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Immediate effect of active release technique on hamstring tightness and performance in discus throwers: An Experimental study

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Abstract
Purpose: The study was conducted to see the immediate effect of active release technique on hamstring Tightness and performance in discus throwers .The study would reveal if this could enhance performance of discus thrower.
Objective: To see effectiveness of Active Release Technique on tight hamstrings and performance of a discus thrower.
Method: Subjects were selected on the basis of inclusion and exclusion criteria. Informed consent was taken & they were given Active Release Technique on Hamstrings.
Study Design: The study design is Experimental and conducted as pre and post experimental study.
Result: After one session of Active Release Technique the athletes' length of hamstrings increased by 3.9° on average (p value <0.05) and performance of players increased by an average of 0.4 metres.
Conclusion: The study concluded that Active Release Technique was effective for increasing the length of hamstrings and improving a discus thrower's performance.

Keywords: hamstring, immediate, thrower, Experimental

1. Introduction

Discus throw is a field event where an athlete has to throw a disc from a circle in a marked sector. The athlete has to throw the disc as far as possible from the circle. The athlete should not leave the circle before the disc has landed. While leaving the circle the athlete has to exit the circle from rear half of the circle. The discus throwers usually take one and a half spin in the circle to throw the disc. The athletes usually throw four to six throws in competition. The athlete with the furthest throw wins.

The athlete spins to gain an angular momentum which is converted to linear momentum by the athlete. More the angular momentum, more linear momentum and hence a further throw will be achieved. Angular momentum is a quantity which denotes rotation of the body. The angular momentum depends on two things:

- The speed of rotation of body.
- The distance of the body from axis of the rotation.

If the speed of body is more, the angular momentum will be more.

If the body is more spread out or away from the axis of rotation, the angular momentum will be more.

There are five main phases during discus throw:

1. Initial Double Support Phase.
2. A Single Support Phase on Left Foot.
3. Non-Support Phase.
4. Single Support Phase on Right Foot.
5. Delivery Phase.

During the single-support phase on the left leg at the back of the circle, it is helpful for the discus thrower to swing the right leg counter clockwise very fast, very far from the middle of the body, and over the longest possible range of motion. Such a thrust of the swinging right leg helps the athlete to generate (i.e., to obtain) counter clockwise angular momentum about the vertical axis [1].

The hamstring muscles should have enough length to allow the athlete to swing the right leg very far from the middle of the body and over the longest possible range of motion. If the hamstrings tight, they will tend to prevent the athlete to create a greater angular momentum.

The prevalence of hamstring tightness in athletes participating in field events was found to be 85% [2].

Techniques which are frequently used for management of hamstring muscle flexibility are different variety of stretching techniques such as active, passive and PNF stretching techniques [3, 4, 5], manual soft tissue release techniques such as positional release [6], dynamic soft tissue mobilization [7], roller massage technique [8], foam roller [9], massage technique [10] and these techniques were effective in treating hamstring tightness and improving flexibility. There is no agreement for the ideal soft tissue technique to improve flexibility [11].

Active Release Technique (ART) is a type of manual therapy used to release the soft tissues and to manipulate fascia, tendons and muscles to alter the structural changes in collagen, muscle sarcomere and trigger points. ART is

performed by application of digital pressure (by therapist) while actively shortening the muscle and then relaxing (by recipient) then removal of digital pressure. This combines voluntary contraction as well as manipulation of trigger point and scar tissue to relieve tension and to improve muscle length [12]. Mobilization of muscle tissues is suggested to reduce the passive muscle stiffness [13]. ART is assumed to restore normal function by breaking the cross-fibre adhesion which restricts the smooth movement of tissues by adhering to adjacent tissue [14].

George *et al*., (2006) conducted a pilot study on 20 asymptomatic males to observe the effects of single session of ART on hamstring muscle flexibility and found statistically significant improvement in flexibility when assessed using sit and reach test and reported the need of trial with larger sample size to establish the effectiveness of ART in clinical practice.

2. Materials and Methods.

Materials

1. Pen
2. Informed Consent
3. Assessment Form
4. Data Collection Sheet
5. Mat
6. PVC frame
7. Strap
8. Universal Goniometer
9. Measuring Tape

Methodology

Study Design: Experimental
Study Type: Pre and Post Experimental Study
Sample Size: 40
Sampling Method: Random Sampling
Study Population: Discus Throwers aged 18 – 26
Study Setting: On field & track academies in and around Pune and Mumbai
Duration of Study: minimum 6 months

2.1. Inclusion and Exclusion Criteria

2.1.1. Inclusion Criteria

- Discus throwers 20- 26 year old
- Male throwers [15].
- Active knee extension less than 160 degrees [16].

