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Effect Of Dry Needling on Kicking Speed in Football Players with Hamstring Tightness.

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Abstract

Background:

One of the most popular sports in the world is Football. One of the most usual injury from Hamstring Tightness is hamstring muscle damage. Football is therefore a dynamic sports that causes more injuries than other sports. In clinical and fitness contexts, the term is frequently used to represent restricted motion based on by adaptive soft tissue shortening, mainly minimal muscular shortening. The term "myofascial trigger point" refers to a hyperirritable point in skeletal muscle that is connected to hypersensitive palpable nodules in a taut band and has the characteristics of localized pain, soreness, motor dysfunction, and autonomics disturbances. Dry Needling is trained technique that involves penetrating the skin with a small needle to stimulate trigger points, muscles and connective tissue for the treatment of musculoskeletal pain.

Method:

Football players with Hamstring tightness [n=53] were included in the study according to the selection criteria. Subjects were evaluated for hamstring tightness using popliteal angle and kicking speed was assessed before and after the treatment. Subjects were given dry needling on hamstring muscle for the period of 1 week alternately.

Results:

Statistical analysis was done using paired t test. Based on the result there is increased in popliteal angle p=[0.000] and kicking speed time p=[0.0001] of the players when compared with pre and post treatment. Dry needling technique was proved statistically in reducing hamstring muscle tightness.

Conclusion:

It is concluded that Dry needling proves to be effective in improving hamstring flexibility and kicking speed among football players and hence helps in bringing out their best performance on the field.

Keywords: Dry Needling, Trigger points, Myofascial tigger points, Kicking speed, Hamstring tightness.

1. Introduction:

One of the most popular sports in the world is football. One of the most usual injury from hamstring tightness is hamstring muscle damage.[1] Football is therefore a dynamic sport that causes more injuries than other sports.[1] Football involves quick changes in direction and speed, which may cause a higher occurrence of bicep femoris injuries because they function as lateral rotators when the hip is extended

and the knee is semi-flexed.[1] The most common injury is hamstring tightness, which causes hamstring muscle injury.[1]

The most typical muscular strain to affect the lower limb in elite athletes is the hamstring strain in particular.[2] In men's professional soccer, muscle injuries contribute for over one-third of all time-loss injuries, with a mean break period of 19 days and an injury rate of 1.0 per 1000 hours played.[2] Muscle injuries are common in sports that require quick acceleration or deceleration, jumping, turning, or kicking, and can result in significant time off for the sport as well as diminished performance upon return.[2] In football, hamstring injuries are most commonly sustained while running or sprinting in the biceps femoris, with the muscle-tendon junction being the most common injury site; hence, effective running and sprint mechanics are important.[3] High forces are present in both closed and open kinetic chain activities, which can cause the length of the hamstring muscles to vary by up to one-third as a result of eccentric or concentric contraction.[1] The hamstring continues to be active during the concentric contraction of the first half of the stance phase, opposing distal knee extension while hip stretching.[3] At later stages of the swing phase while running, the hamstrings help to proximally assist hip extension while acting to slow down distal knee extension.[3] It is believed that strain injuries are most likely to happen directly before heel impact, during the eccentric contraction of the hamstring near the conclusion of the swing phase, when the muscle reaches its maximum length.[3]

In clinical and fitness contexts, the term "tightness" is frequently used to represent restricted motion based on by adaptive soft tissue shortening, mainly minimal muscular shortening.[4] From minor muscle shortening to permanent contractures, restricted motion can take many different forms.[4] The muscle tightness is also used to describe an adaptive shortening of the contractile and non-contractile components of the muscles.[4] The hamstrings were the most affected of the four muscles studied, with 84 percent of subjects reporting tightness, followed by the iliopsoas with 43 percent, rectus femoris with 33 percent, and iliotibial band tightness with 26 percent.[4] These muscles in the lower extremities should maintain flexibility because they are used more commonly during football.[4] The speed of the foot as it makes contact with the ball is a significant factor in determining ball speed and kick distance.[5] The foot is the quickest part of the open kinetic chain during kicking, which can alternatively be defined as an accumulation of forces or "whip-like" process.[5] The various football codes place a high value on kicking distance and accuracy.[5] In a football game, kicking speed and distance are also vital qualities.[5]

