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COMPARISON OF IMMEDIATE EFFECT ON APPLICATION OF REMOTE SELF-MYOFASCIAL RELEASE ON POSTERIOR CHAIN FLEXIBILITY IN ASYMPTOMATIC YOUNG INDIVIDUALS

Physiotherapy

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ABSTRACT

Aim of study: The aim of the study was to compare the immediate effect on application of remote self- myofascial release on posterior chain flexibility in asymptomatic young individuals. **Material and Method:** 44 subjects were assigned into two groups, Group (A) Plantar fascia release and Group (B) Suboccipital release. Outcomes measures used were Sit and reach test (SRT), Active knee extension test (AKE) and Weight bearing lunge test. **Result:** There was a significant difference in SRT and AKE on left side between group A and B. Within the same group there was a significant improvement in outcome measures post intervention. **Conclusion:** There was an immediate increase in flexibility of the hamstrings, gastrocnemius-soleus muscles and lumbar spine ROM through remote self- myofascial release.

KEYWORDS

Self-myofascial release, plantar fascia release, suboccipital release, superficial back line

INTRODUCTION

Fascia is a band of tough connective tissue. It plays an important role in stability, support and cushioning. [4] It is a continuous structure extending from head to toe, wrapping around every part of the human body.[2] The tensegrity principle explains the continuity between fascia and muscles that are anatomically far from each other. Hence, any tension, strain and trauma produced in one part of body can transmit to remote structures through myofascial meridians.[3] The superficial back line (SBL) connects the entire posterior surface of the body. It extends from bottom of foot to top of the head in two pieces- toes to knees and knees to brow. The SBL contains the plantar fascia, short toe flexors, achilles, gastrocnemius, soleus, hamstring muscles, sacrotuberous ligament, fascia of sacrolumbar area, erector spinae and epicranial fascia.[1] The fascial system plays a primary role in movement and dynamic flexibility. It assists the body to move in an efficient manner. Poor flexibility causes reduced range of motion and leads to altered biomechanics causing joint dysfunction. Self- myofascial release assists in improving the flexibility of tight fascia and it is performed by individuals themselves.[10] The duration varies from few seconds to 1 to 2 minutes. It produces a feeling of tissue release within 2 minutes.[4] It involves applying gentle sustained pressure into the restrictive layers of connective tissue.[8, 9] It stimulates the Golgi tendon organs and reduces the motor unit firing rate. Thus, decrease the tone in the muscle.[8] Its main function is to restore optimal length, decrease pain and improve function. [2,10]

Therefore, the aim of this study was to see the effect of remote self-myofascial release on the flexibility of the posterior chain.

METHODOLOGY

44 subjects were taken from K.J. Somaiya College of Physiotherapy, Mumbai. Both males and females between the age group 18-25 years, lacking at least 25^0 of AKE when hip flexed to 90 degree, more than 1.5cm lunge distance asymmetry in weight bearing lunge test and average of sit and reach test less than 38cm were included in this study. The exclusion criteria included soft tissue, bony, spinal or lower limb injuries in the last 3 months, involvement in regular flexibility/yoga program and subjects exhibiting hypermobility (Beighton score>4) and Sensory abnormality.

PROCEDURE

Approval from Ethics Committee was obtained. Subjects were selected based on inclusion and exclusion criteria. A written format consent was taken from subjects after explaining the details of the study. Subjects willing to participate in the study were included. The participants were screened using the Beighton score to exclude hypermobility. Participants were randomly allocated by computerized randomized sheet to one of the two groups: Group A (Bilateral SMFR on plantar surface of foot) and Group B (SMFR to sub-occipital region). Participants were taught the technique of self-bilateral myofascial release.

Group A- They were provided with a tennis ball and instructed to roll the ball on sole of each foot from behind the metatarsal heads to the heel concentrating on medial arch for 2 minutes. They were asked to apply as much pressure as they could, pushing into discomfort but not pain. The release was applied for 4 minutes, two minutes each foot.

