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A STUDY ON IMPACT OF MYOFASCIAL RELEASE TECHNIQUE VERSUS SUB OCCIPITAL MUSCLE INHIBITION TECHNIQUE ON HAMSTRING FLEXIBILITY AMONG IT WORKERS WITH HAMSTRING TIGHTNESS

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ABSTRACT

Background: The capacity to move a single joint or a set of joints effectively across an unrestricted, pain-free Range of Motion (ROM) is referred to as flexibility. Reduced Flexibility can cause reduced ROM, which in turn causes changes in biomechanics and, consequently, joint problems. A prolonged forward bend sitting posture puts stress on the hamstrings, resulting in reduced flexibility.

Objectives: To study combined effect of myofascial release technique (MFR) and sub occipital muscle inhibition technique (SMI) on Hamstring flexibility pre and post intervention using active knee extension test.

Methodology: 30 subjects were selected based on the selection criteria they were divided into 2 groups. Group A consist of 15 subjects and they received MFR technique, Group B consist of 15 subjects and they received SMI technique. Both the groups received the interventions for 5 sessions per week for 4 weeks.

Results: The pre and posttest values for hamstring flexibility where measured by active knee extension test. The pre mean value of group A&B for AKE(R) where 120.07 &120.65. The pre mean value of group A&B for AKE (L) where 119.27 & 119.2.The Post mean value of group A&B for AKE(R) where 140.47 &147.53. The Post mean value of group A&B for AKE (L) where 139.6& 146.4

Conclusion: The study concluded that SMI technique was more effective in improving the hamstring flexibility among IT workers with hamstring tightness.

Keywords: Hamstring flexibility, Superficial back line, Sub-occipital muscle inhibition, Myofascial release technique, Active knee extension test.

INTRODUCTION

The capacity to move a single or many joints smoothly without limitations and with pain-free range of motion is known as flexibility [1]. Flexibility is the key factor essential for the majority of musculoskeletal functions and for optimizing the performance of physical tasks [2].

The hamstrings are the three large muscles Semitendinosus, Semimembranosus and biceps femoris which originate from the ischial tuberosity and get inserted into fibula and tibia. Therefore they act as extensors of hip joint and flexors of knee joint [3].

The sub occipital muscles are four muscles attaching at C1 or C2 vertebrae from the spinous or transverse processes. All these muscle and obliquus capitus inferior, attach to the base of the occiput. The function of the sub occipital muscle are to rock and tilt the head into extension and also to protract the head. The rectus capitus posterior major and obliquus capitus inferior assist in rotation of the head to the same side. These muscles are essential for stabilizing the head on the atlas and the atlas on the axis, as well as for precise movement control [4].

In particular, when it comes to the hamstring group of muscles, both common people and athletes frequently struggle with flexibility dysfunction [5, 6]. Inadequate or inappropriate rehabilitation after a long-term muscle injury or low levels of physical activity in people may cause muscle tightness. The tightness of muscle may lead to overuse syndrome or some pathological conditions at the joint on which the muscle acts, especially on a muscle like the hamstring which passes over two joints [7, 8].

Due to restricted mobility, musculoskeletal problems and hamstring tightness can result in joint hypomobility, nerve compression, or spinal disc degeneration, all of which can cause lower back pain. [9, 10]

Prolonged sitting can lead to a decrease in hamstring flexibility [11]. Muscle tension affects the muscle's length-tension relationship and the limb's capacity to absorb shock. A vicious cycle of range reduction and posture issues results from decreased flexibility, which ultimately lowers optimal performance [12].

Tight hamstrings can cause a variety of other musculoskeletal issues as well as a diminished range of motion [13]. Shortness of hamstring muscles results in restriction of knee extension when the hip is flexed or hip flexion when the knee is extended also lead to postural changes in pelvic region causing posterior pelvic tilt and flat back. [14, 15]. Hamstring tightness leads to decrease in active knee extension (AKE) range, dorsiflexion range and decrease in lumbar lordosis leading to postural deformities, bending forward deficit, hamstring strain or injuries, discomfort when sitting and a shambling gait [16]. Hamstring tightness also influences the lumbopelvic rhythm [17]. Patellar tendinopathy, patellofemoral pain syndrome, and plantar fasciitis are all linked to hamstring tightness [18, 19].

