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KEY WORDS: Neural mobilization, Hamstring Flexibility, Functional Performance, Football Players.

IMMEDIATE EFFECT OF NEURAL MOBILIZATION ON HAMSTRING FLEXIBILITY AND FUNCTIONAL PERFORMANCE AMONG FOOTBALL PLAYERS IN VADODARA

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ABSTRACT

Background: Hamstring muscle injuries are a common occurrence in a wide range of sprint-based sports which accounts about 13-15% of injuries in football players. The predisposing factors for it are poor hamstring flexibility & neural tension. Epidemiological research has cited reduced flexibility as an etiological factor in acute muscle strain injury and can influence functional performance. To prevent hamstring muscle injury, routine traditional intervention is used. Neural mobilization has been an emerging technique but its research on sports field is very limited. Thus, the need of the study was to examine the immediate effect of neural mobilization on hamstring flexibility and Functional performance using this new technique and also to prevent/decrease the risk of hamstring muscle injury. **Aim:** To evaluate the immediate effect of Sciatic Neural Mobilization technique on Hamstring Flexibility and Functional Performance among Football Players in Vadodara. **Methodology:** 48 Male Football Players who met the Inclusion Criteria were recruited from Baroda Football Academy (BFA) and Swarnim Gujarat Sports University (SGSU). There was a short session of 3 minutes warm up. The Baseline and post-intervention data collection was done in a sequential order (Bilateral Hamstring Flexibility, Vertical jump test, Four-Line Sprint Test) in which in between Vertical jump & Four-Line Sprint Test 5 minutes break was provided to avoid fatigue. Following 5 minutes break, Sciatic neural sliding mobilization was given for bilateral lower limb to participants by physiotherapist. **Result:** The Data were analyzed using Paired t- Test, and there was statistically significant improvement in all the three outcome measures (P = < 0.001) **Conclusion:** The present study showed that sciatic neural mobilization had a Positive effect on hamstring flexibility and functional performance among Football Players in Vadodara.

INTRODUCTION:

Flexibility is a chief factor in physical fitness that will allow smooth and safety movements. [1] It is limited mainly by muscles crossing multiple joints, such as the hamstrings and joint capsules. [2] The commonest muscle to always go for tightness is the Hamstring muscle Thus; the flexibility of hamstring muscle is always emphasized more. [3] It plays a significant role in performance of activity such as controlled trunk movement, walking, running, & jumping. [1] When it comes to injury level, Hamstring muscle injury is one of the most common musculoskeletal tendinous injuries in lower extremity which accounts about 13-15% of injuries in football players. [1,4] There are Many predisposing factors suggested within the literature for hamstring muscle injury, including insufficient warm up, poor flexibility, muscle imbalances, neural tension, fatigue, and previous injuries. [5] the most important predisposing factors to be focused of hamstring muscle injury are poor hamstring flexibility & neural tension. [6, 7] Epidemiological research has cited reduced flexibility as an etiological factor in acute muscle strain injury and can influence functional performance. [8] Functional Performance defined by Manske and Reiman as tests/measures which is used as assessment tool to qualify and quantify specialized movements in sport and exercise. [9] The factors which can affect the Functional performance in football players are motivation, warm up rating, flexibility and power, speed & endurance. Depending on this above described factors, for present study we are mainly focusing on two factors that are Flexibility and Speed. Thus, there are certain tests which can be used to check Functional performance in football players. [10] Which Include 1) Bilateral Hamstring Flexibility [11] 2) Vertical Jump Height [12,] 3) Four-Line Sprint Test. [10]

Neural mobilization is an intervention which is given as active stretches through which the nerves are made taut and then slack. [3] It is an intervention aimed at restoring the homeostasis in and around the nervous system, by mobilization of the nervous system itself or its structures. [13]

Currently, there are two types of neural mobilization which are being empirically examined. They are known as neural gliding and neural tensioning. [14]

Over the past few decades, in the field of physical therapy, neural mobilization has been an emerging technique for treatment of musculoskeletal disorders with neural involvement but research on neural mobilization in sports field is very limited. Furthermore, there have been very few studies investigating the immediate effects of neural mobilization on hamstring flexibility & Functional performance in football players. To prevent hamstring muscle injury, routine traditional physiotherapy intervention (static or dynamic stretching protocol) is used but a study on effect of neural mobilization on hamstring flexibility & Functional performance is very limited.

Thus, the need of the study is to examine the immediate effect of neural mobilization on hamstring flexibility and Functional performance using a neural mobilization technique rather than the traditional intervention and to prevent/decrease the risk of hamstring muscle injury.

AIM & OBJECTIVES:

- To evaluate the immediate effect of Sciatic Neural Mobilization technique on Hamstring Flexibility among Football Players in Vadodara.
- To evaluate the immediate effect of Sciatic Neural Mobilization technique on Functional Performance among Football Players in Vadodara.

