



Original Article

Effects of Remote Myofascial Release of Sub-Occipital Region In Asymptomatic Individuals with Hamstrings Tightness

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ABSTRACT

The purpose of this study was to research the effect of performing Remote myofascial release of sub occipital region in asymptomatic individuals with hamstring tightness (HST). If muscles have tightened up then muscles are working at less than 100 % of capacity and performance will be down as a result **Objectives:** To find out the effect of performing remote myofascial release of sub occipital region in asymptomatic individual with hamstring tightness **Methods:** The study was a Quasi experimental trial and was conducted in Physiotherapy center for arthritis. There were 64 participants in this research and divided into 2 groups. Group A was treated with static stretching exercises of hamstrings and group B was treated with remote Myofascial release of sub occipital region and static stretching exercises. For analysis we used Knee Extension angle and Sit to reach test at baseline and after 2 weeks of treatment in both groups. Data analysis was done by SPSS **Results:** p value of within the group comparison for knee extension angle and Sit to reach test score was significant i.e. <0.001. Mayofascial Release of sub occipital region and static stretch give us best outcome in terms of efficiency. In group A Pre-treatment knee extension angle was 14.68 and post treatment 10.87 with mean difference 3.81P <0.01. In group B, pre-treatment knee extension angle 14.78 and post-treatment knee extension angle 13.75 with mean difference 11.03 and p<0.001 which concludes that remote myofascial release of sub-occipital region improve the flexibility of HST **Conclusions:** The current study concludes that myofascial release of sub occipital region along with static stretching and static stretching alone, both are effective in improving flexibility in patients with HST. However, myofascial release of sub occipital region along with static stretching is more effective than static stretching alone.

INTRODUCTION

Muscles contract and relax to bring movement in the joints; due to repeated action of contraction, they are prone to get tight. Hamstring is one of best common example of this stiffness. Postural changes of body observed due to HST are mainly due to wrong sitting posture. People adopt wrong posture for comfort and it brings problems like low back pain among others [1-3]. As the sub-occipital muscles have the maximum number of muscle spindle fibers in it so it suggestively involve in head posture control due to its proprioceptor monitoring ability [4]. Lately the flexibility of

hamstring was considered to be affected by the muscles inhibition techniques which were pursuing the sub-occipital muscles [5]. These muscles are considered as regulator of head posture and the rotation of head. Because of the their connection through myofascial chain the inhibition of sub-occipital muscles put an impact over the hamstring muscles by decreasing their tone and increasing the range of flexion [6,7]. Tendency to move freely through one joint or multi joints without causing pain is known as flexibility. Limitation of flexibility gives rise to limitation of motion which is

indication for dysfunction of joint [8]. Low back pain and injuries of lower limb linked with limitation of flexibility [9, 10]. Reflexively activation of tissues with nociceptive and proprioception is known as Fascia [11]. Myofascial tissues have prime importance in alteration of tensional state (thoracic -o- lumbar fascia and pectoral fascia) have contractile cells for this alteration response [7, 9]. Sub occipital muscle stimulation causes improvement in hamstring flexibility and causing relaxation of group of muscles situated between upper cervical vertebrae, axis vertebra and occiput [4, 12]. Decrease of myofascial relaxation results in decrease in tone of sub-occipital muscle resulting in change in tone of hamstring muscles neural system control hamstring and sub occipital muscles [9, 13]. In sports before and after activity stretching exercises are performed to prevent injury and fatigue. Joint stretching exercises are performed to improve the range of motion [4, 11, 14]. Various techniques are being used for reduction of pain, flexibility improvement, increased stamina, reduction of factors of disability and improvement in daily activities. Among them, Myofascial Release (MFR) technique is very useful [15]. In physical training activities stretching is important technique [16]. In static stretching there is rearrangement of collagen and increment in number of sarcomeres [17]. Hold a single position for a period of time in sitting, standing and lie position is known as Static stretching (SS) [18]. Stretch time for 30 seconds has optimal results per day. According to Smith, safest method of stretching and least chances of injury is static stretching [9, 12, 17]. Another method is dynamic range of motion (DROM) having better result than Static stretching. Full range of motion during DROM, is gained through contraction by the antagonist muscle grounds the joint crossed by the agonist (lengthening muscle). Slowly all purposeful movements are performed. MFR is better than static stretching hamstring in case of HST [19, 21]. Mainly two techniques are present for the relaxation of sub-occipital muscles to achieve the hamstring relaxation. These two techniques are self MFR technique and the sub-occipital muscle inhibition technique. There are many studies which indicate the use of foam roller for self MFR for the hamstring but a rare portion of study is present in the regard of self MFR of the sub-occipital muscles [10, 22, 23]. As a clinical practitioner, the physiotherapists most commonly focus just on the region of problem, but never ever correlate the different regions with each other and techniques which may apply on one region also show their impact on the other region. In this research the purpose is to identify the effect of SS and remote MFR of sub occipital region in HST in asymptomatic patients.