Kinetic chain is the chain of system linked together to create human movement. Thus muscle and fascia are functionally linked. The connection between hamstrings and sub occipital muscles is through superficial back line. The superficial back line is a continuity of fascia from the bottom of the foot to the forehead. Along the way, many structures participate in holding this fascia which includes plantar fascia, Achilles tendon, soleus, two heads of the gastrocnemius, hamstrings, sacrotuberous ligament, sacral fascia, erector spinae, transversospinalis, suboccipital muscle and frontalis. The suboccipital and hamstring muscle are included in the superficial back line may have a positive effect on the entire line itself [20].

The sub occipital muscle inhibition technique is a manual technique that aims to relax the tension in the sub occipital muscles by decreasing the myofascial restriction in the suboccipital region. Sub occipital muscle inhibition (SMI) technique is a method of relaxing the tension in the four muscles located between the occiput and the axis, which regulates the upper cervical vertebrae (rectus capitus posterior major, rectus capitus posterior minor, obliquus capitus inferior, and obliquus capitus superior); these muscles are known to be associated with regulating body posture as well as rotation of the head [21, 22].

Myofascial release (MFR) is one of the commonly utilized manual techniques to enhance the extensibility of soft tissue through compression by restoring restricted fascia or normal muscular strength [23]. MFR approach was thought to have a possible role in alleviating pain, improving flexibility, lowering impairment, and hence enhancing function in daily tasks. [24, 25, 26, 27]. This technique involves specifically guided low load, long duration mechanical forces to manipulate the myofascial complex. [28].

NEED FOR THE STUDY

There are several therapeutic approaches for addressing hamstring tightness, including myofascial release technique, positional release technique, muscle energy technique, and various stretching techniques. Although the value of the sub-occipital muscle inhibition approach for treating upper cervical spine patients is widely recognized, its link to other structures is still unknown.

Looking at the recent advances for improving flexibility, soft tissue mobilization and myofascial release techniques are been studied for immediate effects on hamstring flexibility but there is dearth of literature on long term and combination of intervention technique effects [29].

Hence the need of the study is to find the impact of myofascial release and sub-occipital inhibition technique on flexibility of hamstring among IT workers with hamstring tightness.

METHODOLOGY

This pre-test and post-test experimental study was conducted over six months at the Out Department of KG college of Physiotherapy, Coimbatore, to find out the impact of sub occipital muscle inhibition technique versus myofascial release on hamstring flexibility among IT workers with hamstring tightness. Thirty male subjects who are willing to participate in the study meeting the inclusion criteria—aged 25 to 35 years, clinically diagnosed with bilateral hamstring tightness with Active knee extension 125^0 or less and SRT 16.9 cm or less were recruited and randomly assigned into two equal groups of fifteen participants each. Subjects with History of neck trauma, tumor, infections and fractures of the cervical spine, herniated disc or protrusions, spinal deformities, acute back pain, muscle tendon injuries of the hamstring, hypermobility (Beighton score> 4), Involved in regular flexibility/ yoga program, history of any recent surgeries to the involved side were excluded. Demographic data, including age, height, weight, sitting hours, years of experience were collected, and baseline assessments were performed using the Active knee extension test. Group A received myofascial release technique combined with conventional physiotherapy, while Group B underwent Sub occipital muscle inhibition technique along with conventional therapy, with both groups received 30-minute sessions, five times a week for four weeks. Everyone were provided written consent, instructed to report any discomfort during the treatment duration and informed about the study. Post-intervention, assessments were repeated using the same outcome measures, and the results were statistically analyzed to compare the effectiveness of the two interventions on hamstring flexibility.

