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RESEARCH ARTICLE

COMPARISON OF SELF MYOFASCIAL RELEASE TECHNIQUES USING FOAM ROLLER AND LACROSSE BALL IN INDIVIDUALS WITH HAMSTRINGS TIGHTNESS

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Abstract

Background:Hamstrings tightness gives rise to pain in heel, knee and low back. Self myofascial release(SMR) techniques have gained popularity within fitness and rehabilitation communities as a holistic means for prevention/treatment of pathologies. SMR methods includes release with foam roller, roller massage sticks and lacrosse ball.

Aim:To compare immediate effect of foam roller and lacrosse ball for self-myofascial release on hamstring flexibility.

Setting and Study Design: This Experimental study was carried out at Pune.

Materials and Method: 32 individuals, 18-30 years, both genders, with Hamstring Tightness(Active Knee Extension deficit > 25°), divided in two groups. Group A(n=16) performed foam rolling and Group B(n=16) performed self-release with lacrosse ball.

Results: Group A showed statistically significant difference ($p < 0.001$) as compared to group B.

Conclusion:Self-myofascial release with foam roller showed statistically significant difference in improving Hamstrings flexibility as compared that with Lacrosse balls.

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Introduction:-

Flexibility is the ability that helps us to move a single joint or series of joints with ease and smoothness through unrestricted, pain free range of motion (ROM) ⁽¹⁾. Joint integrity, muscle length and the extensibility of soft tissues around the joint determine its flexibility. Flexibility has many benefits in fitness and in rehabilitative programs. It is one of the important parameters of muscle function which facilitates the neuro-musculoskeletal systems and is responsible for performance of complicated movements. The effects of stretching depends on the type of stretching which is being conducted ^(2, 3).

Hamstrings, a group of muscles of posterior compartment of thigh, are responsible for flexion at the knee joint and extension at the hip joint. They play a crucial role in daily activity like walking, running, jumping and controlling movements of the trunk. The most common causes of hamstring tightness include inadequate stretching before an intense workout, maintaining the same position for extended period of time for instance prolonged sitting, standing, kneeling etc. Hamstring tightness though is asymptomatic, but it predisposes to problems like heel pain, knee pain

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and low back pain due to compensatory mechanism that controls excess lumbar lordosis. Even when it is asymptomatic, the tightness must be prevented to avoid further problems ⁽⁴⁾.

Fascia is a connective tissue that envelopes muscles, nerves, blood vessels and connects all the structures of the body. Fascial thin sheets and connective tissue fibers form a line in form of a pathway called the myofascial meridians. Hamstrings muscles forms part of the superficial back line (SBL). Fascia becomes involved due to injury, disease, inactivity, inflammation, etc. Fascial involvement leads to restrictions in it that decreases soft tissue flexibility, strength, endurance, motor coordination and leading to high amounts of physical pain ^(5,6).

Myofascial therapy covers a wide spectrum of techniques including osteopathic soft-tissue techniques, structural integration such as rolfing, connective tissue massage (CTM), instrument assisted fascial release, myofascial trigger point therapy, strain-counter strain and muscle energy techniques (MET). Myofascial release (MFR) is a very wide terminology that includes variety of maneuvers in which includes application of pressure to muscles and surrounding fascia. Self myo-fascial release (SMR), a type of myo-fascial release technique, allows regular and frequent application of intervention without the therapist's help. Self-Myofascial Release methods includes release with foam roller, roller massage sticks and lacrosse ball. A foam roller is a tool that is used to improve core stability, balance and proprioception, soft tissue mobility and body awareness. Foam rollers are available in various sizes, density and firmness. It can be used conveniently for almost all group of muscles like Quadriceps, Gluteal muscles, Iliotibial band, calves, and back, etc. Lacrosse balls are specifically used to treat fascial tightness, targeting trigger points thus breaking adhesions and facilitating the release of soft tissues. It is easy to use and such balls are available in various sizes, density, and firmness. Just like the foam roller, it can be used to treat muscle groups as well as individual muscles of the body. ⁽²⁾