MATERIALS AND METHODOLOGY:

Source of data: Male Football players were recruited from Baroda Football Academy (BFA) and Swarnim Gujarat Sports University (SGSU), Vadodara.

Study Site: Sports Authority of Gujarat, Manjalpur, Vadodara.
Study Population: Football Players.

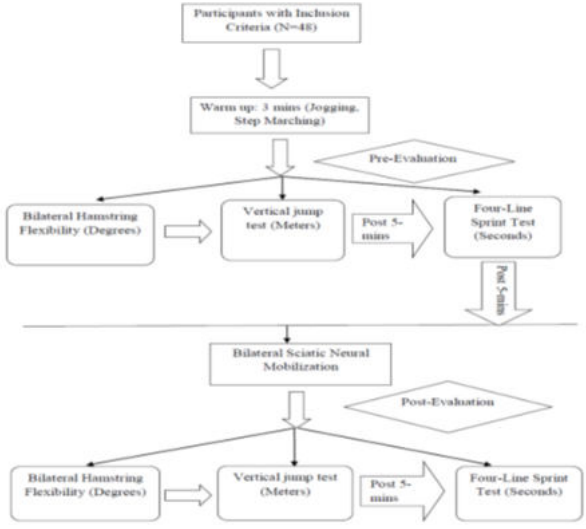
Sample Size: 48 participants have taken part in present study to estimate improvement in Hamstring Flexibility by 5 degree with SD = 9.75 at 1% risk and 80% power.[3]

Type of Sampling: Convenient Sampling.
Study Duration: March 2020-January 2021
Study Design: Experimental Study.

INCLUSION CRITERIA:
- Normal healthy individual with age group of 15-25 years.
- Gender: Male.
- Football players at least playing at District/ State/ National level.
- Football Players regularly playing in game at least once a week for 30 minutes since last 1 year.

EXCLUSION CRITERIA:
- Any injury in last six months to lumbar region or either Lower Extremity which required medical attention or limited their activity for more than 3 days.

PROCEDURE:
This Experimental study was conducted after taking ethical approval from Institutional Ethical Committee of BITSP. For the present study, Forty-Eight Male Participants who met the Inclusion Criteria (Age: 21.06 ± 1.961, Weight: 64.33 ± 4.852, Height: 175.1242 ± 7.45446 & BMI: 20.994 ± 1.3620) were recruited from Baroda Football Academy (BFA) and Swarnim Gujarat Sports University (SGSU) and study was conducted at Sports Authority of Gujarat, Manjalpur, Vadodara. Verbal explanation was given to all 48 participants regarding this study. Prior conducting the study written consent was taken.



OUTCOME MEASURES:
1. Bilateral hamstring flexibility (degrees) (11, 14): Active SLR (Straight leg raise) Test was used to check Hamstring muscle flexibility for both lower limb using Digital Inclinometer same as described by Davis et al.

Figure 1: Bilateral hamstring flexibility Measurement

2. Vertical jump height (12, 15): This test was used to Access the lower limb power. It was performed using chalk on finger method. Two jumps were carried out with 30 sec recovery between trial and average of it was used for Analysis. It is having good Reliability i.e. ICC= 0.87-0.93

3. Four-Line Sprint Test (10): It was used to measure sprinting ability and intensive acceleration. The time was calculated using handheld stopwatch same as described by Dieter Rosch et al.

Figure 2: Vertical jump height Measurement

Figure 3: Performance of Four-Line Sprint

Sciatic neural mobilization:[16,17,18]
- The physiotherapist took the limb into hip flexion with knee extended till the participant feel the first stretch then moved the ankle joint into Dorsiflexion and Plantar Flexion alternately within the available range as a maneuver to mobilize the sciatic nerve.
- This oscillatory technique of neural mobilization was given in 3 sets of 10 repetitions each with a gap/rest of 10 seconds between each maneuver for one lower extremity.
- The same procedure was repeated for another lower extremity.

Figure 4: Sciatic Neural Mobilization

STATISTICAL ANALYSIS:
- The statistical analysis was done using SPSS Version 27.0.
- Conformity of the data to normal distribution was tested using the Kolmogorov-Smirnov and Shapiro-Wilk test.
- Descriptive statistics were obtained using Frequency, Percentage, Mean, SD, CI, Median, and IQR to summarize the data. They were expressed as mean ± standard deviation (X ± SD)
- The difference between the pre to post intervention values of each and every outcome measures that is Bilateral Hamstring Flexibility, Vertical jump height and Four-Line Sprint Test with normal distribution was evaluated using the Paired t-test.