STATISTICAL ANALYSIS

Using Student's t-test the collected data were analyzed to evaluate the effectiveness of the interventions. The paired t-test were used to compare the pre-test and post-test values within each of the group for the Active knee extension test. Paired t-test formula used was:

$$S=\sqrt{\frac{\sum d^2-\frac{\sum d^2}{n}}{n-1}} \qquad t=\frac{\bar{d}\sqrt{n}}{s}$$

The d represents the difference between pre-test and post-test scores, đ is the mean difference, n is the number of subjects in each group, S is the standard deviation of the differences and $\Sigma d^2$is the sum of squared deviation.

An unpaired t-test was applied to differentiate post-test between Group B (Sub occipital muscle inhibition technique) and Group A (Myofascial release technique) to evaluate between-group differences in functional outcomes. The unpaired t-test formula used was:

$$S=\sqrt{\frac{\Sigma(x_1-\bar{x}_1)^2+(x_2-\bar{x}_2)^2}{n_1+n_2-2}} \qquad T=\frac{\bar{x}_1-\bar{x}_2}{S}$$

Where n_1 and n_2 are the sample sizes of Group A and Group B respectively, x_1 and x_2 are the individual post-test scores of each group, $\overline{x_1}$ and $\overline{x_2}$ are the mean scores of each group, and S represents the pooled standard deviation. A p-value of less than 0.05 was regarded as statistically significant, and all statistical tests were two-tailed. Standard statistical software was used for the analysis.

RESULT

The present study evaluated and compared the effects of Myofascial release technique and Sub occipital muscle inhibition technique on hamstring flexibility in IT workers with hamstring tightness using the Active knee extension test.

AKE	GROUP	TEST	MEAN	SD	T VALUE	P VALUE
AKE (R)	GROUP A	PRE	120.0667	3.28344	-38.293	.000
		POST	140.4667	3.97971		
	GROUP B	PRE	120.6482	3.30944	-41.566	0.00
		POST	147.5333	3.71996		
AKE (L)	GROUP A	PRE	119.2667	2.37447	-37.624	.000
		POST	139.6000	3.13506		
	GROUP B	PRE	119.2000	3.44757	-57.865	0.00
		POST	146.4000	3.39748		

Table 1: Within group analysis of Pretest and posttest values of Active Knee extension test (Right) & (Left) for Group A & Group B

In Group A, for AKE(R) mean pre-test score was 120.0667, which improved to 140.4667 post-treatment, the paired t-test yielded value of the -38.293, which was statistically significant of the value ($p < 0.05$) as mentioned the Table 1.

In Group A, for AKE (L) mean pre-test score was 119.2667, which improved to 139.6 post-treatment, the paired t-test yielded value of the -37.624, which was statistically significant of the value ($p < 0.05$) as mentioned the Table 1.

In Group B, for AKE (R) mean pre-test score was 120.6482, which improved to 147.5333 post-treatment, the paired t-test yielded value of the -41.566, which was statistically significant of the value ($p < 0.05$) as mentioned the Table 1.

In Group B, for AKE (L) mean pre-test score was 119.2, which improved to 146.4 post-treatment, the paired t-test yielded value of the -57.865, which was statistically significant of the value ($p < 0.05$) as mentioned the Table 1.

AKE	GROUP	MEAN	SD	T VALUE	P VALUE
AKE (R)	GROUP A	140.4667	3.98	-5.02	0.00013
	GROUP B	147.5333	3.72		
AKE (L)	GROUP A	139.6	3.14	-5.70	0.00001
	GROUP B	146.4	3.40		

Table 2: Between group analysis of Posttest values of Active Knee extension test (Right) & (Left) for Group A & Group B

On comparison of the post- test scores between Group A and Group B for AKE(R) using unpaired t-test, Group B (147.5333) showed a significantly higher improvement than Group A (140.4667), with a t-value of -5.02 ($p < 0.05$) as mentioned the Table 2.