Group B- They were provided with a tool resembling the peanut lacrosse ball. This was prepared by fusing two tennis balls with a tape. Participants were asked to stand against the wall and place the tool in the suboccipital region. Each participant had to tuck the chin in and move in an upward and downward direction while maintaining the pressure. The entire suboccipital region was covered. The release was applied for 2 minutes.

All outcome measures (SRT, AKE test and WBL test) were measured at baseline and after administration of intervention.

SRT was done using a sit and reach box. Feet were placed flat against the box and subject was asked to reach forward as far as possible along the measuring line. They were asked to reach out and hold that position for one-two seconds while the distance is recorded. Three SRT measurements were recorded and average was calculated.

AKE test was carried out in the supine position. A line was drawn between the fibular head and lateral malleolus of leg. A goniometer was placed along the line. The hip was flexed to 90 degree. The subject was then asked to actively extend the knee. With goniometer the degree of knee flexion was measured and recorded.

WBL test was done against a wall. Participants were asked to place their foot on the tape and lunge forward until their knee touches the wall. Heel is required to remain in contact with floor at all times. Leg that is not being tested can rest on the floor. The maximum distance from wall to tip of big toe was recorded (in cm) using the measuring tape.

STATISTICAL ANALYSIS

Baseline parameters were analyzed using Graph Pad Instat software version 3.10. When data passed normality test, paired and unpaired t tests were used within group and between groups respectively for comparing the variables. When data did not pass normality, Wilcoxon signed rank test was used within group and Mann Whitney test was used between groups.

RESULT

Table 1. Comparison of outcome measures SRT, AKE and WBL within the same group (group A)

GROUP A							
SRT PRE		SRT POST					
MEAN	SD	MEAN	SD	p value			
23.04	9.45	25.3	9.35	0.0001	Significant		
AKE RIGHT PRE		AKE RIGHT POST		AKE LEFT PRE		AKE LEFT POST	
MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
49.09	7.96	41.36	5.38	42.04	9.343	36.818	6.463
p value	Significant			p value	significant		
0.001				0.002			
WBL RIGHT PRE		WBL RIGHT POST		WBL LEFT PRE		WBL LEFT POST	
MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
12.818	1.532	13.954	1.786	12.545	2.502	13.59	2.261
p value		significant		p value		significant	
0.0001				0.0072			

Table 2. Comparison of outcome measure SRT, AKE and WBL within the same group (Group B)

GROUP B							
SRT PRE		SRT POST					
MEAN	SD	MEAN	SD	p value			
22.35	7.725	27.08	8.294	0.0001	Significant		
AKE RIGHT PRE		AKE RIGHT POST		AKE LEFT PRE		AKE LEFT POST	
MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
48.86	11.436	39.09	9.211	45.909	10.538	35	10.235
p value		significant		p value		significant	
0.0001				0.0001			
WBL RIGHT PRE		WBL RIGHT POST		WBL LEFT PRE		WBL LEFT POST	
MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
11.045	2.572	12.181	2.481	12.227	2.448	13	2.247
p value		significant		p value		significant	
0.0001				0.015			

Table 3. Comparison of outcome measures SRT, AKE and WBL between group A and B

GROUP A		GROUP B			
SRT DIFF		SRT DIFF		P VALUE	SIGNIFICANCE
MEAN	SD	MEAN	SD	0.0001	Significant
2.254	1.68	4.731	2.105		
AKE RIGHT DIFF		AKE RIGHT DIFF		P VALUE	SIGNIFICANCE
MEAN	SD	MEAN	SD	0.3531	Not Significant
7.727	6.853	9.772	7.634		
AKE LEFT DIFF		AKE LEFT DIFF		P VALUE	SIGNIFICANCE
MEAN	SD	MEAN	SD	0.0101	Significant
5.227	6.633	10.909	7.341		
WBL RIGHT DIFF		WBL RIGHT DIFF		P VALUE	SIGNIFICANCE
MEAN	SD	MEAN	SD	0.8814	Not Significant
1.136	0.99	1.136	0.71		
WBL LEFT DIFF		WBL LEFT DIFF		P VALUE	SIGNIFICANCE
MEAN	SD	MEAN	SD	0.8776	Not Significant
1.045	1.647	0.909	1.192		