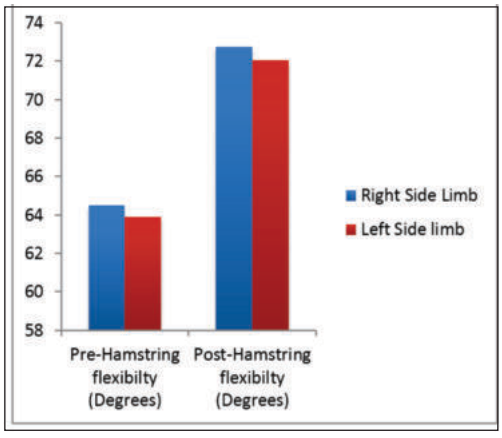
- The level of significance was set at $p<0.05$. (Confidence interval of 95%)

RESULTS:

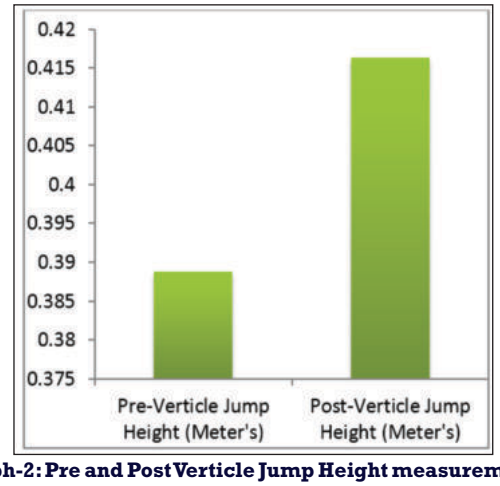
- This study was completed with a total of 48 participants. Descriptive baseline data is shown in Table-1 and the result for all the three outcome measures showed significant improvement post-intervention having P-value = < 0.001 which is shown in Graph-1, Graph-2 and Graph-3.

Table-1: Descriptive Baseline Data of participants.

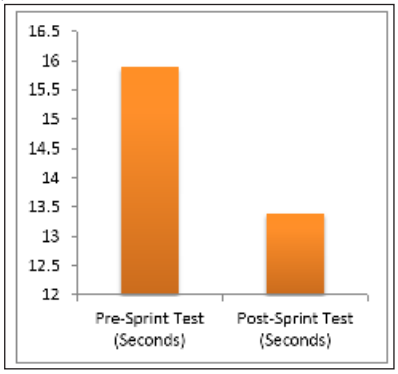
No. of Participants	48
Age (Years)	21.06 ± 1.961
Height (Cm's)	175.1242 ±7.45446
Weight(Kg)	64.33 ±4.852
BMI (kg/m2)	20.994 ±1.3620



Graph 1: Pre and Post Hamstring Flexibility measurement for bilateral lower limb (in degrees).



Graph-2: Pre and Post Verticle Jump Height measurement (in Meters).



Graph-3: Pre and Post Four-Line Sprint test measurement (in Seconds).

DISCUSSION:

In this study, Sciatic Neural mobilization was given to all 48 participants and pre to post improvement was checked using 3 outcome measures. According to the results, in each and every outcome measure there was a significant improvement seen post intervention.

There are various possible reasons for justifying the improvement in bilateral hamstring flexibility post-intervention. This may be due to improvement in neurodynamics, axoplasmic flow, vascular perfusion; maintaining Equilibrium between neural tissues and surrounding mechanical interfaces and thus inhibiting the mechanosensitivity. The another probable mechanism involved can be explained as following; when tension is applied to the nervous system during neurodynamics application, there is a decrease in the cross-sectional area and increase in pressure within the nerve which moves the sciatic nerve together along with the hamstring muscle, resulting in increased flexibility.[1,3] The result of present study is supported by a recent systemic review and meta-analysis done by Lopez LL et al. showed the effectiveness of neurodynamic treatment on hamstrings flexibility compared with no intervention and other techniques.[19]

The result for one of the variable of functional performance that is Verticle jump height (in meters) was significantly improved post-intervention may be due to increase in motor response which may have occurred as a result of accelerated axonal transport and blood flow in the neural tissue.[20] Studies suggest that there exist some relation between Verticle jump height and sprint test, this might be the reason for getting improvement in four-line sprint test post-intervention.[21, 22] Similar results were seen in studies done by Sanchez J. et al and Alipasali F. et al using various stretching techniques.[23,24]

Furthermore, the mechanism involved in getting significant improvement in both the functional performance outcome measures in present study could be due to improvement in bilateral hamstring flexibility post-intervention as study by Garcia-Pinillos F. et al suggest that flexibility of hamstring muscle is a key factor for football-specific skills performance, such as jumping, sprinting, agility, and kicking in young football players.[25]

CONCLUSION:

The results of the study indicate that application of Passive Sliding technique of sciatic neural mobilization to football players had an immediate significant effect on Hamstring Flexibility and Functional Performance. Therefore, sciatic neural mobilization can be said to have a Positive effect on hamstring flexibility and functional performance and it is Beneficial to use sciatic neural mobilization technique to prevent Hamstring injuries by improving hamstring flexibility and also to improve Functional performance in football players.

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