On comparison of the post- test scores between Group A and Group B for AKE(L) using unpaired t-test, Group B (146.4) showed a significantly higher improvement than Group A (139.6), with a t-value of -5.70 ($p < 0.05$) as mentioned the Table 2.

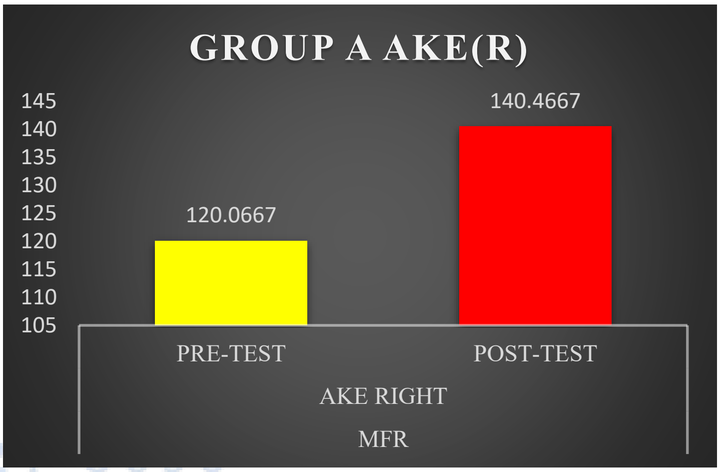

Figure 1: Pretest and posttest values of Active Knee extension test (Right) for Group A

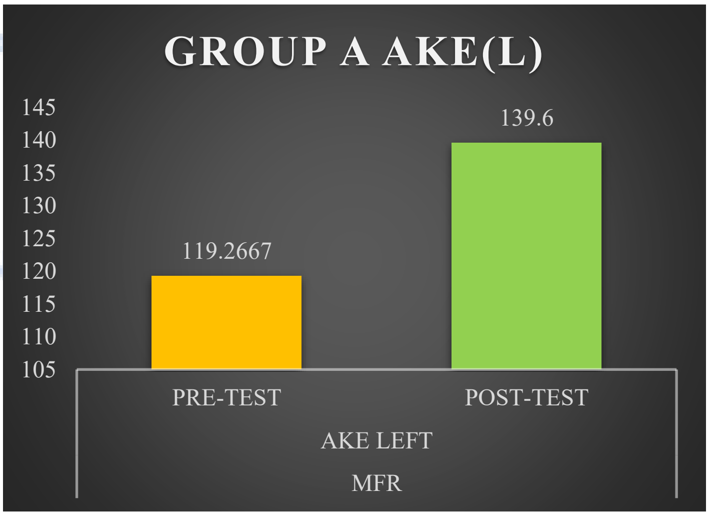

Figure 2: Pretest and posttest values of Active Knee extension test (Left) for Group A

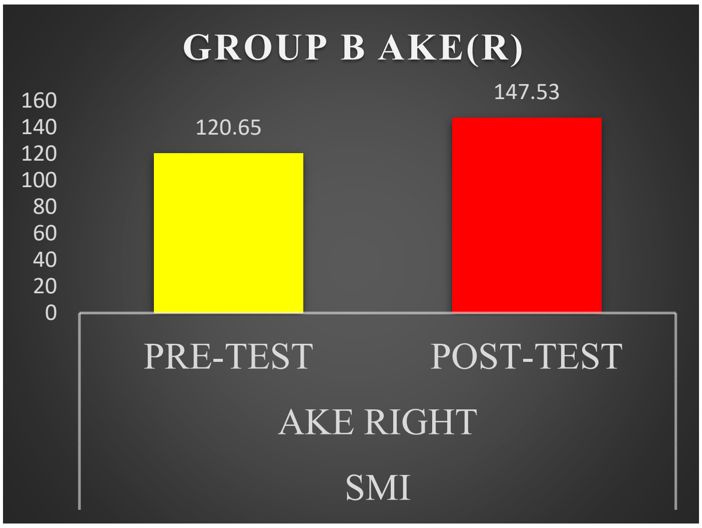

Figure 3: Pretest and posttest values of Active Knee extension test (Left) for Group B