Time constrains affects ones attitude towards self-care during busy working hours. Different devices are currently being employed replicate myofascial release techniques so that individuals can do their own assisted fascial releases at home or work station. Self-Myofascial Release (SMR) techniques have gained popularity within the fitness and rehabilitation communities as a holistic means for prevention and treatment of various pathologies ⁽¹⁴⁾. Hence such easily available devices like foam roller or lacrosse ball by the side of work station may give opportunity to participate in self-rehabilitation program without the need to spend extra time and take special efforts towards treatment. Many individual studies are available to prove the effect of self myofascial release using foam roller or lacrosse ball in increasing flexibility, but very few literature is available to compare as which of these two methods is more effective and efficient to increase hamstring flexibility. Hence a need arises to compare the effectiveness of foam roller and lacrosse ball in hamstrings tightness with self MFR.

Materials And Method:-

Materials:

1. Pen
2. Goniometer
3. Foam roller
4. Lacrosse balls

Method:-

Approval from College Ethical committee was taken, healthy individuals were screened and recruited for the study. 32 healthy individuals with age between 18-30 years, of both genders (18 males, 14 females) were selected. Pre-treatment active knee extension was assessed for hamstring flexibility, and subjects with mild to moderate hamstrings tightness were included. Individuals with history of fracture in past 6 months, soft tissue injuries in past 6 months, wound on the lower limb were excluded. Written consent was taken from all individuals. Then the individuals were randomly divided in two groups by chit method.

The experimental Group A received self myofascial release with foam roller for hamstrings. The participant was made to sit on ground in long sitting position with the foam roller below the thigh to be treated. Then the participant was instructed to extend the upper limbs, taking weight on them and were asked to roll back and forth over the roller for a period of 30 seconds followed by 30 seconds of rest, for a total of 4 minutes. The same was repeated for the other lower extremity (Fig No. 1).

The experimental Group B received self myofascial release with lacrosse ball for hamstrings. The participant was made to sit in high sitting with the lacrosse ball below the thigh to be treated. The participant was then instructed to extend and flex the knee for 30 seconds, followed by 30 seconds rest, for a total of 4 minutes. The same was repeated for the other lower extremity (Fig No. 2).

An equal rest period of 5 minutes was given to all subjects of both the groups during which they were asked to sit on a chair and relax. Immediately after that active knee extension was assessed and recorded. All the data recorded was analyzed for statistical significance using paired t-test for within group comparisons and unpaired t-test for between group comparisons.



Fig. No.1:-



Fig. No. 2:-

Outcome measure:

Immediately after performing self myofascial release, active knee extension test was assessed and recorded. To assess the length of hamstrings by AKET, the subject was made to lay in supine with hip flexed to 90 degrees and knee flexed with pelvis stabilized with strap. Three landmarks were marked to measure hip and knee range of motion viz., the greater trochanter, lateral condyle of femur and the lateral malleolus. The fulcrum of the universal goniometer was centered over the lateral condyle of the femur with the proximal arm secured over the femur using greater trochanter as the reference. The distal arm was aligned with the lower leg. The hip and knee of the test extremity were placed in 90 degrees of flexion. The subject was then asked to actively extend the lower extremity as far as possible until a stretch sensation was felt. Angle of knee flexion was measured with the goniometer. Three readings were taken for each leg and the average of three was taken as final reading (Fig No. 3).



Fig. No. 3:-

Statistical Analysis:

All the data recorded was analyzed for statistical significance using paired t-test for within group comparisons and unpaired t-test for between group comparisons.

Group A: Subjects receiving self myofascial release with foam roller (n=16; 9 males, 7 females)

Group B: Subjects receiving self myofascial release with lacrosse ball (n=16; 9 males, 7 females)

Table No. 1:- Pre and Post of mean AKET for Group A.

