

Effect of Muscle Energy Technique on Kicking Speed in Football Players with Hamstring Tightness - An Experimental Study

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ABSTRACT

Background: Football is a dynamic sport that requires athlete to perform many different movements and skills such as rapid acceleration and deceleration, jumping, kicking, and sliding, quick changes of directions. Hamstring muscle injury being the commonest injury is due to hamstring tightness. Prevalence of hamstring injury is common in football players because of its tightness. Muscle energy technique helps in increasing Hamstring flexibility of football players with hamstring tightness.

Purpose of Study: The purpose of this study was to find out the effect of Muscle energy technique on kicking speed in football players with hamstring tightness. The players were given 6 days Muscle energy technique on hamstring muscle to improve its flexibility. Kicking speed time was checked pre and post Muscle energy technique.

Materials and Methodology: Football players with hamstring tightness [n=40] were included in this study. Muscle energy technique was given for hamstring tightness for 6 days. Pre and post kicking speed time of the players were noted.

Result: There was decrease in kicking speed time of the players when compared with pre [0.785] and post [0.4450] Muscle energy technique was proved statistically significant [p=0.000].

Conclusion: It is concluded that Muscle energy technique helps in decreasing the kicking speed time i.e. the ball will cover the given distance in shorter period of time in football players with hamstring tightness and hence helps in bringing out their best performance on field.

Keywords: Muscle energy technique [MET], Hamstring tightness, kicking speed time.

INTRODUCTION

Football is one of the most famous sports played worldwide. Every sport in some or the other way has its own risk of injury. Hence football being a dynamic sport, contributes to a greater number of injuries. Hamstring muscle injury being the commonest injury is due to hamstring tightness. The length of hamstring muscles can change by up to one third as a result of eccentric or concentric contraction and is subject to high forces in closed and open

kinetic chain activities. In football, hamstring injuries mainly occur while running or sprinting in the biceps femoris with the muscle-tendon junction being the most common injury site; hence, it is important to look at sprint and running mechanics. Of the three hamstring muscles, the bicep femoris has the greatest muscle-tendon length and is stretched the most during sprinting, therefore being the most frequently injured muscle. Football also requires quick change of direction and speed

and this may also be a factor to the higher rate of bicep femoris injuries because they act as lateral rotators when the hip is extended and knee is semi-flexed.¹ Also the low hamstring flexibility causes decrease in their kicking performance.²

Muscle strains are most common in football with 41% injury rate, among them hamstring muscle injuries accounts for 11% and 32% of muscle strains.³ Muscle flexibility when limited, also restricts the range of motion and hence may lead to injury of muscle, affecting its function.² All this factors indirectly affects the sports performance. Hence to reduce these injuries and improve performance, hamstring flexibility is to be considered.²

The most interesting events during a football include high-intensity work, such as sprints, turns, jumps, shots, or tackles. The basic movement patterns in football require high power output and rapid force development, as well as the ability to efficiently utilise the stretch-shortening cycle in ballistic movements.²

Among, various skills used for playing football Kicking ability are most important one. It helps in goal scoring, clearance and passing. An analysis revealed that 80.69% goals scored during 2012 World Cup were achieved by kicking. Kicking ball at high velocity is also important to give the opposing goalkeeper less time to react. Therefore kicking ability plays an important role in performance of football players.⁷

To evaluate hamstring flexibility many tests have been proposed such as, Sit and reach test, Modified Sit and reach test, Active knee extension test, Passive knee extension test [popliteal angle test].⁸

Popliteal Angle test:

Popliteal angle test is designed to have an object fixed end point, minimize associated pelvic motion and to be performed conveniently.⁸ The test is performed, with the limb which 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.⁴

Various techniques for increasing flexibility of muscle are:

1. Manual or mechanical stretching
2. Self stretching
3. Neuromuscular facilitation and inhibition techniques
4. Muscle energy technique
5. Joint mobilization/manipulation
6. Soft tissue mobilization/manipulation
7. Neural tissue mobilization.⁵

Muscle energy technique:

1. It is a manipulative procedure which has evolved out of osteopathic medicine and used for increasing length of muscle and fascia and to mobilise joints. It causes voluntary muscles contractions by the patients itself in a controlled direction and intensity against a resistance applied by therapist.⁵
2. Muscle energy technique not only increases flexibility of muscle but also strengthens the muscle.
3. Liebenson (1989, 1990) describes three basic variations which are used by Lewit and Janda as well as by himself in a chiropractic rehabilitation setting.
4. Lewit's (1999) modification of MET, which he calls post isometric relaxation, is directed towards relaxation of hypertonic muscle, especially if this relates to reflex contraction or the involvement of myofascial trigger points.
5. The shortened muscle is placed in a mid-range position about halfway between fully stretched and relaxed state.
6. The patient then contracts the muscle isometrically, using maximum degree of effort, for 5-10 seconds, while the effort is resisted by the therapist.
7. On release of the effort, a rapid stretch is made to a new barrier.
8. Janda's variation on this approach (Janda 1993), known as 'post facilitation

stretch, uses a different starting position for the contraction and also a far stronger isometric contraction than that suggested by Lewit.