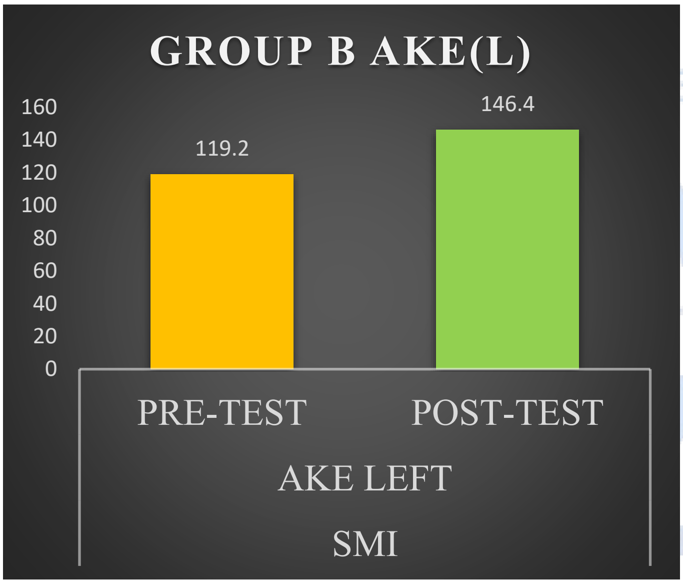

Figure 4: Pretest and posttest values of Active Knee extension test (Left) for Group B

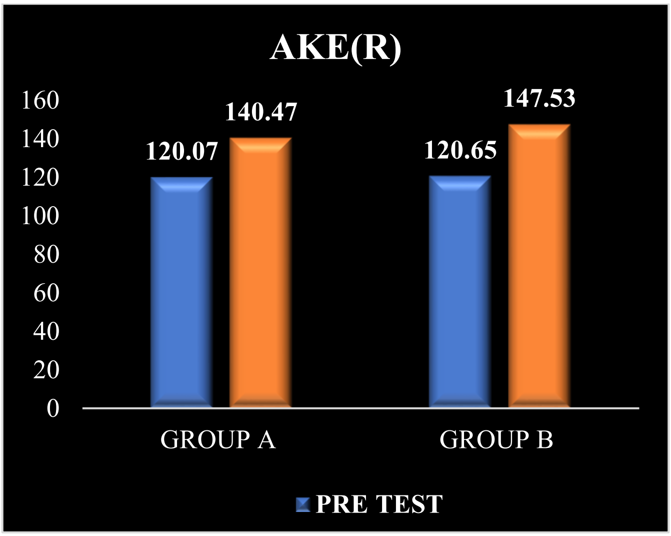

Figure 5: Pretest and posttest values of Active Knee extension test (Right) for Group A and Group B

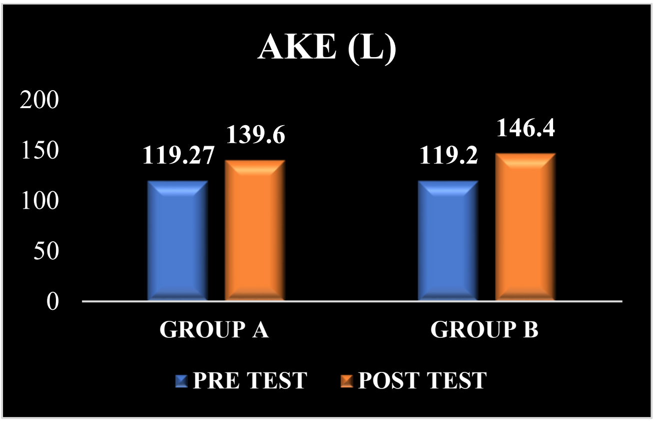

Figure 6: Pretest and posttest values of Active Knee extension test (Left) for Group A and Group B

Overall Interpretation

Both intervention groups demonstrated statistically significant improvements in hamstring flexibility following treatment. However, Group B, who received Sub occipital muscle inhibition technique, showed superior improvement compared to Group A, who received Myofascial release technique in active knee extension measures.

