	15.740± 1.496	17.974± 3.179

Conclusion

The study indicates that retro walking training in young adults with below average hamstring tightness who underwent backward walking training protocol for 4 weeks, showed significant improvement in the hamstring flexibility

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