METHODS

It was a Quasi-experimental trial conducted in outpatient

department of physical therapy Naseer hospital and PT care clinic Lahore. Sample size was 64, calculated by online EPITOOL sample size calculator by putting following values of Knee Extension Angle (KEA) Score [1]. Group A comprised of Static stretching of hamstrings and group B included participants undergoing MFR of sub occipital region and static stretching of hamstrings. Consecutive sampling technique was used to collect the data. Participant having age range of 20-60 years, both gender and with knee extension angle less than 20° were included. Participants with Psychological disease (tremors, bipolar disorder), hypermobile joints, Spinal injuries and tumors (Cancer), Contraindicated to MFR. (irritation, inflammation) and individuals with neck pain (mechanical neck pain) were excluded. Two tools were used for the data collection: knee extension angle test (KEA) and sit and reach test (SIT)

Knee Extension Angle test (KEA)

In this method after the 90-90 position of patient, goniometer was used to measure the range of motion while the knee extension was performed passively up to the point of first stop, a first point of resistance which felt by therapist. It was the first reading which was recorded. Reliability of 0.84 to 0.93 was shown by this test and it considered as gold standard test for hamstring length measurement.

Sit and reach test (SIT)

Hamstring and lower back flexibility was measured through sit and reach test which is very important as we often need it to measure the flexibility of back in condition such as lordosis of lumbar because of muscle tightness. A box is used for this test with a step and a roller. A box on the floor has been placed against which individual whom we were going to measure the flexibility was present with his leg straight on the ground and the sole of his feet placed against the wall of box. Both knee after locking were placed against the floor flatly with the assistance of tester. The subject now started to reach forward with palms downward upper limbs stretched outward ahead along the line of measurement. The hands reached forward as far as possible and now measure the reading in centimeter from hand to the box wall. There were some points where care should be taken such as hands should remain at the same level during the test no one should be forward or backward from each other. Secondly no jerky movement should be performed and there should be hold off one to two seconds for each outreach movement. Some researchers used the feet level as a zero mark and others used the zero mark 9 inches before the feet level. This test is only valid for the flexibility of lumbar and hamstring muscles so only used for these two conditions. Warm-up and the practice are two things which affect the reliability of this test, each time recording taken should be different with and

without warm-up. There are many procedures which proceeded after the warm-up such as the test for the endurance.

Treatment Approach

Common treatment for both groups

Patients performed straight leg raising (SLR) 10 repetitions for warm up. Static stretching participants were adopted supine lying with neutral head hands side by side. Straps were used for stabilization of contra lateral limb and the pelvis. The 90 90 position of the knee and the hip joint was achieved passively after that knee with slow passive motion taken to the extension up to the level of maximum resistance and stabilized there for 30 seconds to achieve the maximum static stretch. Repetition of the static stretch was done after the rest interval of 15 second. Same procedure was repeated for the contra lateral limb. Three session of treatment per week for two weeks were given. Pretreatment reading was recorded and post treatment reading after 2 weeks were recorded

Group B (Myofascial Release of Sub Occipital Region)

The exercise Program was started with warm up exercises for 10 min. Static stretching was performed three times and between the repetitions there should be a rest interval of 15 seconds. Additionally, patients of this group were given myofascial release of sub occipital region for 3 day\ week and 10min/day.

MFR to the sub-occipital region

Physiotherapist always stands at the head side of the patient examination couch. Participant was lying in supine position. Therapist placed his/her fingers on posterior side of upper cervical vertebral region. Applying the stretch from up to down side or upper to lower side with fingertips, pressure was maintained from occipital to the region of sub-occiput. Glide up to the level of sub-occipital region from the base of occiput performed this for up-to two minutes with five times repetition. Hold 30 seconds rest in all treatment plan. Post treatment reading after 2 weeks was recorded. Reading was taken on KNEE extension angle (KEA) and sit to reach test questionnaire.