DISCUSSION

Ghulam Fatima,et al,2017 conducted a study which concluded that in a majority of the students hamstrings tightness is observed and long-duration sitting can be a contributory factor in hamstring tightness. [11]

This research was conducted to examine the difference between the effects of myofascial release and sub occipital muscle inhibition technique on hamstring flexibility among IT workers with hamstring tightness. Pre and post intervention, hamstring flexibility was assessed using AKE.

Various authors have done numerous studies on the fascial links. The fact that sub occipital inhibition technique could increase the flexibility of the hamstring because in Sub occipital inhibition the superficial backline was relaxed through relaxation of the sub occipital muscles. [20, 30]

As stated by sung-hak cho et al., 2014, the use of SMI and SMFR to participants with hamstring shortening led to an immediate rise in the hamstring's flexibility when examined, and it was shown that SMI was superior. [15] Additionally, studies on the impact of SMI on hamstring flexibility revealed that Robert Scleip demonstrated in 1996 that the link to dura mater, postural control, and myofascial chain connection all contribute to increased flexibility which also supports the findings of this research. [9, 31]

In individuals with short hamstring syndrome, the sub occipital inhibition technique altered the flexibility of the hamstring muscles and enhanced the ROM of straight leg raising, as shown by Aparicio et al. in 2009. Young adults made up the majority of the participants in their study, and they were about the same age as the patients in our study. A notable improvement in AKE was discovered for the SMI group following the intervention, along with evidence of increased hamstring flexibility. [32]

MFR has a wide range of effects; it helps in reducing delayed onset muscle soreness, decreasing pain, modulates autonomic nervous system activity, and increases flexibility [33, 34, 35, 36]. The beneficial gain in hamstring flexibility brought about by remote MFR in this investigation may be attributed to the fascially mediated transmission of forces across the Evidence suggests that forces are transmitted through intramuscular connective tissue pathways in SBL [37, 38, 39, 40].

According to the results of this research, myofascial release and sub occipital inhibition technique, which were applied to subjects with hamstring tightness, resulted in increase in flexibility of the hamstring, and it was confirmed that SMI was more effective. Our results extended these findings showing that increase in flexibility was greater when performed in combination.

CONCLUSION

The study came to the conclusion that, after four weeks of therapy, there was a statistically significant improvement in hamstring flexibility in both groups but suboccipital muscle inhibition technique group showed better results than myofascial release therapy group. In conclusion, the research found that the sub occipital muscle inhibition approach was superior at increasing the flexibility of hamstrings among IT workers with hamstring tightness.

LIMITATIONS AND RECOMMENDATIONS

The study's short length, small sample size, limited age group & single gender selection and lack of follow-up have hampered its generalizability and long-term validity of the findings. There was insufficient control over outside factors such participant variability, contextual factors, and climatic conditions. To confirm and extend these findings, more research with larger sample size, longer duration, age-group stratification, and long-term follow-up is advised. Further studies should examine how sub occipital muscle inhibition technique affects other significant outcomes including disability rating, quality of life, and its suitability for other conditions such as low back pain and plantar fasciitis.

