International Journal of Allied Medical Sciences and Clinical Research (IJAMSCR)

ISSN:2347-6567

IJAMSCR | Volume 9 | Issue 2 | Apr - Jun - 2021
www.ijamscr.com

Research Study Medical research

Comparative study of static stretching and suboccipital muscle inhibition technique on hamstring muscle flexibility in college students

Shrikrishna Shinde[*1], Neha Warkhede[2], Neha Borse[3], Pritesh Yeole[4]

[1]*Associate Professor, MVPS College of Physiotherapy, Nashik, India*
[2]*Intern, MVPS College of Physiotherapy, Nashik, India*
[3]*Intern, MVPS College of Physiotherapy, Nashik, India*
[4]*Professor, MVPS College of Physiotherapy ,Nashik, India*

***Corresponding Author: Shrikrishna Shinde**
Email: krishnashinde12989@gmail.com

ABSTRACT

Background

Hamstring is one of the commonest muscles that often get tight. Hamstring tightness increases apparently from childhood up to age 40-49 years and its incidence is higher in males than females. Tight hamstrings can have profound effect on seated postural alignment of body and number of studies showed positive correlation between decreased hamstrings flexibility and low back pain of lumbar intervertebral disc pathology.

Aim

To compare the effectiveness of static stretching versus suboccipital muscle inhibition technique on hamstring muscle flexibility in college going students.

Methods

In this comparative study, 30 young adults were recruited from medical college. Subjects were evaluated for hamstring tightness using finger to floor test and popliteal angle. After all measurements were taken, 15 subjects were given Static stretch for 30 seconds followed by 15 seconds relaxation, 5 times in each session 3 times a week for 2weeks. Another 15 subjects were given Suboccipital muscle inhibition technique 5 min for each session, 3 times a week for 2 weeks.

Results

For paired t test, in group A, for finger to floor test and popliteal angle test $p < 0.0001$ (extremely statistically significant). In group B, for finger to floor test $p<0.0001$ (extremely statistically significant). For popliteal angle test $p=0.0093$(very statistically significant).Unpaired t test was not found significant when the data was compared between the groups.

Conclusion

The comparison within group shows improvement in popliteal angle and finger to floor test, but when compared between both groups are equally effective.

Keywords: Hamstring muscle tightness, Static stretching, Suboccipital muscle inhibition.

INTRODUCTION

Hamstring is one of the commonest muscles that often get tight. Hamstring tightness increases apparently from childhood up to age 40-49 years and its incidence is higher in males than females. Tight hamstrings can have profound effect on seated postural alignment of body and number of studies showed positive correlation between decreased hamstrings flexibility and low back pain of lumbar intervertebral disc pathology. Tight hamstring muscles increase the patellofemoral compressive force because of the increased passive resistance during the swing phase of ambulation and running. In addition hamstring cross over two joints when tight muscle fails to pass through full physiological amplitude under rapid and stressful situations.

This results in varying degree of muscle damage and ultimately various hamstring injuries.[1] Various treatment techniques are available to treat hamstring tightness such as muscle energy technique, position release technique, myofacial release techniques and different stretching techniques.

The importance of suboccipital muscle inhibition Technique for cases of upper cervical spine treatment is well accepted but its relationship with other structures has not yet been identified. Erika Quintana Aparicio et al, studied the effectiveness of the suboccipital muscle inhibition technique for treating hamstring tightness. The study suggested the possible hypothesis that hamstring muscle act as postural control of suboccipital muscles.

Connection of sub-occipital muscles with duramater and presence of myofacial chains that links the connective tissue fascia and muscles along specific lines in the body. It is important to study the treatment and influence on local region where treatment is taking place and also globally in distant region. Hence the aim of present study is to find out the efficacy of sub-occipital muscle inhibition technique in improving flexibility of tight hamstring muscles.

Several studies have indicated that flexibility of the hamstrings is improved by stretching. Indeed, many stretching techniques are used in clinical practice, including ballistic stretching, static stretching and proprioceptive neuromuscular facilitation techniques. Among the stretching methods, passive and active stretching techniques are easy to implement and are useful as home exercises[(2)].

Two methods of extension and increasing the length of muscle proposed in Medical and Research Center of Rehabilitation are hold relax(HR) and static stretch(SS). Static stretch refers to Passive stretching means the passive flexibility exercises are applied with the assistance of an external force with a special method that causes the extension of soft tissue of muscle.[(3)]

To our knowledge, no studies have compared static stretching and suboccipital muscle inhibition techniques for the hamstring muscles. Thus, the purpose of this study is to compare the effect of static stretch and suboccipital muscle inhibition techniques on the flexibility of the hamstring muscles in the college going students.

