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A comparative study between neurodynamic sliders and static stretching on hamstring flexibiliy in normal individuals with hamstring tightness

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ABSTRACT

Background and Aim

Flexibility is considered important for general health and fitness. The Neurodynamic sliders technique has been shown to improve hamstring flexibility. It targets the neural tissue as well as the surrounding connective tissue rather than only the muscle tissue which is targeted mainly in the static stretching. The aim of this study is to compare the effects of NDS (Neurodynamic sliders) and static stretching on hamstring flexibility in order to identify the most effective intervention for hamstring tightness.

Methodology

An experimental study was carried out wherein 60 individuals selected by random sampling by Active Knee Extension test (AKE) were divided in two groups, (30 each) one received NDS and the other received static stretching. The individual interventions were given 3 times per week for 4 weeks and the AKE was repeated in the 4th week to record results.

Result and conclusion

The study suggests that there is a statistically significant difference for an increase in hamstring flexibility in participants with static stretching as well as those with NDS which indicates that both static stretching and NDS are effective in increasing the hamstring flexibility individually .The comparison between the two indicates that both of them are equally effective.

Keywords: Neuro dynamic sliders, Hamstring, Flexibility

INTRODUCTION

Flexibility is the ability of a muscle to lengthen, allowing one joint or more to move through a range of motion (ROM), and is important for normal biomechanical functioning [1]. Reduced flexibility could be due to postural adaptations, scarring, muscle spasms or contraction. Regardless of the cause, tightness is followed by a limitation in the joint range of motion (ROM) and a muscular imbalance [2].

There are various techniques improving hamstring flexibility like static stretching, PNF, MET etc. The Neuro dynamic sliders technique is one such technique. It is a method of producing sliding movement of neural structures relative to their mechanical interfaces .It provides tension on the targeted nerve proximally via joint movements while releasing tension distally and then reversing the sequence. Neural sliders produce significant movement in nerves without generating much tension or compression and are considered useful in the reduction of pain and the excursion of nerves [3].

Passive stretching also used to improve hamstring flexibility is a technique where a therapist provides a sustained end range stretch in order to elongate a shortened muscle tendon unit and periarticular connective tissue [4].

Flexibility is important for general health and fitness [5]. Multijoint muscles such as the hamstrings which have large functional movements are more prone to musculoskeletal injuries. Reduced hamstring flexibility can cause hamstring strains, low back pain [6] plantarfasciitis [7] and patellofemoral pain syndrome [8]. It can bring about altered postures as tight hamstrings can cause the pelvis to tilt posteriorly and flat back posture. Flexibility of hamstrings is also important for daily activities like bending, long sitting.

Stretching has been conventionally used to improve hamstring flexibility in individuals with hamstring tightness. The effect of Neurodynamic sliders which work on the excursion of the neural tissue and the surrounding connective tissue rather than only muscle tissue have seldom been compared to conventional stretching. Hence it is required to be explored if it, gives better results than the conventional techniques to identify the most effective intervention of a very common condition such as hamstring tightness in the age group of 18-25 mainly consisting of students where prolonged sitting increases tightness [9].

Methodology

- Study design Experimental study
- Sampling Purposive Random Sampling
- Sample size 60

Inclusion criteria

- Subjects in the age group of 18-25 years
- Subjects having knee extension < 160 degrees checked by the Active Knee extension (AKE) test.[10]
- Both genders

Exclusion criteria

Injury to the hamstrings within the past 1 year Subject performing regular stretching exercises History of neck trauma (whiplash) Neck pain History of Neurological or orthopaedic disorders Diagnosis of Low back pain in the last 6 months Lumbar Radiculopathy Vertigo Neurovascular and cardiovascular disorders. Recent Fractures [11].

MATERIALS

- Universal goniometer
- Plinth
- Stool

PROCEDURE

An experimental study was done in subjects with hamstring tightness in Talegaon Dabhade, Pune. The subjects were selected on the basis of the above mentioned criteria. An informed consent was then taken from the subjects. They were screened by the Active Knee Extension test. The Active Knee extension test (AKE) – The subjects were positioned on a plinth with both legs extended. Anterior superior iliac spines were positioned by aligning them with the vertical bars of the stool. The lower extremity not measured was stabilized using a strap across the thigh.