9. This method, which forms a component of PNF methodology and MET, is mainly used in acute settings, where tissue damage or pain precludes the use of the more usual agonist contraction, and also commonly as an addition to such methods, often to conclude a series of stretches whatever other forms of MET have been used.
10. Muscle energy technique offers a spectrum of approaches which range from involving hardly any active contraction at all, relying on extreme gentleness of mild isometric contraction, all the way to the other extreme of full-blooded, total strength contraction.⁶
11. Study also shows the effectiveness of Muscle energy technique in increasing hamstring muscle flexibility in Indian National Football Players.¹

Hamstring muscle has the ability to generate high force, by their contraction during kicking. Players with good muscle flexibility, shows better performance by good force production capabilities. Hamstring muscle flexibility is a key factor for performing football kick.

Previous studies have shown decrease in kicking speed in football players with hamstring tightness. Study also shows increase in flexibility in football players with hamstring tightness using Muscle energy technique.

So, the purpose of this study is to find out the effect of Muscle energy technique on kicking speed in football player with hamstring tightness.

The aim of the study was to evaluate the effect of Muscle energy technique on kicking speed in football players with hamstring tightness.

The objective of the study was to study the effect of Muscle energy technique on kicking speed in football players with hamstring tightness.

METHODOLOGY

1. **Type of study:** Experimental study
2. **Sampling technique:** Non probability sampling
3. **Study duration:** 6 months
4. **Type of sampling:** Convenience sampling
5. **Sample size:** 40
6. **Study setting:** Football club, Miraj.

Materials:

1. Paper
2. Pen
3. Stop watch
4. Cone
5. Universal Goniometer.
6. Football.

PROCEDURE

- Ethical clearance was obtained from the Institutional Ethical Committee.
- Subjects were selected according to the inclusion criteria.
- Prior to the study subjects were explained the procedure in vernacular language.
- A written informed consent was taken from the subjects prior to the intervention.
- The subjects were tested for hamstring tightness using popliteal angle test.
- Kicking speed time was be noted.
- After that Muscle energy technique was performed for 6days 1 session/day.
- Kicking speed time post Muscle energy technique was noted.

PRE MUSCLE ENERGY TECHNIQUE PERFORMANCE TEST:

1. Players were made to stand at the cone placed at 11m from the goal post.
2. To normalize, 2 steps run up is used for a perfect kick.
3. Subjects were asked to kick the ball as fast as possible towards goal irrespective of the accuracy.
4. The time when the ball reaches the goal was recorded in seconds.
5. 3 kicks were performed and mean was be calculated.



MUSCLE ENERGY TECHNIQUE:

1. Muscle Energy Technique was applied using post isometric relaxation technique
2. Subject lies in supine position, therapist in standing.
3. His hip was passively flexed by the therapist, till limitation.
4. Now the subject's leg was placed on therapists shoulder and was instructed to press downward, while therapist resists it for 30 seconds.
5. After contracting hamstring during relaxation, the subject's leg was taken in further flexion. 3 repetitions/ session will be carried out.



POST MUSCLE ENERGY TECHNIQUE PERFORMANCE TEST:

After applying Muscle Energy Technique again, the pre-test procedure was repeated.

Both the pre and post test data was compared and the effect was evaluated.

Statistical Analysis

Statistical analysis was performed using Statistical Package for the Social Sciences [SPSS] software 16.0. The level of significance [p=0.000] for Pre and Post Kicking Speed was performed using Paired t test.

RESULTS

Data analysis was performed using Statistical Package for the Social Sciences [SPSS] version 16.0. The level of significance for PRE and POST Kicking speed was calculated by Wilcoxon Signed Ranks Test.

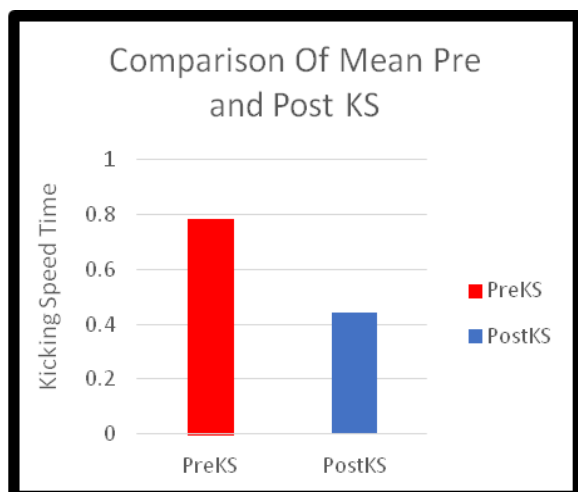
For this study total of 40 football players with hamstring tightness were included. To check their kicking speed, Kicking speed test was used Pre and Post Muscle energy technique.