2.1.2 Exclusion Criteria

- Athlete with neurological symptoms in lower limb
- History of musculoskeletal injury in lower limb in last 3 month
- Previous surgery of lower limb [18].

2.2 Outcome Measures

2.2.1 Active Knee Extension Test

The participant will be in supine position. Both Anterior Superior Iliac Spine will be aligned with the vertical PVC bars. The lower limb not being measured will be secured by using a strap across lower third of the thigh. The lateral knee joint will be marked using a washable ink. From that point two lines will be drawn, one to the greater trochanter and other to the apex of the lateral malleolus. The participant will be told to flex the hip until it touches the horizontal PVC bar. They will be asked to actively extend the knee as much as possible and hold it for 5 seconds while maintaining the contact between the thigh and horizontal PVC bar. A standard universal goniometer will be placed over the previously marked joint axis and along the femur and fibula. The angle will be measured thrice and mean will be taken to minimize error. Interrater reliability: 0.87 for dominant knee and 0.81 for non-dominant knee. Intrarater reliability (Test Retest) 0.78 - 0.97 [17].

2.2.2. Performance of the thrower

The thrower will be asked to perform a throw and distance will be measured in metres from the edge of the throwing circle to the point of impact of the discus. To minimize the error an average of three readings will be taken.

2.3. Procedure

The study commenced with a presentation of the synopsis to the ethical committee and accordingly clearance was taken from P.E.S Modern College of Physiotherapy, Shivajinagar, Pune 5. The 40 subjects were selected according to inclusion and exclusion criteria and samples will be formed. Subjects were explained the procedure. Informed consent from the samples was taken. Preparation of the subject: Subjects were be asked to wear comfortable and non-restrictive clothing like shorts. The subjects were asked to wipe the sweat and keep the skin dry. Patients were in supine lying on mat and markings were done on the joints using washable ink.

Prior to the intervention:

- Hamstring tightness was recorded using active knee extension test.
- Performance of the thrower was recorded by measuring distance of the throw.

One session of Active Release Technique was given to the swinging leg.

Post intervention:

- Hamstring tightness was recorded using active knee extension test
- Performance of the thrower was recorded by measuring distance of the throw.

Fig 1: Active Release Technique

ART was performed by applying downward pressure with thumb to the area of the muscle.

While maintaining the pressure participant was asked to extend the knee joint while maintaining the same pressure thumbs were moved in upward direction till complete extension of the knee joint [18]. This procedure was repeated

on the origin, insertion and muscle bellies by application of digital pressure in longitudinal direction while participant will be in prone position, the therapist gave commands to the participant to shorten and lengthen the hamstring muscle by asking them to flex and extend the knee joint. The pressure was removed after holding the contact for 5-20 seconds when the muscle was in shortened position [19], and the same procedure wase repeated 5 times for each hamstring muscle i.e. Semimembranosus (SM), Semitendinosus (ST) and Bicep Femoris (BF) [18, 19].

2.4. Data and Stastical Analysis

Data analysis was done for the samples using outcome measures active knee extension test and Distance. Pre and post data analysis was done using paired t test. Confidence interval will be set at 50%. Any value <0.05 will be considered significant & any value >0.05 will be considered not significant.

Table 1

	PRE Treatment Mean ± SD	POST Treatment Mean ± SD	T Value	P Value	Significance
Ake Test	139.1±8.185	143±8.371	-24.510	0.000	Highly significant
Distance	37.17±5.806	37.58±5.453	-2.317	0.026	Significant