The term "myofascial trigger point" refers to a hyperirritable point in skeletal muscle that is connected to hypersensitive palpable nodules in a taut band and has the characteristics of localized pain, soreness, motor dysfunction, and autonomic disturbances.[6] Many non-invasive techniques, including stretching, ischemia compression, laser therapy, acupressure, ultrasound, and pharmaceutical treatments, have been applied to reduce musculoskeletal pain.[6] Trigger points adversely impact people's social and professional life and significantly lower quality of life by producing pain and functional impairment. Acupuncture is a minimally invasive method that can be used to treat muscular pain.[6] DN is trained technique that involves penetrating the skin with a small needle to stimulate trigger points, muscles, and connective tissues for the treatment of musculoskeletal pain condition. By lowering the degree of overlap between the actin and myosin filament, dry needling offers a mechanical localized stretch to the shorter sarcomeres and constricted cytoskeleton structures within the trigger points, allowing sarcomeres to restore their resting length.[6]

A popular intervention performed by physiotherapists to treat a variety of problems is dry needling.[7] Dry needling has been demonstrated to be beneficial for treating TrPs related pain quickly, increasing

range of motion, and enhancing quality of life.[7] TDN carries a risk of haematoma, pneumothorax, infection and nerve damage.[8] Dry needling for trigger points can be done superficially (to a depth of 5–10) or deeply, penetrating the belly of the affected muscle.[8] The needle is then removed once the MTrP has been removed in the majority of deep TDN procedures after slowly manipulating the tissue to cause a localised twitch response (LTR).[8] Rapid, involuntary contraction of the MTrP-containing muscle fibres is the defining feature of a local twitch response.[8] A heavy bout of ecentric or concentric loading has been theorised to cause the development of myofascial trigger points.[8] Due to an excessive release of acetylcholine, enhanced activation of nicotine receptors, and inhibition of acetylcholinesterase at the motor endplate, this loading might cause localised muscular contractures.[8] It indicates when compared to non-pathological muscle fibers, active MTrPs have higher concentrations of inflammatory and nociceptive chemicals as well as a lower pH.[8] The physical impairments related to the existence of MTrPs, such as range of motion, weakness, and painful contraction, are most likely caused by these physiologic changes.[8] Points of tension targeting and removing local MTrPs by dry needling is a common therapeutic method for aforementioned deficits.[8

2. Materials:

1) Cotton
2) Sanitizer
3) Pen
4) Hand gloves
5) Needles
6) Stopwatch
7) Paper
8) Cones
9) Goniometer
10) Football

3. Methodology

Type of study: Experimental study
Study design: pre-post experimental
Study duration: 6 months
Type of sampling: probability sampling
Sample size: 53
Study setting: Football academy / sports club in Sangli and Miraj city

4. Abbreviations

DN	Dry needling
TrPs	Trigger points
MTrP	Myofascial trigger points
KS	Kicking speed

HT	Hamstring tightness

5. Outcome measures:

Popliteal Angle Test:

The Popliteal angle test is developed with an object fixed end point, minimal associated pelvic motion, and easy of use in consideration. The test is performed, the subject is in supine position. The limb is to be tested is flexed at 90 degree both at hip and knee, while the opposite limb is extended at hip. Now the therapist passively extends the knee till the maximum tolerable stretch of hamstring muscle. Then the angle is measured.

INTERV ENTION:

Dry Needling Technique:

Subjects will assigned to the treatment on hamstring tightness.
Pre treatment and post treatment by using popliteal angle test.
The subject will be in prone position.
The area is well sterilized where the needle is inserted.
Study protocol – 1 session/ Alternate day-one week.

6. Results, Figures and Tables.

Statistical analysis was done using Paired t test.

Table No 1:

Distribution of patients according to Age:

Age group	Frequency	Percent
18 to 19	15	28.30%
20 to 21	23	43.40%
22 to 23	15	28.30%
Total	**53**	**100%**

In This group, maximum number i.e. 23 patients (43%) belonged to age group 20 – 21 years and remaining 15 patients (28%) were having age between 18 – 19 years and 22 - 23 years.

Graph No 1:

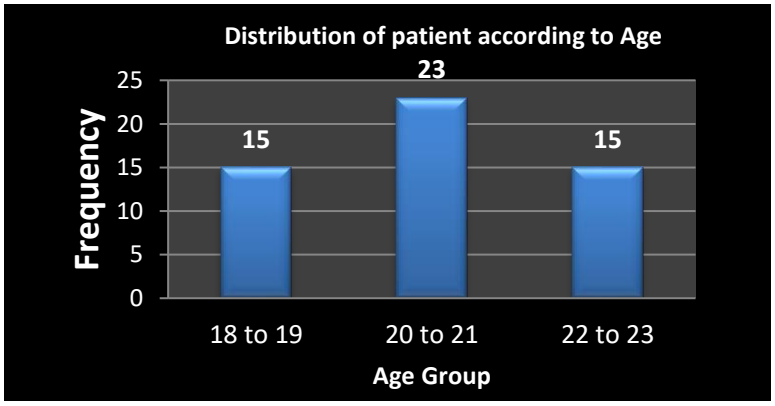
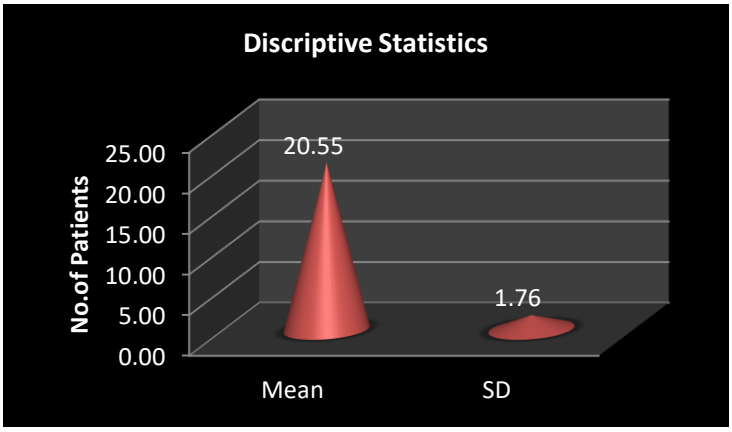


Table No. 2:
Descriptive Statistics:

Particular	Minimum	Maximum	Mean	SD
Age	18	23	20.55	1.76

Graph No. 2:



The above graph depict that, average age of patient was 20.55 years with age Variation 1.76.

Statistical Analysis of different parameters:

For this assessment parameter "Paired t Test" is used for intra-group comparison. (I.e. pre and post intervention score).

We have tested hypothesis for each parameter and result is represented accordingly, the level of significance is kept at 0.05. Proper summary statistics like contingency tables, percentages are provided along with graphs & diagrams

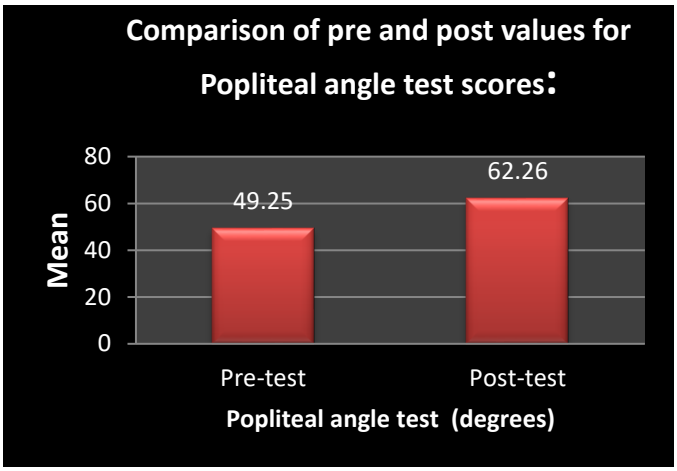
1. **Popliteal angle test (degrees):**

Table No. 3:

Group	Mean	SD	Mean Difference	SD Difference	Sample size	Paired t test	P-Value
Pre – test	49.25	9.43					
Post – test	62.26	9.28	13.02	6.60	53	14.35	**0.000**

For this group, the mean Improvement in Popliteal angle test [in degree] scores after treatment is significant (P-value < 0.05) at 5% level of significance. I.e. it can be said that there is significant improvement in Popliteal angle test score.

Graph No. 3:
Comparison of pre and post values for Popliteal angle test scores:



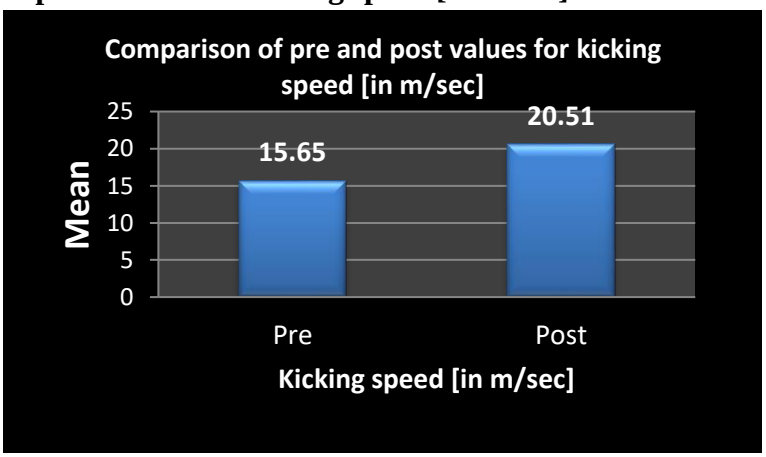
1. **kicking speed [in m/s]:**

Table No. 4:

Group	Mean	SD	Mean Difference (Post–Pre)	SD Difference	Sample size	Paired t test	P-Value
Pre – test	15.65	2.51					
Post – test	20.51	4.98	4.86	2.47	53	9.01	**0.0001**

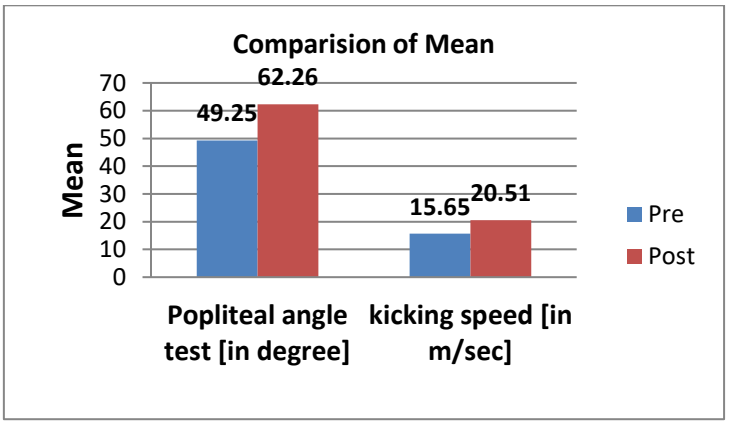
For this group, the mean improvement in kicking speed [in m/s] scores after treatment is significant (P-value < 0.05) at 5% level of significance. I.e. it can be said that there is significant improvement in kicking speed [in m/sec] score.

Graph No. 4:
Comparison of pre and post values for kicking speed [in m/sec] scores:



Graph No. 5:

Comparision of Mean:



Here the comparison of mean of popliteal angle test and kicking speed is highest after giving dry needling technique i.e pre and post treatment

7. Discussion:

The focus of this study was to study the Effect of Dry Needling on kicking speed in Football players with hamstring tightness.

The study was concluded on 53 players. Age group 18 to 23 were selected according to the inclusion criteria. The popliteal angle test was measured before and after the intervention. Dry needling was given on hamstring muscle for 3 days in a week (alternate days).

In this study it proved that dry needling is effective in improving hamstring flexibility and kicking speed in football players. This is due dry needling provides a mechanical localised stretch to the shorter sarcomeres and constricted cytoskeleton structures inside the trigger points by reducing the degree of overlap between the actin and myosin filament, enabling sarcomeres to regain their resting length.[6]

As Dr. Neha Bhosale et.al [2019] indicates that numerous young people have been encouraged to start playing football as a recreation by the game's rapid rise in popularity in India. Comparing football players to the general population who do not participate, it is apparent that they have a flexibility deficit. Hence the recreational football players shows a very high incidence of hamstring tightness.

As the Santosh Metgud et.al [2018] shows that dry needling is helpful in reducing pain intensity and improving muscle flexibility. Dry needling's immediate effects were more noticeable in reducing the gastrocnemius soleus muscle's discomfort level. As a result, flexibility improved right away post dry needling.

As the Noureddin Nakhostin Ansari et.al (2020) shows that in this study the popliteal angle was increased after dry needling. After dry needling, the hamstring's inactive compliance increased noticeably. The improvements occurred without the muscles being stretched or being held in flexed position for a long time.

As the Warren B Young et.al [2011] The speed at which the foot makes contact with the ball indicates that being able to kick the ball far and quickly is beneficial. The gluteal, hamstring, and knee flexor muscles are also especially involved in a maximum soccer kick.

8. Conclusion:

This study conducted that Effect of Dry Needling on kicking speed in football players with hamstring tightness. P value is [p=0.000] in popliteal angle test and in kicking speed the p value is [p=0.0001] , which is less than 5% of level of significance. So the alternate hypothesis is been accepted here. This study comes to the conclusion that although dry needling is successful in increasing hamstring flexibility, it also enchances the kicking ability of football players. Football players who have tight hamstrings can increase their hamstring flexibility with dry needling, which also helps them kick with more speed.

- **Limitations:**
  1) Only male players were included.
  2) Small sample size.
- **Suggestions:**
  1) Further study can be done on other sports also with the activity based on hamstring flexibility.
  2) Study can be done by comparing male and female subjects.

9. Acknowledgement:

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