DISCUSSION

This study was conducted to compare the immediate effect on application of remote SMFR on posterior chain flexibility Myofascial restriction may occur due to altered posture, lack of full ROM, inflammation and injury. Structures originally designed to function separately gets impaired and form adhesions. It affects their ability to slide freely over one another. Myofascial restrictions cause muscle imbalance and affect postural alignment.[12] SMFR works on two mechanisms. Mechanical component includes thixotropy and piezoelectricity. The ability of fascia to fluctuate between a gel state and a fluid state is thixotropy. In the piezoelectric model, pressure applied from the outside creates an electric charge and stimulates the fibroblasts. It increases the production rate of collagen fibers in the treatment area. The neurophysiological mechanism includes the Golgi reflex arc and mechanoreceptors. In response to slow stretch, Golgi tendon receptors stimulate alpha motor neurons via the spinal cord and lowers the firing rate. It decreases the muscle tone. The mechano receptors such as interstitial muscle receptors, Ruffini and Pacini corpuscles are found in all types of connective tissue- muscle fascia, tendons, ligaments and joint capsules. Therefore, manual touch activates mechanoreceptors and stimulates the central nervous system. It then reduces the muscle tension.[9] Rob Grieve[5] in his study, advocated the use of tennis ball on plantar surface of each foot in 28 healthy volunteers. The procedure consisted of baseline and post intervention SRT measurements. SMFR was delivered for four minutes (two minutes per foot) and showed an immediate increase in lumbar spine and hamstring muscle flexibility. Similar results were found in this study. Individuals in Group A were taught SMFR using a tennis ball on plantar aspect of each foot. There was an increase in flexibility of lumbar spine, hamstring and gastrocnemius-soleus muscles indicated by SRT, AKE and WBL test respectively. Group B consisted self-myofascial release in suboccipital region. This release showed a significant improvement in all three outcome measurements. Suboccipital muscle release reduces the tension in the muscles located between the occiput and axis. Rectus capitis posterior major, rectus capitis posterior minor, obliquus capitis inferior and obliquus capitis superior muscles assist in regulating body posture and rotation of the head. The hamstrings and suboccipital muscles are connected by one neural system and passes through the dura mater. Thus, when the tone of suboccipital muscles falls, the tone in the hamstrings also decreases due to relaxation of the myofascia. [11] Similar study [5] conducted by Durga Joshi showed the effect of remote myofascial release on hamstring flexibility in 58 asymptomatic individuals. A tool resembling peanut lacrosse ball was used for suboccipital release and found that therapist administered static stretching of hamstrings and remote myofascial release were equally effective in improving the hamstring flexibility[5]. Although the differences in outcomes between two groups were not statistically significant in this study. Out of the three variables- SRT, AKE test and WBL test, there was a significant difference in SRT between group A and B. It showed greater increase in lumbar flexibility after suboccipital release. There was also a significant difference in AKE (left side) between group A and B. It showed greater increase in hamstring flexibility after suboccipital release. The differences in the efficacy of SMFR could be caused by the varying pressure applied by the individuals.

The study has limitations as follows: no quantification of the pressure applied on the tennis ball was attempted. Long term effects of SMFR were not assessed.

CONCLUSION

There was an immediate effect of SMFR on the SBL in both group A and B. It was found that there was an increase in flexibility of the hamstrings, gastrocnemius-soleus muscles and lumbar spine post intervention. There was no significant difference found between group A and B. Both plantar fascia release and suboccipital release were found equally effective in increasing the flexibility.

Clinical Implications

Treatment to the affected part is not possible in case of high irritability or severity in that area. Taking into account the continuity of myofascial meridian, this technique can be used to the proximal/ distal aspect of the same area to increase flexibility and ROM. The findings of this study show an increase in flexibility using SMFR. Thus, SMFR can be used as an adjunct or alternative to some of the established forms of conventional stretching exercises.

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