Parameters	AKET	
	Pre	Post
AKET Right	42.7±3.15	25.5±4.47
AKET Left	42.5± 3.7	25.3± 4.6

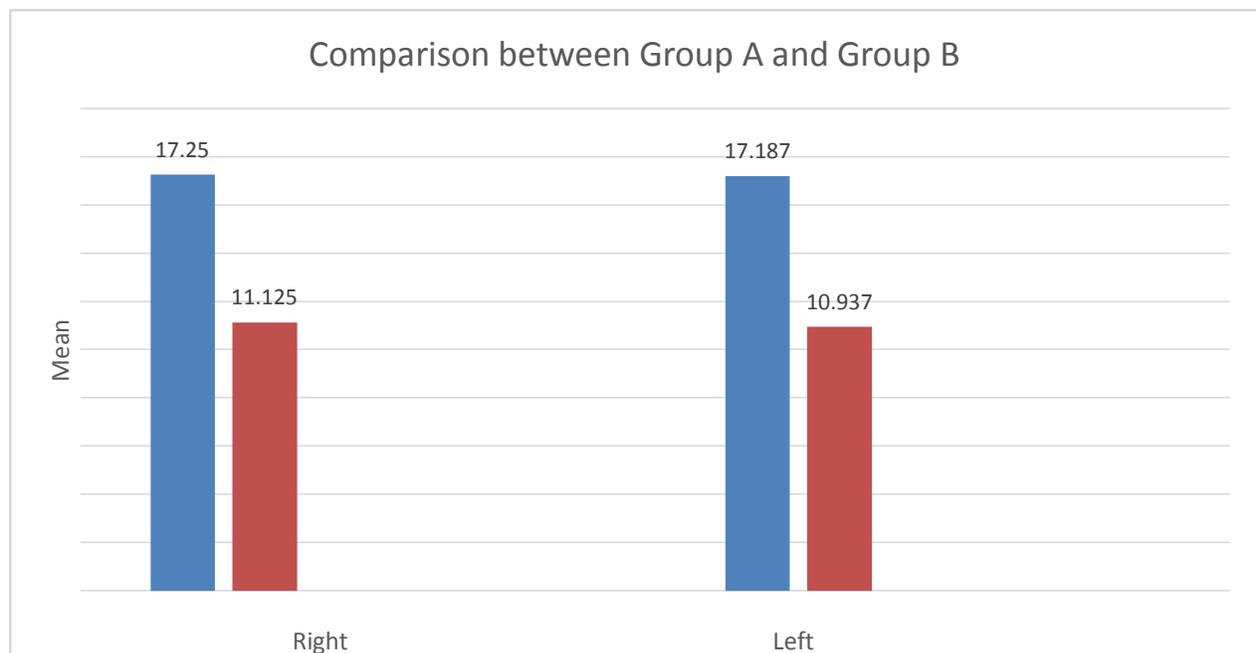
Table No. 2:- Pre and Post of mean AKET for Group B.

Parameters	AKET	
	Pre	Post
AKET Right	42.375±2.7	31.2±4.865
AKET Left	42.2±3.2	31.3±5.04

Table No. 3:- Comparison between Group A and Group B.

Parameters	AKET	
	Group A	Group B
Right	17.25±2.887	11.125±3.364
Left	17.187±3.038	10.937±2.955

Graph No. 1:- Comparison between Group A and Group B.



Results:-

Group A included 16 subjects (9 males and 7 females). Group B included 16 subjects (9 males and 7 females). The mean age of individuals in Group A was 22.12 and in Group B was 21.81 with p value 0.733, which signifies no statistical significance. The mean BMI of individuals in group A was 23.34 and for Group B was 26.03 with p value 0.09, which signifies no statistical significance.

The mean values of AKET of Group A for right side decreased from 42.7 to 25.5 and that of left side decreased from 42.5 to 25.3 with the p values of both less than 0.0001 which is highly significant (Table No. 1). The mean values of AKET of Group B for right side decreased from 42.375 to 31.2 and that of left side decreased from 42.2 to 31.3 with the p values of both less than 0.0001 which is highly significant (Table No. 2). On comparison of mean differences of AKET of Group A and B for right side and left side the p value was 0.001 which is highly significant, thus Group A showing high statistical significance over group B (Table No. 3, Graph No. 1).

Discussion:-

In this study we compared the immediate effective of self myofascial release with foam roller and lacrosse ball in hamstrings flexibility using Active Knee Extension test. Group A performed self myofascial release using foam roller for hamstrings for 4 minutes and Group B performed self myofascial release using lacrosse ball for hamstrings for 4 minutes. We observed that both the Active knee extension improved in both the groups significantly. And when compared between the groups, AKE showed high statistical significance in Group A as compared to Group B.