METHODOLOGY

- Study design: Comparative study
- Study setting: MVPS' College of Physiotherapy, Nashik
- Duration of study: 6 months
- Sample size: 30
- Sampling technique: Convenient Sampling

Inclusion criteria

- Age between 15-25 yrs.
- College student having hamstring tightness-

a) 90-90 knee extension test< 70 degrees (with 90 degrees of hip flexion)

b) Finger to floor distance >10cms.

- Male and female both subject.

Exclusion criteria

- Any infection at knee joint.
- H/o fracture or any soft tissue injury related to knee in last 1 month.
- Non consent subject.
- Individual with H/O neck trauma.

Method of data collection

The study was conducted at MVP'S college of physiotherapy Nashik, Maharashtra. 30 subjects were evaluated for hamstring flexibility and were recruited in project according to inclusion criteria. Demographic data including gender, age were recorded.

Hamstring flexibility was assessed by popliteal angle and finger to floor test. Lower the popliteal angle, and higher the distance in finger to floor test shows less flexibility of hamstring muscle. Subject were assessed and photographic record was obtained from a mobile (Samsung m31, 64 MP).

For Finger to floor test, Subject was standing barefoot on floor. The subject was asked to bend forward and the distance from middle finger to the floor was measured. Result was taken in cms. Subjects who stayed beyond distance of 10 cm from floor were classified as reduced flexibility. For Popliteal angle test, subject was positioned supine with hip of tested leg in 90 degrees of flexion, the contra lateral leg stayed flat on examination table. The knee was extended until it reaches the maximal tolerable stretch of hamstring muscle as indicated by the patient with ipsilateral hip remaining in 90 degrees of hip flexion

For static stretching, subject was asked to lie down in supine lying with 90 degrees of hip flexion .Static stretch was applied for 30 seconds at the point where tightness in the hamstring muscle was felt. It was followed by 15 seconds relaxation.

For Sub occipital muscle inhibition, Subject was asked to lie down in supine lying. The hand of therapist was placed behind the head of subject with palm facing upwards and fingers flexed with finger pads positioned on the posterior arch of atlas. A force was applied on the atlas in the direction of ceiling for 5min with a slight traction in a cranial direction for 5 minutes in each session. Both the groups were treated 3 times a week for 2 weeks (total 6 sessions).

DATA ANALYSIS

A total of 30 subjects were included in the study out of which 15 were assigned to the Group A and 15 were assigned to Group B. All the subjects finished their intervention period of 2 weeks. The collected data was analyzed statistically using GraphPad Instat. The within group (Intra group) comparisons of the change in finger to floor distance and popliteal angle Pre and Post was assessed by paired t test. The between group (Inter group) comparisons of the change in finger to floor distance and popliteal angle Pre and Post was assessed by unpaired t test.

Table 1- Comparison of Finger to Floor test Pre and Post Interventional within Group A and Group B

	Group A	Group B
Pre assessment	16.86	16
Post assessment	9.8	11.9
t value	8.3969	8.2575
P value	<0.0001	<0.0001
Results	Extremely statistically significant	Extremely statistically significant

Table 2- Comparison of Popliteal angle test Pre and Post Interventional within Group A and Group B

	Group A	Group B
Pre assessment	44.2	44.66
Post assessment	51.4	48.26
t value	8.2575	3.014
p value	<0.0001	0.0093
Results	Extremely statistically significant	Very statistically significant

Table 3- Comparison of Finger to Floor test Pre and Post Interventional between Group A and Group B

Finger to Floor test	Pre interventional score	Post interventional score
Group A	16.86	9.8
Group B	16	11.9
t value	1.4435	0.5048
p value	0.8925	0.2594
Results	Not significant	Not significant

Table 4-Comparison of Popliteal Angle Test Pre and Post Interventional between Group A and Group B

Popliteal Angle test	Pre interventional score	Post interventional score
Group A	44.2	51.4
Group B	44.66	48.26
t value	0.3776	1.6448
p value	0.9014	0.394
Results	Not significant	Not significant

DISCUSSION

The purpose of this study was to compare the effectiveness of static stretching versus suboccipital muscle inhibition for hamstring flexibility in college going students.

In this study, 30 subjects were assigned, 15 subjects were in group A who received static stretching in six sessions for 2 weeks. Group B consisted of 15 subjects who received suboccipital muscle inhibition in six sessions for 2 weeks.

The outcome measures were finger to floor test which was measured using inch tape and popliteal angle test which was measured using a goniometer. Outcome measures were assessed pre-treatment, immediately after 1st session, after 1 week and after 2 weeks post treatment session.

In group A, the two tailed P value for paired t test of finger to floor test and popliteal angle test was <0.0001 and was extremely statistically significant. Thus the study showed that static stretching was effective in decreasing finger to floor distance and increasing popliteal angle thus improving hamstring flexibility.

