

To Compare The Immediate Effects Of Eccentric Training Versus Hold Relax Proprioceptive Facilitation On Hamstring Flexibility In Male Football Players Of Age Group 15 To 21 Years.

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Abstract: Hamstring injuries are commonly found in the sporting area and more predominantly seen in the football players due to various activities that the sport involves like running and kicking. There are different types of techniques used to decrease hamstring tightness like neurodynamic sliding, PNF stretching, static stretching and eccentric training. The purpose of study was to investigate immediate effectiveness of eccentric training versus hold relax PNF technique in male football players of age group 15 to 21 years with reduced hamstring flexibility. The study incorporated total 40 Athletes having hamstring tightness with 20 athletes in Group A and 20 athletes in Group B. Group A received eccentric training and Group B received PNF stretching and the results were calculated immediately after the treatment. Paired t test was done within the groups that showed significant increase in hamstring flexibility in both the groups while, the unpaired t test between the groups showed extremely significant improvement in Hamstring flexibility. The study therefore concluded that eccentric training and PNF stretching both are equally effective in decreasing hamstring tightness and improving knee extension ROM. Clinically more improvement was seen in group A as compared to group B.

Key Words: Hamstring, Eccentric training, PNF Stretching, Male football players.

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I. Introduction

Flexibility is defined as moving one or more joints easily through an unrestricted pain free range of motion.⁽¹⁾ Activities which are more dynamic in nature have proved to be more beneficial to increase flexibility. Hamstring injuries are the commonest injuries in the sporting area, and more often occurs in activities which involve running, sprinting, jumping or kicking activities. As documented in several studies, incidence rates of hamstring strains range between 7.7% and 30% (Bennel et al 1998) with relatively high recurrence rate between 18% and 34%. (upton et al, 1996 and heiser et al 1984). Injury surveillances showed that hamstring injuries are the most common injuries in athletics (mc lennan and mchennan, 1990 Bennel and crossley, 1996), soccer (woods et al 2004), Australian football (orchard and seaward, 2002) and cricket (orchard et al).⁽²⁾ Limited flexibility predisposes athletes to several musculoskeletal overuse injuries and significantly affects sports performance. Worrell and Perrein (1992) proposed a theoretical model for hamstring strains, suggesting that they result from complex interaction of four etiological factors as warm up, strength, fatigue and flexibility. In order to avoid muscle injuries, stretching exercises before beginning of sports activities are highly recommended. Stretching exercises will eventually increase flexibility and decreases the muscle stiffness. Various stretching techniques are applied by physical therapists and coaches. Four methods of stretching are:

1. Ballistic stretching
2. Static stretching
3. PNF stretching and
4. Neurodynamic sliding

All this four methods of stretching technique have been shown to increase range of motion as well as flexibility immediately after treatment. More recently Nelson and Bandy investigated a flexibility program which consisted of eccentric training of a muscle through full range of motion theoretically this helps to reduce injury rates, improve athletic performance and improves flexibility. It also increases strength and can help to protect against the sports injuries. ⁽²⁾ Some of the goals of pre-event flexibility training program includes decreasing the chances the individual will sustain an injury, warming the muscle, and improving the flexibility

of the muscle in preparation for the activity.⁽²⁾ PNF is more advance form of flexibility training that involves both stretching and contracting the muscle at same time. Theoretically both eccentric and PNF stretching are effective to decreases hamstring tightness and improving the flexibility.

II. Materials And Methods

Comparative research study was carried out on athletes of district coaching center, Nasik from 20August 2018 to 20th February 2019. A total number of athletes taken under study were 40 male football players of age group 15 to 21 years.

Study design: Comparative study.

Study location: This was a district coaching football center located in Nashik , Maharashtra.

Study Duration: 20August 2018 to 20 February2019

Sampling size: 40 Athletes.

Subject and selection method: The study population of the athletes was taken from football district coaching center, Nashik who presented with hamstring tightness of more than 20 degrees. They were further divided into two groups.