REFERENCE

1. Divya G patel, neeta J vyas, megha S sheth. Immediate effect of application of bilateral self myo-fascial release on the plantar surface of the foot on hamstring and lumbar spine flexibility: a quasi-experimental study. International journal of therapeutic applications.2016; volume 32: 94-99.
2. Phrompaet S, PaungmaliA, Pirunsan U, Sitilertpisan P. Effects of pilates training on lumbo-pelvic stability and flexibility. Asian J Sports Med. 2011; volume 2:16-22.
3. Akinpelu Ao, Bakareu, Adegokeboa. Influence of age on hamstring tightness in apparently healthy Nigerians. Journal of the nigeria society of physiotherapy. 2005; volume 2:15.
4. Brodeur RR, J.M.McPartland. Rectus Capitis Posterior Minor: A Small but Important Suboccipital Muscle. Journal of Body Work and Movement. 1999; volume 3:30-35.
5. Adkitte R, Rane SG, Yeole U, Nandi B, Gawali P. Effect of muscle energy technique on flexibility of hamstring muscle in Indian national football players. Saudi J Sports Med 2016; 16-28.
6. Weerasekara I, KumariI, Weerarathna N, WithanageC, WanniarachchiC. The prevalence of hamstring tightness among the male athletes of University of Peradeniya in 2010, Sri Lanka. Int J Phys Med Rehabil 2013;Volume1:2
7. Zachezeweski IE, Sally RW and Barnes MR. Improving flexibility, Physical Therapy. 1989:698-699.
8. Bohannon RW. Effect of repeated 8 minutes loading on the angle of straight leg raising. Physical Therapy, 1984; 64:491-497.
9. Andrew i todd anthea i bennett candice j christie. Physical implications of prolonged sitting in a confined posture – A literature review. Ergonomics SA, 2007; volume 2:19.
10. B. Troussier, C.Tesnieret, j, fauconnier, j, grisons, r,juvin and X.Phlelip. Comparative study of two different kinds of schools furniture among children. Ergonomics, 1999; vol.42:516-526.
11. Ghulam Fatima, Muhammad Mustafa qamar1, Jawad ul Hassan, Ayesha Basharat. Extended sitting can cause hamstring tightness. Saudi journal of sports medicine 2017; volume 17 issue 2.
12. Vidhi S, Anuprita T, Asmita K, Twinkle D, Unnati P, Sujata Y. Comparison of PNF technique with NDS technique for Hamstrings tightness in asymptomatic subjects. Indian J Physiother Occup Ther 2014; 8:158.
13. Houston MN, Hodson VE, Adams KK, Hoch JM. The effectiveness of whole-body-vibration training in improving hamstring flexibility in physically active adults. J Sport Rehabil 2015; 24:77-82.
14. Florence Peterson Kendall, 4th edition, Muscle testing and function with Posture and Back pain.
15. Sung-hak cho, phd, PT, soo-han kim, phd, PT, du-jin park, phd, The comparison of the immediate effects of application of the suboccipital muscle inhibition and self-myofascial release techniques in the region on short hamstring. J. Phys. Ther. Sci.2015; 27: 195–197.
16. Marek Jozwiak, Syzmon Pietrzak, Franciszek Tobjasz. The epidemiology and clinical manifestations of hamstring muscle and plantar foot flexor shortening .Developmental Medicine & Child Neurology 1997;39:481-483.

