www.jmscr.igmpublication.org
Impact Factor (SJIF): 6.379
Index Copernicus Value: 79.54
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossrefDOI: https://dx.doi.org/10.18535/jmscr/v6i11.148

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

To study the effect of Suboccipital Muscle Inhibition and Neural Flossing Techniques on Hamstring Flexibility in Young Adults

Authors
Dr Rasika Panse[1*], Dr Ujwal Yeole[2], Shubhada Trivedi[3], Dr Pournima Pawar[4]
[1,4]Assistant Professor, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth Pune
[2]Associate Professor, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth Pune
[3]Intern, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth Pune, India
Corresponding Author
Dr Rasika Panse
Mobile no -9689362993, Email: *panserasika09gmail.com*

Abstract
Background: *Prolonged forward bend sitting posture puts strain on hamstring leading to decreased flexibility. Hamstrings and suboccipital muscles are connected by one neural system. Abnormal lower extremity neuro-dynamics may alter resting muscle length and changes in the perception of stretch or pain. As neural flossing technique alter such sensation and improve hamstring flexibility. Hence in this study we aim to study the combined effect of suboccipital muscle inhibition and neural flossing technique on hamstring flexibility in young adults.*
Objectives: *To study combined effect of suboccipital muscle inhibition and neural flossing technique on flexibility of hamstring pre and post intervention using modified sit and reach test and active knee extension test and pain using NPRS.*
Materials and Methodology: *A study with Pre Post experimental design included 100 volunteers according to inclusion and exclusion criteria were selected by simple random sampling method. Intervention in form of suboccipital inhibition and neural flossing techniques was given thrice a week for period of 2 weeks. Data was documented on 1st, 3rd and 7th day of each week. Pre and post intervention hamstring flexibility was assessed.*
Results: *Comparison of pre and post intervention data was done, results showed the p-value was <0.001 which was extremely significant.*
Conclusion: *Hamstring tightness and stretch pain reduced significantly when combination of suboccipital muscle inhibition and neural flossing technique was given in young adults.*
Keywords: *Hamstring flexibility, SMI (sub-occipital muscle inhibition), NFT (neural flossing technique), SRT (sit and reach test), Active knee extension test, NPRS (Numeric pain rating scale).*

Introduction

Flexibility is the ability to move a single or multiple of joints smoothly without any restriction and pain-free range of motion. Changes in flexibility may cause abnormal stress on musculoskeletal system leading to injury[1, 2] as it reduces strength, endurance, motor coordination and lead to high amounts of physical pain[1,3]. Shortness of hamstring muscles results in restriction of knee extension when the hip is flexed or hip flexion when the knee is extended[4] also leads to postural changes in pelvic region

causing posterior tilt and flat back[5]. Hamstring tightness causes decrease in AKE range, dorsiflexion and lumbar lordosis decreases leading to postural deformities, bending forward deficit, hamstring strain or injuries, discomfort when sitting and a shambling gait[6].

The prolonged sitting posture has negative impacts on biomechanical and physiological perspective that is 50% of the body's muscles contract to hold the body motionless while resisting gravity and the static forces costs more energy than dynamic movements[7]. Limited mobility leads to musculoskeletal disorders, hamstring tightness and consequence is joint hypomobility, nerve compression or spinal disc degeneration causing LBP[7,8]. Sitting for longer duration hours may be a contributing factor for reduced hamstring flexibility[9]. Very few individuals can maintain same posture for long time in sitting position, as the ischial tuberosities give little support and back muscles cannot support trunk for very long time when no sufficient back rest provided[8].

Traditionally stretching was used to improve flexibility but a review found no evidence for stretching for prevention of hamstring injury[10] as a sole intervention. Looking at the recent advances for improving flexibility, Soft tissue mobilization, Myofascial release techniques …etc. are been studied for immediate effects on hamstring flexibility but there is dearth of literature on long term and combination of intervention technique effects[5,10].

The suboccipital muscle inhibition (SMI) technique relaxes the tension in the muscles located between the axis and occiput, which regulates the upper cervical vertebra. Suboccipital muscles are: rectus capitis posterior major, rectus capitis posterior minor, obliquus capitis inferior, and obliquus capitis superior. The main functions of these musclesis to regulate body posture and rotation of the head. Hamstrings flexibility increases due to relaxation of the myofascia as the tone of suboccipital muscles falls, they are connected by one neural system, which passes through the dura mater known as superficial back line (SBL)[4,5]. In SMI technique, patient lies comfortably in supine lying and can be easily administered by the therapist inducing relaxation of the fascia by applying pressure softly to the suboccipital area.