In 1997, Madding stated that there is no significant difference between time periods of 30 and 60 seconds static stretches and both times cause the flexibility of hamstring muscles and extension range of knee to increase, which in this study the 30 seconds stretch has been used and has a significant effect on the recovery of hamstring muscles.[3]

The mechanisms responsible for increasing muscle length after stretching are not completely understood (Weppler and Magnusson, 2010). The improvements in ROM observed after static stretching might be explained by the fact that in static stretching there is a great possibility of increasing the number of sarcomeres in series (muscle length) due to longer exposure to the stresses generated in the specific degree of stretching, which remains constant (Bandy and Sanders, 2001). In addition, stretching increases viscoelasticity and decreases stiffness of muscular and connective tissues (Halbertsma, Van Bolhuis, and Goken, 1996); Magnusson, Simonsen, Aagaard, and Kjaer, 1996), which enhances muscular extensibility. Nonetheless, many studies (Ben and Harvey, 2010; Folp, Deall, Harvey, and Gwinn, 2006; Konradand Tlip, 2014; Law et al., 2009) have refuted the existence of muscular mechanical adaptation after static stretching. Instead, they state that what appears to be a mechanical in muscular extensibility is in fact just an increased sensory capacity of tolerating the discomfort associated with stretching of tight muscles. Regardless of the mechanism behind flexibility improvement, the benefits of both stretching and adequate flexibility seems to be real.[10]

Stretching itself enhance blood supply in joints and muscles ,helping to warm them up ,which improves functional performance during sports and activities of daily living (Savelberg and Meijer,2003).According to Ferreira,

Texieria-salmela, and Guimaraes (2007) and LaRoche, Lussier, and Roy (2008) increased flexibility from long term stretching training enhances muscle performance, which, in turn, improves functional capacity.[10]

Earlier study by Chan et al (2001) who reported that static stretching protocols of either 4 or 8 weeks are effective in terms of improving flexibility of hamstrings. The mechanism of action is that static stretching exercise causes plastic stretching which results in irreversible tissue elongation (Turner et al, 1998).[5]

In group B, the two tailed p value for paired t test of finger to floor test was<0.0001 and was extremely statistically significant whereas for popliteal angle test it was 0.0093 and was very statistically significant. Thus the study showed that suboccipital muscle inhibition technique was effective in decreasing finger to floor distance and increasing popliteal angle thus improving hamstring flexibility. These findings showed that the interventions localized at a distance from the musculature i.e. treating the suboccipital muscles for increasing the hamstring length was found to be effective. This is of special importance in this treatment approach for hamstring tightness.

Treating the hamstring in patients with acute lower back pain for increasing hamstring length such as local site stretching techniques may cause aggravation of the local inflammatory response and may cause further muscle spasm and guarding. Pollard and Ward (1997)[14]suggested a different approach i.e. cervical spine treatment that might avoid compressing or stretching irritable structures but still produce an increase in hip flexion range of motion and hamstring extensibility. Pollard and Ward reported change in the extensibility of hamstring muscle following application of cervical isometrics contract relax technique. They found significant increase in remote hip flexion range of motion. They also reported that this finding seems to be only short term in duration and did not report how long altered extensibility remained. This uncertainty about duration of this reported effects leads to difficulties in assessing this approach for therapeutic merit.[1]

Schleip (1997)[15] et al also performed proprioceptive neuromuscular facilitation techniques on the suboccipital muscles and on hamstring muscles, measuring elasticity of the latter with the SLR test whose finding revealed an increase in hamstring elasticity by 9%. Glen noted the presence of Myodural Bridge connecting rectus capitis posterior minor muscles to the duramater.[16]Mechanism of SBI (superficial back line): The superficial back line is a continuing line of fascia and muscle from head to heel which includes both the sub-occipitals and the hamstrings. The SBL helps keep us upright and is connected by the one neural system. The very small sub-occipital muscles have a link to the duramater (the membrane enveloping brain and spinal cord) and because of this are often described as the control center of the SBL having an effect on the movement of the muscles within the SBL, particularly the hamstring group.[9]

The result of this study suggests that both static stretching and suboccipital muscle inhibition technique have a significant effect on recovery of hamstring short tissue flexibility and increasing the popliteal angle. But there was no significant difference between these two methods, and it was clinically determined that static stretching, with respect to increase in popliteal angle, is slightly more effective than suboccipital muscle inhibition. The reason for this difference may be the external addition of stretch stimulation on muscle contraction which is the characteristic of static stretching (winter at al.)[2]Static stretching may be effective in increasing the length of muscle due to the prolonged stretching, which may allow the muscle spindle to adapt over time and cease firing. The result of this adaptation/relaxation of the muscle spindle is an increased length in the muscle[12]

CONCLUSIONS

It can conclude that both the techniques are effective in improving hamstring muscle flexibility. Both Static stretching and Suboccipital muscle inhibition technique are significant to increase popliteal angle and decrease distance in finger to floor test which have improved hamstring flexibility. Clinically it is observed that static stretching causes more increase in popliteal angle post treatment session as compared to suboccipital muscle inhibition technique.

