International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2024: 7.101

A Study to Compare the Effectiveness of Static Stretching Versus Muscle Energy Technique on Hamstring Flexibility among Amateur Foot Ball Players

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Abstract: ***Hamstring strain injuries (HSI) are the most common injury in male professional football players and are potentially a primary risk factor to re-injured. Prevalence of hamstring injuries ranges from 8-25%. For the study 30 male amateur football players between the age group 18-25 years were recruited with mild hamstring tightness with active knee extension more than 20 degree. The subjects were screened for eligibility to participate in the study and regarding the study. The subject explained the purpose of the study and their role in the study. STUDY DURATION: 4 weeks duration with 3 sessions per week (alternative days). PARAMETER OF THE STUDY: Back Saver Sit and Reach Test (BSSRT) and Active Knee Extension Test (AKET). The inter-group analysis compared the two treatment groups in terms of changes in all the outcome measures and the corresponding result showed that Treatment A is effective than Treatment B in terms of improvement in BACK SAVER SIT AND REACH RIGHT TEST, while there is no significant difference between two treatments in terms of improvement in ACTIVE KNEE EXTENSION TEST (RIGHT, LEFT) & BACK SAVER SIT AND REACH LEFT TEST. Hence, we conclude that Treatment A (STATIC STRETCHING) is effective than Treatment B (MUSCLE ENERGY TECHNIQUE) in improving the value of BACK SAVER SIT AND REACH TEST (RIGHT).***

Keywords: Hamstring, Football, Stretching

1. Introduction

Hamstring strain injuries (HSI) are the most common injury in male professional football players and are potentially a primary risk factor to re-injured. Prevalence of hamstring injuries ranges from 8-25% depending upon the sports, the timing for return to sports ranges from as easy as two weeks to never, depending upon injury severity and the sports in an observational study (Eric Wilrof Krause et al.2005) reported single reason prevalence rate greater than 80% among the elite soccer players. Woods et al 2004 describes than 12% of soccer player's injures are hamstring strains, and the financial burden of this is estimated to be £74.7 million hamstring muscle injures usually cause significant time loss from competition and training. Flexibility is the major component of physical fitness it is important to allow an adequate range of motion. Muscular flexibility is an important aspect of normal human function. Limited flexibility has been shown to predispose a person to several musculoskeletal overuse injuries and significantly affect a person level of function. Hamstring muscle is the muscle of back of the thigh and consist the semitendinosus, semimembranosus, long head of the biceps femoris and ischial head of the adductor magnus they share common characters, origin from ischial head and inserted into the medial tibial condyles, they are major knee flexors. Hamstring flexibility plays an important role in basic movements such as walking and running. The muscles act as flexors of the knee and extensors of the hip. The hamstrings have a major role in hip extension and hip-hyper extension. Hamstring tightness leads to high risk of recurrent injury, decreases the performance in athletes, lead to post-exercise soreness and decreases co-ordination among athletes.

Tightness in hamstring muscle cause posterior pelvic tilt which leads to decrease in lumbar lordosis result in low back pain. The length of the hamstring muscle is considered to play an important role in both the effectiveness and efficiency of basic movements such as walking, running, jumping, and controlling some movement in the trunk. Hamstring tightness causes a major in the performance of sports person and it is a common cause of pain. Thus, there is a great need of the study which reveals the importance and significance of the two physiotherapeutic interventions in treating hamstring flexibility among football players. The MET is a widely accepted method for treating hamstring tightness and sit and reach test is a procedure used to measure hamstring flexibility.

Static stretching has been defined as elongating the muscle to tolerance and sustaining the position for a length of time static stretching result in more than twice the gains in hamstring flexibility than performing DROM at the same frequency and duration.

2. Materials and Methodology

Source of Data:
Data will be collected from kannigapuram ground for amateur football player. The players will be included in the study based on the fulfillment of Inclusion criteria. The purpose of the study will be explained to all the subjects and consent from each subject will be obtained, the subjects were randomly assigned.

Method of Collection of Data:
For the study 30 male amateur football players between the

age group 18-25 years were recruited with mild hamstring tightness with active knee extension more than 20 degree. The subjects were screened for eligibility to participate in the study and regarding the study. The subject explained the purpose of the study and their role in the study.

Study Design:
The study is based on the comparative study design.

Study Duration: 4 weeks duration with 3 sessions per week (alternative days)

Inclusion Criteria: Age – 15 to 25 years, Young male amateur football players, Symptomatic individuals, Bilateral hamstring tightness, Subjects having mild hamstring muscle tightness more than 20-degree of full extension while perform 90-degree straight leg raising test, Acute injury, Lack of hamstring strength and Painful movement of hamstring.