Data Collection Procedure

During 1st visit following steps were considered: Complete physical examination of patients who took part in our research, Consent form signed by patients after given brief description about techniques. Pretreatment KEA and Sit to reach test were performed as baseline recording. Treatment protocol was given to patients according to their group division location. In next visit, patients were reassessed by researcher therapist. Treatment protocol included 3 sessions per week for total 2 weeks were given. At the end of 2nd week (after 6 sessions) again reading with KEA and Sit to reach test were taken.

Data Analysis Procedure

SPSS for windows software, version 21 was used to analyze the data using statistical significance $p=0.05$. Shapiro-Wilk Test was used to check the normality of data. The data was normally distributed with p value > 0.05 so parametric tests of analysis were applied. Following tests were used: Frequency tables were used to show summary of group measurements measured over time. Paired sample t test was used to show change of subjective as well as objective measurements over time. Independent sample t test was used to show the difference between the groups.

METHODS

The current study involved a total number of 64 patients who were divided into 2 groups on alternative basis. Patients enrolled in the group B were treated with remote myofascial release of sub occipital region in addition to the Static stretching while Group A treated with static stretching protocol only. Out of 64 patients, 39 were females whereas 25 were males. 6 sessions were given to each patient for 2 weeks in both groups. Pretreatment readings were recorded on Knee extension angle and sit to reach test before the beginning of the treatment and after the 2 weeks. KEA and sit to reach were the outcome measures of the study. In Group A the upper most age of the patients was 57 years where as lowermost age was 26 years with a mean of 39.50 ± 9.17 years. Uppermost height was 1.89 meters and lowermost height was 1.49 meters with a mean of 1.67 ± 0.09 meters (Table 1). Similarly, the upper most weight of patients in the group A was 89 Kg and lower most weight was 48 Kg with a mean of 63.03 ± 12.01 Kg. Upper most BMI was 34.34, lower most BMI was 15.29 with a mean value of 22.62 ± 4.54 (Table 1). In the group B, the upper most age of the patients was 59 years whereas lowermost age was 26 years with a mean of 39.12 ± 10.57 . Uppermost height was 1.85 meters and lower most height was 1.58 meters with a mean of 1.70 ± 0.08 meters. Likewise uppermost weight of the patients was 87 Kg, lowermost weight was 48 Kg with a mean of 63.09 ± 9.73 Kg (Table 1). Uppermost BMI of the patients was 30.09; lowermost BMI was 14.61 with a mean of 21.81 ± 3.71 (Table 1). The group A comprised 14(43.8%) male patients, 18(56.3%) female patients and a total of 32. Similarly, the number of male patients in the group B was 11(34.4%) and number of female patients was 21(65.6%). Total patients in the group A were 32. Out of 64 patients who were part of this study, 25 were males and 39 were females. The pretreatment mean value for functional outcome on the Knee Extension angle for group A was 14.68 whereas the post treatment mean was 10.87. The mean difference was 3.81 with a p value < 0.001 . Similarly, the pretreatment mean of group B was 14.78 whereas the post treatment mean was 3.75. The mean

difference was 11.03 with a p value <0.001 (Table 2). The p values indicate that the results for both groups were statistically significant. The pretreatment mean of group A was 10.75 whereas the post treatment mean was 13.71. The mean difference was 2.96 with a p value <0.05. In the same way, the pretreatment mean of group B was 7.37 whereas the post treatment mean was 14.25 (Table 2). The mean difference was 6.87 with a p value <0.05. The p values indicate that the results for both groups were statistically significant. The mean difference before the treatment was 0.09 with a p value of 0.92 which is greater than 0.05. This p value indicates that the results were not statistically significant in pretreatment session. However, the mean difference after the treatment was 7.12 with a p value of < 0.001 which is significant. The comparison of sit reach test. Pretreatment the mean difference was 0.53 with a p value of 0.38 which was not statistically significant. Post treatment the mean difference was 3.50 with a p value of <0.001 (Table 3).

variables		Minimum	Maximum	Mean \pm SD
Age	Group A	26.00	57.00	39.50 \pm 9.17
	Group B	26.00	59.00	39.12 \pm 10.57
Height	Group A	1.49	1.89	1.67 \pm 0.09
	Group B	1.58	1.85	1.70 \pm 0.08
Weight	Group A	48.00	89.00	63.03 \pm 12.01
	Group B	48.00	87.00	63.09 \pm 9.73
BMI	Group A	15.29	34.34	22.62 \pm 4.54
	Group B	14.61	30.09	21.81 \pm 3.71