LIMITATIONS

-Short follow up time
-Only younger population
-Majority of subject were females
-Small sample size

REFERENCES

1. Jagtap Pramod K, Shubhangi D. Mandale"The effect of suboccipital muscle inhibition technique on Hamstring tightness patients". J Evol Med Dent Sci. 2015, (23 April 2015); 4(33, April 23):56825689. doi: 10.14260/JEMDS/2015/831.
2. Nishkawa Yuichi, Junya. Aizawa, Tetsuya Takahashi"immediate effect of passive and active stretching on hamstrings flexibility: a single-blinded randomized control trial." (10 July 2015) Pg-3167-3170 J. Phys Ther Sci. 2015; 27(10).
3. HoshangBakhtiari Amir, Haji Hasani Abdolhamid, AmoozadehKhalili Mohammad. Comparative study of Static stretch and Hold relax on increasing the range of motion of knee extension and flexibility of shortened hamstring muscles of male students in Semnan; October 2014. doi: 10.5812/mejrh.24365.
4. Chaurasia BD's Human anatomy. Page no-90 and Vol 3 (Head and Neck). 7th ed, Page no-185. Vol. 2(lower limb, Abdomen and Pelvis).
5. ODUNAIYA NA, HAMZAT TK, AJAYI OF. The effects of static stretch duration on the flexibility of hamstring muscles. Ibadan, Nigeria: Department of Physiotherapy College of Medicine, University of Ibadan (FEB 2005).
6. Chico. Duane Knudson, California State University – Chico, Department of Kinesiology, First and Normal St. J Exer Sci Physiother. 2006; 2: 3-12:95929-0330.

7. Carregaro RL, Silva LCCB, Couryhjc Gil. Comparison between two clinical tests for the evaluation of posterior thigh muscles flexibility. São Carlos, SP, Brazil: Physical Therapy Post-Graduation Program, São Carlos Federal University; March/April 2007DOI: 10.1016/j.jmpt.2009.03.006.
8. Aparicio Erika Quintana 1. Luis BorralloQuirante, Cleofás Rodríguez blanco, Francisco AlburquerqueSendín:"immediate effects of the suboccipital muscle inhibition technique in subjects with short hamstring syndrome".
9. Desai B, Foram B, Shreeya V, Maru G, Nagvadiya K, Parsaniya SB. A STUDY TO COMPARE RETRO-WALKING (BACKWARD WALKING) AND SUBOCCIPITAL MUSCLE INHIBITION TECHNIQUE IN HAMSTRING MUSCLE FLEXIBILITY IN COLLEGIATE STUDENTS: AN EXPERIMENTAL STUDY. Int J Physiother Res. 2019; 7(3):3085-9. doi: 10.16965/ijpr.2019.126.
10. Medeiros Diulian M, Cini Anelize, Sbruzzi Graciele, Lima Cláudia S. Influence of static stretching on hamstring flexibility in healthy young adults: systematic review and meta-analysis. Physiother Theory Pract. 2016; 32(6):438-45. doi: 10.1080/09593985.2016.1204401. PMID 27458757.
11. O'Sullivan Kieran, Murray Elaine, Sainsbury David.
12. Nelson Russell T, William D. Bandy "Eccentric Training and Static Stretching Improve Hamstring flexibility of High schools males".
13. PrahaladaKarnati Venkata Naga, Ammar Mohammad Ali Mohammad. Static versus PNF Stretching in hamstring flexibility A Comparative study.
14. Pollard H, Ward G. The effect of upper cervical or sacroiliac manipulation on hip flexion range of motion. J Manipulative Physiol Ther. 1998;21(9):611-6. PMID 9868632.
15. Schlelp R. Rolling and the neuro-myofacialnet. Boulder: Rolflines; 1996.
16. De Pino Glen M, et al. Duration of maintained hamstring flexibility after cessation of an acute static stretching protocol. J Athl Train. 2000;35:56:9.

How to cite this article: Shrikrishna Shinde, Neha Warkhede, Neha Borse, Pritesh Yeole. Comparative study of static stretching and suboccipital muscle inhibition technique on hamstring muscle flexibility in college students. Int J of Allied Med Sci and Clin Res 2021; 9(2): 246-250.

Source of Support: Nil. **Conflict of Interest:** None declared.