Statistical analysis based on Wilcoxon Signed Ranks Test using Kicking speed test:

Table No. 1: Difference between Mean and SD of Pre and Post session

Variables	Kicking Speed		p- value
	Mean	SD	
Pre	0.785	0.8738	0.000
Post	0.4450	0.5524	

Data Analysis Representation On Chart:



Graph No.1: Shows Mean Pre and Post kicking speed time.

- Table and Graph No.1 shows the pre and post kicking speed mean and standard deviation values and also the p value[0.000] which is extremely significant.
- Mean, pre[0.785] post[0.4450] and SD, pre[0.8738] post[0.5524].
- The result of the study revealed that Muscle energy technique has extremely significant effect[p value=0.000] on kicking speed time in football players with hamstring tightness.

RESULT FROM ANALYSIS

- On an average Pre and Post Kicking Speed time has reduced in football players with hamstring tightness using Muscle energy technique
- Hence it proves that Muscle energy technique helps to reduce the kicking speed time i.e. the ball will cover the given distance in shorter period of time in football players with hamstring tightness.
- P-value is zero, which is less than 5% level of significance. So we may reject H_0 . In other words, we can accept alternative hypotheses H_1 .
- Hence, we may conclude that there is a significant effect of Muscle energy technique on Kicking speed in Football players with Hamstring Tightness.

DISCUSSION

The focus of this study was to study the effect of Muscle energy technique on kicking speed in football players with hamstring tightness. As Wilson, Murphy, and Pryor (1994) indicated that a muscle which has greater length shows a higher rate of shortening and consequently, a stiffer musculotendinous unit. Hence, this may facilitate performance by improving the force production capabilities of the contractile component and by enhancing initial force transmission.¹⁰ F. Garcia-Pinillos et al. [2015] indicated that young football players who have good HF obtained better performance in Kicking speed than players with poor HF. Roshan Adkitte et al. [2020] indicated that Muscle energy technique has been shown to be an effective technique in increasing the flexibility of hamstring muscle in Indian National Football Player's.

We therefore hypothesised that players with increased hamstring flexibility with help of Muscle energy technique, would require less time to kick the ball as compared to without Muscle energy technique. It is well known that acute stretching exerts a short-term or transient effect, which may accumulate with repetition to modify the basal flexibility or range of movement and muscle force generating capacity (Shrier, 2004)⁹. Nevertheless, as per earlier studies there are no studies that have examined the influence of Muscle energy technique on kicking speed in football players with hamstring tightness and that is why this paper is novel.

Oliveira et al. (2013) concluded that flexibility can be a decisive factor in skill performance as demonstrated by kicking deficiencies for football players with shortened hamstring muscles in comparison with athletes those had good hamstring flexibility.¹¹ The results obtained in this study supports the above studies conclusion, pointing out that kicking speed is good in players with good hamstring flexibility.

Muscle energy technique is said to inhibit motor activity through the Golgi

tendon organs or the muscle spindles. The latency period of approximately 10 sec that is present after the isometric phase in post isometric relaxation technique is helpful.

During this period, the movement toward the new position of a muscle or joint can be easier (due to the reduction in tone).

“Creep” is the temporary elongation of connective tissue during stretch as a result of its viscoelastic properties. Permanent “plastic” changes occur as a result of remodelling and micro-tearing of connective tissue fibres. Muscle energy technique may produce increased muscle length by a combination of plastic and creep changes in the connective tissues. If the relaxation phase in Muscle energy technique would be performed for 30 s, it could be lead to a prolongation of the muscle due to plastic changes in the connective tissue and also due to creep.¹² Ahmed have indicated that the application of post isometric relaxation technique produce greater changes in muscle extensibility.¹³ It has been discussed by Abreham that Muscle energy technique is a better technique in improving hamstring flexibility when compared with ballistic stretching.¹⁴ Ramesh and Sivasankar have indicated in their study that in Muscle energy technique an increase in muscle length may be due to the biomechanical event, neurophysiological changes, and increase in tolerance to stretching.¹⁵

The present study revealed that as Muscle energy technique helps in relieving hamstring tightness, player showed positive effect i.e., decrease in kicking speed time after Muscle energy technique is applied.

CONCLUSION AND LIMITATIONS

This study highlights the effect of muscle energy techniques on kicking speed in football players with hamstring tighten. P-value is zero, which is less than 5% level of significance. So we may accept alternative hypothesis. This study concludes that as MET is effective for increasing hamstring flexibility it further helps to improve the kicking ability of football

players, having hamstring tightness. Taken together, these results suggest that good HF is a key factor for young football players not only for preventing injuries, as previous studies have concluded, but also for performing football-specific skills, such as kicking. These results support the rationale that muscle flexibility needs to be part of the specific training of football players beginning at early ages.

The limitation of this study was that female participants can also be included and also the following study can be conducted at different levels of football players.

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