Hamstrings tightness along with asymmetrical muscle strength, proprioception, and joint instability, anatomical and anthropometric factors are important intrinsic factors that predispose an individual to injuries. Extrinsic factors include the environmental factors. Stretching exercises have commonly been used in rehabilitation programs to address inflexibility. But in more recent period, myofascial release techniques are commonly used to get rid of soft tissue restrictions and improve flexibility⁽²⁾.

Our study found statistically significant difference in AKET in Group A using foam roller. This result is in accordance with study done by Elizabeth Sherer (2013) who studied the effect of myofascial release on hamstrings flexibility in college students. Their study concluded that the group received foam rolling technique to improve hamstrings flexibility was better than the control group.

Self myofascial release (also known as self-massage) being a convenient, affordable technique is ideal for use for all age and body types. It shares the same benefits as massage, having positive impact on biomechanical, physiological, neurological and psychological systems. When mechanical pressure is exerted, it is known to decrease adhesions between tissues' layers, it improves compliance of muscles, reduces muscle stiffness and improve joint ROM. Prolonged application of tension to muscle belly with foam roller causes muscle to relax by reducing its ischemia, improve the skins and muscle's blood flow, parasympathetic activity and release endorphins and relaxation hormones. The neurological effect of foam rolling can be accredited to its reflex stimulation that decreases neuromuscular excitability of target muscle and reduce trigger point activities, muscle spasm, excessive muscle tension and render proper body mechanics⁽²⁾.

Williams et al (2019) who studied the effect of self-myofascial release of superficial back line on sit-and reach in college individuals also concluded that foam rolling for hamstrings, lacrosse ball release for plantar surface techniques were effective in improving sit-and-reach distance. The physiological basis of the technique can be accredited to its positive effect on the autonomic and the central nervous system. The interstitial type III and IV receptors get stimulated in the autonomic system thus reducing sympathetic tone and increasing gamma motor neuronal activity, ultimately leading to intra-fascial smooth muscle cells' relaxation. The autonomic nervous system stimulation leads to vasodilatation and improves local tissue fluid dynamics, thus improving soft tissue compliance⁽⁸⁾.

Our study found statistically significant improvement in AKET in Group B. This result is in accordance with a study done by Kshmas Shetty et al (2018). Their study concluded that using golf ball for myofascial release along with stretching has statistically significant results on active knee extension as compared to only passive stretching. The roller-massager with the help of lacrosse ball is efficient, portable tool for myofascial release and deep tissue massage. It targets superficial as well as deep tissue mobilization. Rolling with direct sweeping pressure application

on the soft tissues causes fascia to stretch and improve ROM. Friction created with rolling movement increases temperature of fascia and changes it to a more fluid like state. This temperature and density changes help breaking of the fibrous adhesions formed between different layers of fascia and hence helps in restoration of the soft tissue flexibility⁽⁹⁾.

Our study shows that there was high statistically significant difference in AKET with Foam roller (Group A) as compared to Lacrosse Ball (Group B). The roller-massage helps in increasing blood flow and circulation in the targeted areas, while helping in increase of muscle flexibility and joint ROM. The targeted area with foam roller as self myofascial release tool is more than the target area with lacrosse ball. This could possibly be the reason for obtaining statistically significant improvement in Active Knee extension with Foam roller when compared to Lacrosse ball⁽¹⁴⁾.

Conclusion:-

The study concludes that foam roller and lacrosse ball both of these self myofascial release techniques improve hamstrings flexibility in healthy individuals having hamstrings tightness as measured with active knee extension test (AKET). The study also concludes that foam roller provides better results when compared to lacrosse ball. The study indicates the benefits of including self myofascial release techniques in daily regime in individuals with hamstrings tightness and thus improving hamstrings flexibility. It also implies that foam roller and lacrosse ball may be used as a method of self myofascial release which is less time consuming and is self-administered. Limitations of our study include small sample size, only healthy individuals are included, only the immediate effect of the protocol was assessed. Further studies can be carried out with larger sample size, different population, different muscles and record usefulness of these techniques in long-term.

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Conflicts of interests:

None.

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