The participants were told to flex the dominant hip until the thigh touched the horizontal surface of the stool. While maintaining the contact between the thigh and horizontal surface, participants were asked to extend the leg as much as possible while keeping their foot relaxed and to hold the position for about 5 seconds.

A standard universal goniometer was placed on the lateral epicondyle of knee, and the goniometer arms were aligned along the femur and fibula [12]. Hamstrings were considered tight for having knee extension < 160 degrees.

Fig 1. AKE - Starting position

Fig. 2 After subject is asked to extend her knee

The participants were then randomly divided into two groups one group received the NDS technique on the sciatic nerve of the dominant leg. The technique started with the subject in high sitting, maintaining a thoracic slump, both hands clasped posteriorly at lumbosacral level, feet unsupported followed by alternating sets of movements of Cervical flexion, knee flexion and ankle plantarflexion and cervical extension, knee extension and ankle dorsiflexion. This set was performed for 60 seconds with 10 seconds rest. The spine is straightened in the rest period to avoid any back pain. Total 5 sets were done in one session and 3 sessions/week were done for 4 weeks. [13]. The second group received static stretching to the dominant leg for 30 seconds with 10 seconds rest, repeated 5 times. 3 times/week for 4 weeks [14]

Fig 3. Neurodynamic sliders

Fig. 4 Static stretching

RESULTS

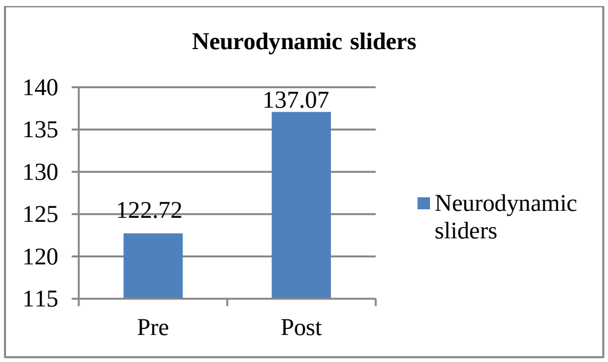

Fig 5 : The above graph shows pre and post data of NDS intervention which shows NDS is effective in increasing hamstring flexibility.

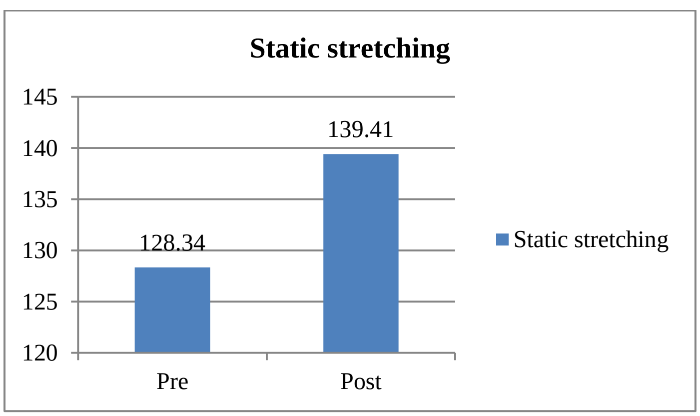

Fig 6 : The above graph shows pre and post data of static stretching intervention which shows static stretching is effective in increasing hamstring flexibility.

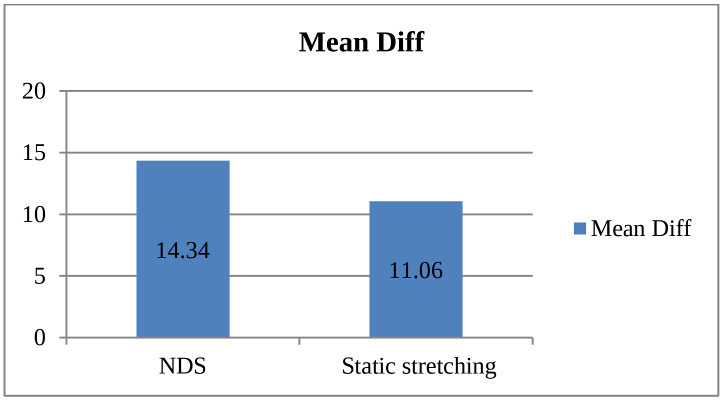

Fig 7: The above graph represents mean difference values of NDS and static stretching showing NDS as a clinically better intervention.