Neural flossing technique (NFT) proposed by Michael Shacklock is an active procedure based on idea that the entire nervous system is continuous structure and it moves and slides in body as we move and the movement is related to physiological processes[11]. NFT moves the nerve through the tissues proximally and distally to the maximum possible extent, by moving every joint and body part that the nerve crosses. NFT involves movement of peripheral nerves from a mean position along its bed. It can be initiated from either one or both ends of the nerve bed[12].

Methods

Study design: Pre- post Experimental design in which Subjects with age group 18 to 25 year were taken with tight hamstrings that are recreationally active and fulfill the inclusion criteria.

Participants and Eligibility

Inclusion Criteria

1. Willingness of the subjects to participate in the study (informed consent signature)
2. Unilateral or bilateral short hamstring syndrome
3. Active knee extension 125° or less[4].

Exclusion Criteria

1. History of neck trauma or fractures
2. Herniated disc or protrusions, spinal deformities, acute back pain
3. Muscle tendon injuries of the hamstring

Materials

1. Plinth
2. Measuring tape
3. Universal Goniometer
4. Sit and reach test box
5. stopwatch
6. Chair

Permission was taken from the institutional ethical committee. All participants were young adults

studying in university (mean ± SD = 19.91±1.96 years), recruited via classroom announcements. The required criteria was met by 100 participants (males =15; females = 85), subjects were explained aim and method of the study and written consent was taken. The participants were also asked to comment on their chair sitting hours in a day, BMI and pain related to hamstring stretch on NPRS. Active knee extension test, Modified Sit and reach test and NPRS were taken 5 mins before and 10 mins after interventions by a blind assessor.

Interventions

Sub-occipital muscle inhibition technique: The SMI technique was conducted with subject in a supine position with eyes closed. The therapist placed hands below the subject's occiput and applied pressure to the area below the atlas, in the upward direction, toward the subject's nose, toward himself/herself, and in the direction of the head, to induce relaxation of the suboccipital muscles. The pressure was maintained for 2 minutes until tissue relaxation had been achieved[4,5].

Neural flossing technique: NFT was performed actively by participant sitting on a chair, with flexed knee and flex the neck at the same time, holding position for 5 seconds. The participant in turn extended the neck and the knee, slightly abduct and flexed the hip. This extended position was maintained for 5 seconds. The above procedure was repeated 15 times, for 3 sets with an interval of 5 minutes between each set[12].

Results

Results were obtained by comparing pre and post intervention values of outcome measures (Modified SRT, AKE and NPRS) by using student paired t-test between group comparisons and mean, SD and mean difference values were obtained.

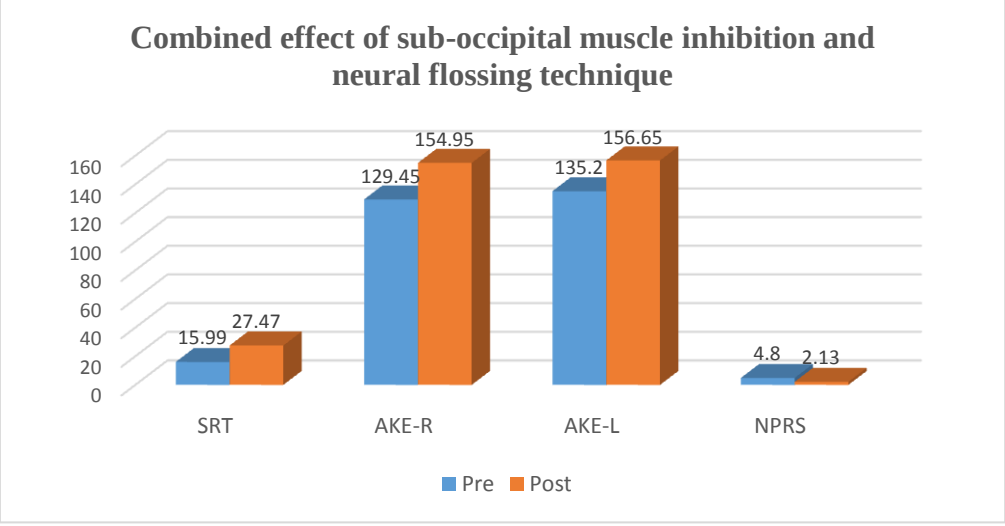
When we compared SRT, AKE-R, AKE-L and NPRS in group; the obtain p-value was <0.0001 which is statistically highly significant. The mean difference shows there is increase in hamstring flexibility as SRT distance and AKE range increased and also the stretch pain reduced.