17. Gajdosik RL, Hatcher CK, Whitsell S. Influence of short hamstring muscles on the pelvis and lumbar spine in standing and during the toe-touch test. Clin Biomech (Bristol, Avon) 1992; 7:38-42.
18. Labovitz JM, Yu J, Kim C. The role of hamstring tightness in plantar fasciitis. Foot Ankle Spec 2011; 4:141-4.
19. Hopper D, Deacon S, Das S, Jain A, Riddell D, Hall T, et al. Dynamic soft tissue mobilisation increases hamstring flexibility in healthy male subjects. Br J Sports Med 2005; 39:594-8.
20. Myers TW: Anatomy trains. Edinburgh: Churchill Livingstone, 2005, pp. 97–101.
21. Hallgren RC, Greenman PE, and Rechtien JJ: Atrophy of suboccipital muscles in patients with chronic pain: a pilot study. J Am Osteopath Assoc, 1994, 94: 1032–1038.
22. McPartland JM, Brodeur RR, and Hallgren RC: Chronic neck pain, standing balance, and suboccipital muscle atrophy—a pilot study. J Manipulative Physiol Ther, 1997, 20: 24–29.
23. Woung KK, chai HM, Chen YJ, wang CL, Shau YW, Wang SF. Mechanical deformation of posterior thoracolumbar fascia after myofascial release in healthy men: a study of dynamic ultra sound imaging. Musculoskeletal Sci pract 2017; 27:124-30.
24. Mohr, A.R., Long, B.C., Goad, C.L., 2014. Effect of foam rolling and static stretching on passive hip-flexion range of motion. J. Sport Rehabil. 23 (4); 296-299.
25. Skarabot, J., Beardsley, C., Stirn, I., 2015. Comparing the effects of self-myofascial release with static stretching on ankle range-of-motion in adolescent athletes. Int. J. Sports Phys. Ther. 10 (2), 203-212.
26. Cho, S.H., Kim, S.H., Park, D.J.The comparison of the immediate effects of application of the suboccipital muscle inhibition and self-myofascial release techniques in the suboccipital region on short hamstring. J. Phys. Ther. Sci. 2015;27(1), 195-197.
27. Beardsley, C., Skarabot, J. Effects of self-myofascial release: a systematic review. J. Bodyw. Mov. Ther. 2015; 19 (4), 747-758.
28. Ajimsha, M.S., Al-Mudahka, N.R., Al-Madzhar, J.A. Effectiveness of myofascial release: systematic review of randomized controlled trials. J. Bodyw. Mov. Ther.2015; 19 (1), 102-112.
29. Yolanda castellote-caballero, maríe c. Valenza, emilio J. Puentedura, césar fernández-de-las-peñas, and francisco alburquerque-sendín. Immediate effects of neurodynamic sliding versus muscle stretching on hamstring flexibility in subjects with short hamstring syndrome. Journal of sports medicine volume 2014,8 pages
30. Anikwe ee, tella ba, aiyegbusi ai chukwu sc. Influence of nerve flossing technique on acute sciatica and hip range of motion. International journal of medicine and biomedical research.2015; volume 4 issue 2.
31. Policínica FisioTex, Don Benito, Badajoz, Spain. Immediate Effects of the Suboccipital Muscle Inhibition Technique in Subjects with Short Hamstring Syndrome. J Manipulative Physiol Ther. 2009; June Volume32 (4):262-9.
32. Aparicio EQ, Quirante LB, and Blanco CR, et al.: Immediate effects of the suboccipital muscle inhibition technique in subjects with short

hamstring syndrome. J Manipulative Physiol Ther, 2009, 32: 262–269.

33. Kim K, Park S, Goo BO, Choi SC. Effect of Self-myofascial Release on Reduction of Physical Stress: A Pilot Study. J Phys Ther Sci. 2014; Nov; 26(11):1779-81.
34. MacDonald GZ, Penney MD, Mullaley ME, Cuconato AL, Drake CD, Behm DG, Button DC. An acute bout of self-myofascial release increases range of motion without a subsequent decrease in muscle activation or force. J Strength Cond Res. 2013 Mar; 27(3):812-21.
35. Macdonald GZ, Button DC, Drinkwater EJ, Behm DG. Foam rolling as a recovery tool after an intense bout of physical activity. Med Sci Sports Exerc. 2014 Jan; 46(1):131-42.
36. Mikesky AE, Bahamonde RE, Stanton K, Alvey T, Fitton T. Acute effects of The Stick on strength, power, and flexibility. J Strength Cond Res. 2002 Aug; 16(3):446-50.
37. Krause F, Wilke J, Vogt L, Banzer W. Intermuscular force transmission along myofascial chains: a systematic review. J Anat. 2016 Jun; 228(6):910-8.
38. Huijing PA, Jaspers RT. Adaptation of muscle size and myofascial force transmission: a review and some new experimental results. Scand J Med Sci Sports. 2005 Dec; 15(6):349-80.
39. Yucesoy CA. Epimuscular myofascial force transmission implies novel principles for muscular mechanics. Exerc Sport Sci Rev. 2010 Jul; 38(3):128-34.
40. Turrina A, Martínez-González MA, Stecco C. The muscular force transmission system: role of the intramuscular connective tissue. J Bodyw Mov Ther. 2013 Jan; 17(1):95-102.