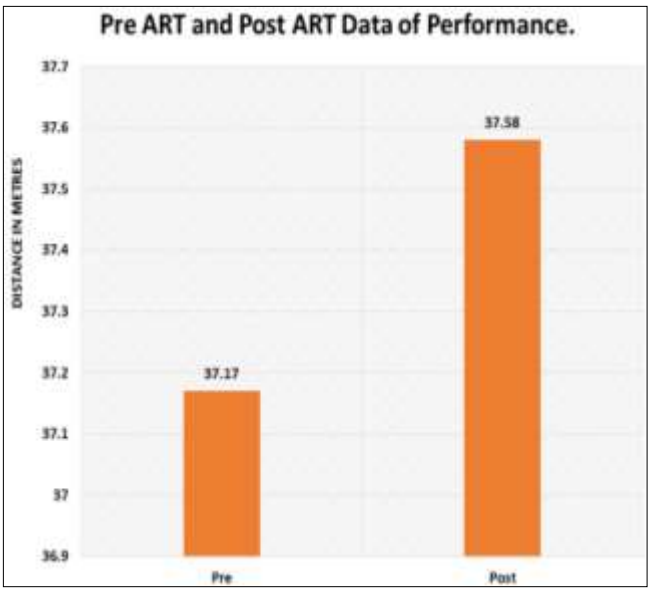

Fig 2

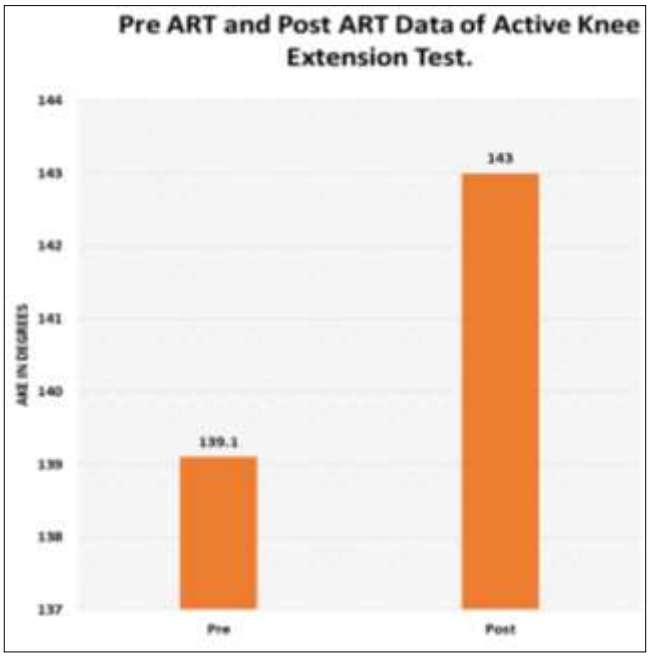

Fig 3

2.5 Ethical issues

Entire process of this research project was done by following the guidelines of Maharashtra University of Health Science. Synopsis proposal including procedure and methodology was approved by the Ethical committee of PES modern college of Physiotherapy at institution level. The safety of the participant was ensured by the researcher and strict confidentiality was maintained regarding patient information, their condition and the treatment.

2.6. Informed Consent

The researcher obtained informed consent from all the participants within the study. All the participants were explained about the study and the nature of the assessment and treatment. They were given the liberty to quit being part of the study at any time if they wish to without having to give any reason for doing so.

3. Result

After one session of Active Release Technique the athletes' length of hamstrings increased significantly. On an average the ROM of the athlete After Active Release Technique increased by 3.9° (p value < 0.05)

Pre Values for the Active Knee Extension test were 139.1±8.185 and Post Values for the Active Knee Extension test were 143±8.371

The performance of players showed an increase after one session of Active Release Technique. Performance of discus throwers increased by an average of 0.4 metres.

Pre Values for the Performance were 37.17±5.806 and Post Values for the Performance were 37.58±5.453.

4. Discussion

The main objective of this study, of 6 months duration, was to see the immediate effect of Active Release Technique on tight hamstrings in discus throwers. Total number of 40 throwers fulfilling the inclusion criteria were assessed and given one session of Active Release Technique. Before the Intervention, the subjects were asked to perform three throws and the distance of the throws was measured in metres. The throwers were also assessed with active knee extension test and an average of two recordings was taken to measure the length of the Hamstrings. The subjects then underwent one session of Active Release Technique. ART was performed by applying downward pressure with thumb to the area of the muscle. While maintaining the pressure participant was asked to extend the knee joint while maintaining the same pressure thumbs were moved in upward direction till complete extension of the knee joint [18]. This procedure was repeated on the origin, insertion and muscle bellies by application of digital pressure in longitudinal direction while participant will be in prone position, the therapist gave commands to the participant to

shorten and lengthen the hamstring muscle by asking them to flex and extend the knee joint. The pressure was removed after holding the contact for 5-20 seconds when the muscle was in shortened position [19], and the same procedure wase repeated 5 times for each hamstring muscle i.e. Semimembranosus (SM), Semitendinosus (ST) and Bicep Femoris (BF) [18], [19]. Post Intervention active knee extension test was performed immediately and the subject was asked to perform three throws. The results showed an average increase of 3.9°in the active knee extension, and an average increase of 0.4m in the performance of the subjects. Active Release Techniques (ART) is a soft tissue method that focuses on relieving tissue tension via the removal of fibrosis/adhesions which can develop in tissues as a result of overload due to repetitive use. Active Release Technique restores normal function by breaking the cross-fibre adhesion which restricts the smooth movement of tissues by adhering to adjacent tissue. George *et al*., (2006) conducted a pilot study on 20 asymptomatic males to observe the effects of single session of Active Release Technique on hamstring muscle flexibility and found statistically significant improvement in flexibility. The range increased as the adhesions were moved actively under the downward pressure from the therapist's fingers and which helped in improving the range by decreasing the restrictions. The performance of the athlete improved. The distance of throws increased as they could generate larger momentum than earlier as the length of hamstring of the dominant leg increased. That increase in player's momentum helped in increasing the total momentum of the discus. Hence the change in player's momentum helped in increasing the total momentum and helped in improving the performance of the player.