Table no. 1: Demographic data

Demographic Data	(Mean±SD)
Age	19.92±2.17
BMI	22.88±4.71
Chair sitting hours	6.14±1.10
Gender	Male(15)
	Female(85)

Table no. 2: Results of combined effect of sub-occipital muscle inhibition and neural flossing techniquepre- post intervention

Outcome Measures	Mean±SD		Mean Difference	p-value
	Pre	Post	Post-Pre	
SRT	15.99±5.64	27.47±5.03	11.48	<0.0001
AKE-R	129.45±11.00	154.95±6.83	25.30	<0.0001
AKE-L	135.20±9.98	156.65±5.13	21.45	<0.0001
NPRS	4.80±1.90	2.13±1.53	2.66	<0.0001



Graph no. 1: Graphs of combined effect of sub-occipital muscle inhibition and neural flossing techniquepre- post intervention

Discussion

This research was conducted to examine the effects of the SMI and NFT in subjects with hamstring tightness. Pre and post intervention, hamstring flexibility was assessed using SRT, PAT and stretch pain using NPRS. Out of total participants, 85% were females and 15% were males. James W. Youdas, in his study found that there is significant effect of gender on HML, with women having more HML than their male counterparts but there was no direct co-relation of age on HML[13].

The mean chair sitting time was 6.14±1.10 hours in a day and had mean BMI 22.88±4.71. Ghulam Fatima,et al, 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[9].

From table 2 the mean values of pre and post intervention for Sit and Reach Test, Popliteal angle and NPRS statistically significant with P-value <0.0001 thus the combined effects of SMI and NFT showed significant improvement in hamstring flexibility. The fact that both techniques could increase the flexibility of the hamstring may be because in SMI, the superficial back line was relaxed through relaxation of the suboccipital muscles[12]. The suboccipital muscles are the "proprioceptor monitors" that contribute significantly to regulation of head posture, and they have the most muscle spindles in the human body[5]. The rectus capitis posterior minor muscle, has composition of 36 muscle spindles per gram and contributes to regulation of posture and the degree of tension[5]. While NFT actively lengthens tissues and releases tension in nerve hence improves mobility[11]. Abnormal posterior lower extremity neuro-dynamics may alter resting muscle length and changes in the perception of stretch or pain. As NFT alter such sensation and improve hamstring flexibility. In these exercises tension is increased at one end and lessened at the opposite end of the nerve, thus improving nerve excursion and reducing the pain[10]. Hence combination of therapy can be used for improving hamstring flexibility.

SMI aims at application of soft traction to feel the tension of the soft tissues and remove the muscle barrier by repeatedly straining and relaxing, which is like "peeling an onion" [14] For fascia to relax effectively proper pressure and soft extension should be applied on the area where fascia limitation is felt. Manheim specified that "the endfeel" and soft tissue extension are of importance in myofascial release[15]. According to Sung-Hak Cho, research results, SMI and SMFR, which were applied to subjects with shortening of the hamstring, resulted in immediate increases in flexibility of the hamstring, and it was confirmed that SMI was more effective[5]. Studies done on effect of SMI on hamstring flexibility also resulted in improving flexibility due to the connection to dura mater, postural control, myofascial chain connection and was proved by Robert Scleip7 in 1996[16,17] which also supports the results of this study.

Yolanda Castellote-Caballero, conducted a study which shows that a neurodynamic sliding intervention increases short-term hamstring flexibility[10]. Anikwe EE in their study found that Nerve Flossing Technique reduced pain and improved hip range of motion as NFT causes a dynamic variation in neural pressure (by stretching at one end and relaxing at the other end), hence leading to evacuation of intraneural edema which might be present[12]. Improvement in ROM is due to increase in the length of hamstring muscule[12,18], which might have resulted from repeated knee extension or due to decrease in pain intensity which possibly prevented the participants from achieving the ROM. This improvement in ROM is in agreement with some previous studies[12,19]

Hence this studies supports the results of previous studies done on hamstring flexibility using Sub-occipital muscle inhibition and neural flossing technique[20]. This study resulted in improvement of flexibility and reduction of pain.