Exclusion Criteria: Individuals with psychological disorder, Uncertain clinical diagnosis (Mental implants around knee), Fracture and dislocation, Neurological disorder, Musculoskeletal disorder, Female football players, Subject having any knee or ankle joint pathology, any congenital deformities of lower limb, Presence of tumour that can restrict ROM at knee joint.

Parameter of the Study: Back Saver Sit and Reach Test (BSSRT) and Active Knee Extension Test (AKET).

3. Procedure

Static Stretching:
Group 1 performed static hamstring stretches by standing erect with the left foot planted on the floor and pointing straight ahead (no hip internal or external rotation) the right hamstring muscles were stretched by placing the right calcaneal aspect on an elevated surface (hip enough to cause a gentle stretching sensation in the posterior high) with the knee fully extended and toes pointed to the ceiling (again no hip internal or external rotation).

The subject then flexed forward from the hip maintaining the spine in a neutral position, while reaching the arms forward until a gentle stretch was felt in the posterior thigh. Once the position was achieved the stretch was sustained for 30 seconds.

Muscle Energy Technique:
Muscle energy technique was applied using post isometric relaxation technique. While the subject was lying in the supine position, the subject's hip was passively flexed by the therapist until the bind was felt. From this position, the subject's lower leg was placed onto the therapist's right shoulder. Then the subject was asked to apply pressure over the shoulder of the therapist for 30s. After the contraction of the hamstrings and during the relaxation phase, the therapist passively took the leg into further flexion with 30s hold.

4. Statistics

t-Test: Two-Sample Assuming Equal Variances		
A_AK_EXT_RT_TEST Diff		***B_AK_EXT_RT_TEST Diff***
Mean	**8.67**	**7.33**
SD	**3.99**	**3.72**
Observations	15.00	15.00
Df	28.00	
t Stat	**0.95**	
P (T<=t) two-tail	**0.352**	

t-Test: Two-Sample Assuming Equal Variances		
A_ AK_EXT_LT_TEST Diff		***B_AK_EXT_LT_TEST Diff***
Mean	**8.33**	**7.00**
SD	**3.62**	**4.55**
Observations	15.00	15.00
Df	28.00	
t Stat	**0.89**	
P (T<=t) two-tail	**0.382**	

t-Test: Two-Sample Assuming Equal Variances		
A_ BS_S&R_RT_TEST Diff		***B_ BS_S&R_RT_TEST Diff***
Mean	**2.87**	**2.13**
SD	**0.92**	**0.35**
Observations	15.00	15.00
Df	28.00	
t Stat	**2.90**	
P (T<=t) two-tail	**0.007**	

t-Test: Two-Sample Assuming Equal Variances		
A_BS_S&R_EXT_LT_TEST Diff		***B_BS_S&R_EXT_LT_TEST Diff***
Mean	**2.93**	**2.40**
SD	**1.71**	**0.63**
Observations	15.00	15.00
Df	28.00	
t Stat	**1.13**	
P (T<=t) two-tail	**0.267**	

5. Discussion

Muscular flexibility is an important aspect of normal human function. It is generally defined as range of motion around a joint or group of a joints and reflex the ability of the muscle tendon to elongate. It has long been recognized as an important component of physical fitness and rehabilitation and is widely conjectured the benefits of good flexibility include reduction and prevention of injury risk and enhanced sports performance.

Group A-to Find out the Effect of Static Stretching
The baseline mean difference of AKET for static stretching training was 30.33 in right leg. After the end of fourth weeks the mean value of AKET has **increased** 30.33 to 39.00. The paired t test done in comparison of pre and post-test mean scored showed that; $t = 8.40$, $p = 0.000 < 0.05$.

The baseline mean difference of AKET for static stretching training (Table 4) was 31.33 in left leg. After the end of fourth weeks the mean value of AKET has **increased** 31.33 to 39.67. The paired t test done in comparison of pre and post-test mean scored showed that; $t = 8.92$, $p = 0.000 <$

0.05.

The baseline mean difference of BSSRT for static stretching training was 4.73 in Right leg. After the end of fourth weeks the mean value of BSSRT has **increased** 4.73 to 7.60. The paired t test done in comparison of pre and post-test mean scored showed that; t =-12.13, p = 0.000 < 0.05

The baseline mean difference of BSSRT for static stretching training was 4.33 in left leg. After the end of fourth weeks the mean value of BSSRT has **increased** 4.33 to 7.27. The paired t test done in comparison of pre and post-test mean scored showed that; t =-6.64, p = 0.000 < 0.05

According to **Kieran O'Sullivan, Elaine Murray & David Sainsbury** The effect of warm-up, static stretching and dynamic stretching on hamstring flexibility in previously injured in football players. The effect of warm-up and static stretching on flexibility was greater in those with reduced hamstring flexibility in football players

According to **PV Askar, Veena Pais, Nagarajan Mohan, Shaikhji Saad, Nusaibath M Shaikhji** Effectiveness of eccentric training, dynamic range of motion exercises and static stretching on flexibility of hamstring muscle among football players. It is concluded that eccentric training, dynamic range of motion (DROM) exercise and static stretching groups improved hamstring flexibility but static stretching more beneficial effect in hamstring flexibility.