Table 1: Age, Height, Weight and BMI of the patients

Variables		Group A Mean	Group B Mean
Pre Treatment	Knee extension angle	14.68	14.78
	Sit to reach test	10.75	7.37
Post Treatment	Knee extension angle	10.87	3.75
	Sit to reach test	13.71	14.25

Variables		Mean Difference	P value	Mean Difference	P value
Pre Treatment-Post Treatment	Knee extension angle	3.81	<0.001	11.03	<0.001
	Sit to reach test	2.96	<0.05	6.87	<0.05

Table 2: Within group pair wise comparison of knee extension and Sit to reach test

Variables		Mean Difference	P Value
Pre Treatment	Knee extension angle	0.09	0.92
	Sit to reach test	0.53	0.38
Post Treatment	Knee extension angle	7.12	<0.001
	Sit to reach test	3.50	<0.001

Table 3: Across the group comparison of Knee extension angle

DISCUSSION

This study supports the use of static stretching and remote

MFR of sub occipital region. These exercises not only proved to be beneficial for flexibility improving but were also helpful in terms of improving the functional outcomes on the site to reach test and knee extension angle. In a study conducted by Druga et al., 58 patients who were diagnosed with asymptomatic HST were enrolled. Age of patients ranged from 20 to 60 years. Treatment was given to 3 groups of patients. The first group was treated with static stretching; the second group of patients was treated through remote MFR of sub occipital region whereas the third group was treated with a combination of both approaches [24]. It was similar to our study which involved a total number of 64 patients who were divided into 2 groups on alternative basis. Patients enrolled in the group B were treated with remote MFR of sub occipital region in addition to the SS while Group A treated with static stretching protocol only. Out of 64 patients, 39 were females whereas 25 were males. Six sessions were given to each patient for 2 weeks in both groups. Druga reported that all 3 treatment approaches brought betterment in the KEA and Sit to reach test however, patients who were treated with SS only and those who were treated with remote MFR of sub occipital region only showed marked differences in their outcome KEA and Sit to reach test as compared to the other groups [24]. Results of the study also support that the KEA and sit to reach test were significantly improved in patients who were treated with both SS and remote MFR of sub occipital region. Durga and Joshi found in their study that static stretching, remote MFR of sub occipital region and plantar fascia showed significant results within group after 24 days which include 7 session in 10 days 2 weeks home plan self SS, Self Remote MFR [24]. While in the study which focused upon SS protocol creating any beneficial effects in terms of improving flexibility among the patients. In our study it was summed up after 2 weeks with 6 sessions only. Pair wise comparison of KEA and Sit to reach test were consistent with the above mentioned study as they were statistically significant. One study showed that there was no significant ($p > 0.01$) difference in hamstrings flexibility pre and post treatment. Both suboccipital muscle inhibition technique and suboccipital static stretching may improve hamstring flexibility in healthy young adults [25]. Kalichman and Ben cited research of the Miller and Rocky finding from 2006 that foam rolling offered no effect on hamstring flexibility improvisation. Miller and rocky investigated in their study that chronic foam rolling in 8 weeks has no change in hamstring flexibility while in our research there were significant change in hamstring flexibility with remote myofascial release and SS in KEA and Sit to reach test [26]. Curran et al., determined in his study that myofascial release with hard material roller significant change in hamstring flexibility [27]. Similarly, our research

there was significant change in hamstring flexibility with remote MFR. A wide range of orthopedic patients can have benefits from both pre-contraction and static stretching, although those having joint contractures do not have significant benefit of stretching [28]. While in current study SS and MFR of sub occipital region were significantly improving condition of patients. Sheffield et al., observed that a footballer who was diagnosed with HST was treated with self MFR and found that self MFR technique improved KEA test score [10]. While in current research conducted on patient's diagnosis with asymptomatic HST also support that KEA and Sit to reach test score was significant improve in patients who were treated with remote MFR and SS.

CONCLUSION

The current study concludes that myofascial release of sub occipital region along with static stretching and static stretching alone, both are effective in improving flexibility in patients with hamstring tightness. However, myofascial release of sub occipital region along with static stretching is more effective than static stretching alone.

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