Conclusion

The combination therapy of sub-occipital muscle inhibition and neural flossing technique was effective in improving hamstring flexibility in young adults.

Limitation and Future scope of study

Study can be done in symptomatic patients while duration of study can be increased to study follow-up effects.

Conflict of interest: None

Funding: None

References

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, volume 32, 2016, 94-99 .
2. Wilson A. Effective Management of Musculoskeletal Injury:a Clinical Ergonomics Approach to Prevention, Treatment and Rehabilitation. Churchill Livingstone, Edinburgh.2002.
3. Sullivan K, Silvey D, Button D, Behm D, Roller-massage 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), 228-236.
4. Florence Peterson Kendall, 4th edition, Muscle testing and function with Posture and Back pain.
5. Sung-hak cho, phd, PT1), soo-han kim, phd, PT2), du-jin park, phd, PT2)*. 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.27: 195–197, 2015.
6. Marek Jozwiak* Syzmon Pietrzak, Franciszek Tobjasz. The epidemiology and clinical manifestations of hamstring muscle and plantar foot flexor shortening .Developmental Medicine & Child Neurology 1997.39:481-483 481
7. Andrew i todd anthea i bennett candice j christie. Physical implications of prolonged sitting in a confined posture – A literature review. Ergonomics SA, 2007, 19 (2)
8. 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,no.3,516-526.
9. Ghulam fatima, muhammad mustafa qamar1, jawad ul hassan2, ayesha basharat1. Extended sitting can cause hamstring tightness. Saudi journal of sports medicine / volume 17 / issue 2 / may-august 2017.
10. Yolanda castellote-caballero,1 maríe c. Valenza,2 emilio J. Puentedura,3 césar fernández-de-las-peñas,4 and francisco alburquerque-sendín5. Immediate effects of neurodynamic sliding versus muscle stretching on hamstring flexibility in subjects with short hamstring syndrome. Journal of sports medicine volume 2014, article ID 127471, 8 pages.
11. Bhatia shweta satishkumar, bid dibendunarayan, thngamani rmalingam. Effectiveness of nerve flossing technique in chronic lumbar radiculopathy. Indian journal of physiotherapy and occupational therapy.January-march 2017, vol 11. No 1.
12. Anikwe ee1*, tella ba2, aiyegbusi ai2, chukwu sc3. Influence of nerve flossing technique on acute sciatica and hip range of motion. International journal of medicine and biomedical research volume 4 issue 2 may – august 2015
13. James W. Youdas, PT, MS1, David A. Krause, PT, MBA, OCS1,John H.

Hollman, PT, PhD1,William S. Harmsen, MS2, Edward Laskowski, MD3.The Influence of Gender and Age onHamstring Muscle Length in Healthy Adults.J Orthop Sports Phys Ther 2005;35:246-252.

14. McPartland JM, Brodeur RR: Rectus capitis posterior minor: a small but important suboccipital muscle. J Bodyw Mov Ther, 1999, 3: 30–35.
15. Manheim CJ: The myofascial release manual. Thorofare: Slack, 2001, pp23–28.
16. 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. 32(4):262-9.
17. Dr. Nilam dave1, prof. Tushar J.Palekar1 and dr. Soumik basu1*individual and combined effect of suboccipital muscle inhibition technique and doming of diaphragm technique for hamstring tightness. Int J pharm bio sci 2017 apr ; 8(2): (B) 980-988.
18. Godges J.J, MacRae P.G, Engelke K.A. Effects of exercise on hip range of motion, trunk muscle performance, and gait economy. Phys Ther 1993;73:468-477.
19. Sarkari E, Multani N.K. Efficacy of neural mobilisation in sciatica. JESP 2007; 3:136-141.
20. Pratik vakhariya 1, shruti panchal *2, bhumi patel 2. Effects of various therapeutic techniques in the subjects with short hamstring syndrome. International journal of physiotherapy and research, int J physiother res 2016, vol 4(4):1603-10. Issn 2321-1822.