Group-B to Find Out the Effect of Muscle Energy Technique

The baseline mean difference of AKET for muscle energy technique training was 30.00 in right leg. After the end of fourth weeks the mean value of AKET has **increased** 30.00 to 37.33. The paired t test done in comparison of pre and post-test mean scored showed that; t =-7.64, p = 0.000 < 0.05.

The baseline mean difference of AKET for muscle energy technique training was 31.00 in left leg. After the end of fourth weeks the mean value of AKET has **increased** 31.00 to 38.00. The paired t test done in comparison of pre and post-test mean scored showed that; t=-5.96, p = 0.000 < 0.05.

The baseline mean difference of BSSRT muscle energy technique training was 4.33 in right leg. After the end of fourth weeks the mean value of AKET has **increased** 4.33 to 6.47. The paired t test done in comparison of pre and post-test mean scored showed that; t =-23.48, p = 0.000 < 0.05.

The baseline mean difference of BSSRT muscle energy technique training was 4.13 in left leg. After the end of fourth weeks the mean value of AKET has **increased** 4.13 to 6.53. The paired t test done in comparison of pre and post-test mean scored showed that; t =-14.70, p = 0.000 < 0.05

According to **Adkitte, R., Rane, S. G., Yeole, U., Nandi, B., & Gawali, P** Effect of muscle energy technique on flexibility of hamstring muscle in Indian national football players is concluded that MET increases the flexibility of hamstring muscle in Indian National Football Players and hence it can prevent the injuries and improves their performance.

According to **Himanshi Ruparelia, Sheetal Patel:** Immediate effect of muscle energy technique (MET) and positional release therapy (PRT) on knee flexors for soccer players. This study concludes that individual receiving MET has more beneficial effect on soccer players.

Comparing the Values of Group-A and Group-B:

On comparison between the two group of A and B, the P value was found to be statistically significant for treatment Group A than treatment Group B in terms of AKET & BSSRT. There is significant difference between two treatment of right leg [A (8.67) and B (7.33)] in term of average improvement in static stretching (t= 0.95) Where the P value is (p = 0.352 > 0.05) in addition, the mean improvement in the value of AKET by treatment A is greater than that of treatment B.

There is significant difference between two treatment of left leg [A (8.33) and B (7.00)] in term of average improvement in static stretching (t= 0.89) Where the P value is (p = 0.382 > 0.05) in addition, the mean improvement in the value of AKET by treatment A is greater than that of treatment B. There is significant difference between two treatment of right leg [A (2.87) and B (2.13)] in term of average improvement in static stretching (t= 2.90) Where the P value is (p = 0.007 < 0.05). In addition, the mean improvement in the value of BSSRT by treatment A is greater than that of treatment B.

There is significant difference between two treatment of right leg [A (2.93) and B (2.40)] in term of average improvement in static stretching (t= 1.13) Where the P value is (p = 0.267 > 0.05). In addition, the mean improvement in the value of BSSRT by treatment B is greater than that of treatment A. The intra-group analysis showed that both the treatment are effective in terms of mean reduction in the value of measures, namely AKET & BSSRT. However, the inter-group analysis showed that is difference between Treatment A and Treatment B in terms of mean reduction in the value of measures, namely AKET & BSSRT.

6. Conclusion

The intra-group analysis showed that both Treatment A and Treatment B are effective in terms of improvement in ACTIVE KNEE EXTENSION TEST & BACK SAVER SIT AND REACH TEST. However, the inter-group analysis compared the two treatment groups in terms of changes in all the outcome measures and the corresponding result showed that Treatment A is effective than Treatment B in terms of improvement in BACK SAVER SIT AND REACH RIGHT TEST, while there is no significant difference between two treatments in terms of improvement in ACTIVE KNEE EXTENSION TEST (RIGHT, LEFT) & BACK SAVER SIT AND REACH LEFT TEST. Hence, we conclude that Treatment A (STATIC STRETCHING) is effective than Treatment B (MUSCLE ENERGY TECHNIQUE) in improving the value of BACK SAVER SIT AND REACH TEST (RIGHT).

7. Limitations and Recommendations

Limitations

Sample size is small, Shorter duration of the study and no long term follow up of the patients.

Recommendations

A large sample size can be taken. A study can be done with comparing other technique and also using control group. Longer study durations and follow up can be done to assess long term benefits. In future studies, different technique can be used to improve the muscle flexibility. Different age group can be included.

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