Table 1: Neurodynamic Sliders: Paired T Test Results

	Pre test	Post test	Difference between pre and post
Mean	122.72^0	137.07^0	14.34^0
Standard Deviation (S.D.)	10.12	9.20	7.12
Standard Error (S.E.)	1.88	1.70	1.32
P value	< 0.0001		

Table 2: Static Stretching: Paired T Test Results

	Pre test	Post test	Difference between pre and post
Mean	128.34^0	139.41^0	11.06^0
Standard Deviation (S.D.)	9.89	8.59	6.12
Standard Error (S.E.)	1.83	1.59	1.13
P value	< 0.0001		

Table 3: Comparison Between Nds And Static Stretching : Unpaired T Test Results

	NEURODYNAMIC SLIDERS	STATIC STRETCHING
Mean diff	14.34^0	11.06^0
SD	7.12	6.12
P VALUE	0.0658	

Table 4: P Values and Their Significance

	NEURODYNAMIC SLIDERS	STATIC STRETCHING	DIFFERENCE
T VALUE	10.838	9.725	1.877
P VALUE	< 0.0001	<0.0001	0.0658
SIGNIFICANCE	EXTREMELY SIGNIFICANT	EXTREMELY SIGNIFICNT	NOT QUITE STATISTICALLY SIGNIFICANT

Out of 60 subjects screened, 58 subjects completed the entire protocol (2 dropouts). Paired t test was done to compare the pre and post results of static stretching and NDS (Intragroup analysis). Both static stretching and neurodynamic sliders were effective in increasing the hamstring flexibility individually. ($p < 0.0001$) which is considered to be extremely statistically significant.

An unpaired t test was then done to compare between static stretching and neurodynamic sliders technique (Intergroup analysis). The difference was considered not quite statistically significant ($p=0.0658$) . Thus both were equally effective in increasing the hamstring flexibility.

DISCUSSION

The present study compared static stretching and neurodynamic sliders to improve hamstring flexibility. Neurodynamic sliders and static stretching were individually very effective ($p < 0.0001$) which is extremely significant. When compared, both were equally effective. ($p = 0.658$). Which is not quite statistically significant

A randomized placebo controlled trial of neurodynamic sliders on Hamstring Responses in Footballers carried over 4 weeks suggested that abnormal mechanosensitivity due to sciatic nerve adhesion decreased hamstring extensibility and stretch tolerance , thus a NS technique targeting these neural structures was used. Sharma S, Balthillaya G [15] studied 60 healthy individuals and supported neural sliders and tensioners as an adjunct to static stretching in increasing hamstring flexibility. Castellote-Caballero Y [16] researched the effects of a neurodynamic sliding technique on hamstring flexibility in footballers by passive SLR and proved NDS to be more effective

The increase in hamstring flexibility could be due to the subject's reduced tolerance to stretch applied. Mechanosensitivity is the ease with which neural tissue becomes active after application of a mechanical stimuli. The more mechanosensitive the nerve is the more intense is the response .The NDS has been proposed to decrease this mechanosensitivity thus neural tissue can glide easily. The body is a container of nervous system in which the musculoskeletal system presents a mechanical interface to the nervous system. The mechanical interface consists of anything that resides next to the nervous system such as tendon, muscle, bone, ligaments, fascia and blood vessels. The nervous system is contained within this interface and follows the movements of the interface thus producing relative sliding. This sliding of the nerve along the nerve beds and fascial system which includes the hamstrings muscles may have led to elongation of the hamstrings.

A study titled effect of hamstring muscle extensibility, muscle activity and balance on different stretching techniques conducted as a onetime session concluded that static stretching improved hamstring flexibility. [17] A metaanalysis investigating the influence of static stretching done on hamstring flexibility in healthy young adults favored static stretching compared to the control in all the tests. [18]

Weppler and Magnuson stated that the effect of stretching in increasing the hamstring extensibility could be due to the changes in the individual's perception of stretch or pain. Thus studies supporting both neurodynamic sliders and static stretching as individual interventions increasing hamstring flexibility were confirmed. In the present study we compared Neurodynamic sliders and static stretching with the aim to find the most effective technique to improve hamstring flexibility.

CONCLUSION

Both static stretching and neurodynamic sliders are equally effective in increasing hamstring flexibility in individuals with hamstring tightness.

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