5. Limitation

1. Intervention was given to the dominating leg only.
2. Follow up was not taken for long term effect.

6. Future scope

1. The study can be done using a longer treatment period.
2. The long term effect of Active Release Technique can be studied.

7. Conclusion

The study concluded that Active Release Technique was effective for increasing the length of hamstrings and improving a discus thrower's performance.

8. References

1. Jesus Dapena, William J Anderst. Scientific Services Project (USA Track & Field) Discus Throw, 1997.
2. Ishanka Weerasekara, Iresha Kumari, Nilushika Weerarathna, Charith Withanage, Chamika Wanniarachchi, Yancy Mariyanayagam, *et al*. The Prevalence of Hamstring Tightness among the Male Athletes of University of Peradeniya in 2010" International Journal of Physical Medicine and Rehabilitation, 2010.
3. Nagarwal ZR, Zutshi AK, Ram KCS. "Improvement of Hamstring FlexibilitA Comparison between Two PNF Stretching Techniques," ISSN Int. J. Sport. Sci. Eng. 2010; 04(01):1750-9823.
4. Rani B, Mohanty PP. "A Comparison between Two Active Stretching Techniques on Hamstrings Flexibility in Asymptomatic Individuals," IOSR J. Dent Med. Sci. 2015; 14(4):2279-861.
5. Umegaki H. "The effect of hip rotation on shear elastic modulus of the medial and lateral hamstrings during stretching," Man. Ther. 2015; 20(1):134-137.
6. Birmingham TB, Kramer J, Lumsden J, Obright KD, Kramer JF. "Effect of a Positional Release Therapy Technique on Hamstring Flexibility," Physiother. Canada. 2004; 56(03):165.
7. Hopper D. "Dynamic soft tissue mobilisation increases hamstring flexibility in healthy male subjects," Br. J. Sports Med. 2005; 39(9):594-598.
8. Sullivan KM, Silvey DBJ, Button DC, Behm DG. "Roller-massager application to the hamstrings increases sit-and-reach range of motion within five to ten seconds without performance impairments.," Int. J. Sports Phys. Ther. 2013; 8(3):228-36.
9. Junker DH, Stöggl TL. "The Foam Roll as a Tool to Improve Hamstring Flexibility," J. Strength Cond. Res. 2015; 29(12):3480-3485.
10. Barlow A, Clarke R, Johnson N, Seabourne B, Thomas D, Gal J, "Effect of massage of the hamstring muscle group on performance of the sit and reach test," Br. J. Sports Med. 2004; 38(3):349-351.
11. Yeun YR. "Effectiveness of massage therapy on the range of motion of the shoulder: a systematic review and meta-analysis," J. Phys. Ther. Sci. 2017; 29(2):365-369.
12. Simons DG. "Understanding effective treatments of myofascial trigger points," J. Bodyw. Mov. Ther. 2002; 6(2):81-88.
13. Axelson HW, Hagbarth KE. "Human motor control consequences of thixotropic changes in muscular short-range stiffness," J. Physiol. 2001; 535(1):279-288.
14. Abelson DB, Abelson K. Active Release Technique.Release Your Pain.2nd Edition, 2nd ed. Calgary Alberta, Canada: Rowan Tree books Ltd, 2008.
15. Marshall PW, Siegler JC. "Lower hamstring extensibility in men compared to women is explained by differences in stretch tolerance," BMC Musculoskelet. Disord, 2014, 15(1).
16. Davis DS. "Concurrent validity of four clinical tests used to measure hamstring flexibility," The journal of strength & Conditioning Research. 2008; 22(2):583-588.
17. Mohamad Shariff, Hamid A, Mohamed Razif Ali, Ashril Yusof. "Interrator and Intrarater Reliability of Active Knee Extension Test among Healthy Adults, J. Phys.Ther.Sci. 2013; 25:957-961.
18. George JW, Tunstall AC, Tepe RE, Skaggs CD. "The Effects of Active Release Technique on Hamstring Flexibility: A Pilot Study," J. Manipulative Physiol. Ther. 2006; 29(3):224-227.
19. Robb, Pajaczkowski J. "Immediate effect on pain thresholds using active release technique on adductor strains: Pilot study," J. Bodyw. Mov. Ther. 2011; 15(1):57-62.