Group A- Eccentric Training -20 Athletes.

Group B- PNF stretching - 20 Athletes.

Inclusion criteria

1. Nonprofessional male players with active participation in football for at least 6week.
2. Age: 15-21yrs.⁽¹⁾
3. A deficit of 20 degree of knee extension with hip in 90 degree of flexion.⁽¹⁾

Exclusion criteria

1. Musculoskeletal injuries to hip and knee.⁽²⁾
2. Chronic low back pain.⁽²⁾
3. History of neck trauma.⁽²⁾
4. History of disc herniation/protrusion.⁽²⁾

Procedure methodology

After taking a written consent from athletes, they were made to lie down in supine position and active knee extension test was performed in 90-90 position of hip and knee. Thus, the degree of hamstring tightness was assessed with the help of the goniometer. The athletes were then grouped in two groups, 20 athletes in group A i.e Eccentric Training and 20 athletes in group B i.e. PNF stretching.

GROUP A: ECCENTRIC TRAINING

In eccentric training the subjects were given supine position with the non-testing lower extremity extended completely. A 0.91m piece of black theraband was hold by the end in each hand with the mid-section of the band wrapped around the testing leg heel. The exercise started with the tested leg knee locked in full extension position. The athlete then pulled the hip into full flexion and kept the knee extended by pulling on the ends of band with both arms. The athlete stopped when he felt the gentle stretch. The position at which the subject felt the gentle stretch was defined as full hip flexion. As the athlete pulled the leg into the hip flexion resist the flexion motion eccentrically contracting the hamstring muscles. The athletes gave enough resistance to slow the hip flexion moment to take five seconds to complete. The eccentric activity was performed six times for total stretch time of 30 seconds.



FIG :1 Eccentric training

GROUP B: PNF STRECHING

For hold relax stretching the subject was taken in supine position with their non-testing lower extremity stabilized by the therapist. For each stretch the therapist stretched the hamstring muscle by passively flexing the hip with knee completely extended, allowing no rotation at hip joint. The testing leg was rested on therapist shoulder. The hamstring muscle was stretched until the athlete reported the mild stretch sensations; this position was maintained for 10 seconds. Next the athlete then isometrically contracted the hamstring muscle for 3 sec by pushing the leg downwards on therapist shoulder against the resistance provided by the therapist. Following this, the athlete was asked to relax for 5 seconds. The therapist then passively stretched the muscle until the mild stretch sensation was reported. This stretch was held for 10 seconds. This sequence was repeated 5 times with each sequence separated from each by 20 seconds of interval.



FIG: 2 PNF stretching

III. Statistical Analysis

The data was analyzed with the use of graph pad and comparison with the help of statistical procedure paired and unpaired t test was done. Paired test was done within the groups and unpaired t test was done between the groups.

IV. Result

After the treatment for hamstring muscle tightness the results were immediately calculated. The results of this study showed significant reduction in pre and post mean values of the group A and group B between the groups. Group A(Eccentric training) the p value is =0.000 which is extremely statistically significant. Thus Eccentric training showed improvement in knee extension ROM.As the p value in group B is <0.000, which is extremely statistically significant. Thus PNF stretching also showed improvement in Knee extension ROM. The unpaired t-test was applied between the 2 groups, which show p value is 0.002 for Knee extension ROM. This is statistically significant. Thus Group A and Group B are equally effective to reduce hamstring tightness. Group A i.e. Eccentric training is clinically more effective compared to the other group B.

TABLE NO 1: AGE DISTRIBUTION

AGE GROUP	NO. OF PATIENTS
15-17	27
18-21	13

GROUP A ECCENTRIC TRAINING

Comparison of pre and post treatment ROM of active knee extension in group A (Eccentric training) using paired t test.

TABLE NO.2

GROUP A	PRE	POST
Mean	29.75	5.15
SD	6.975	6.44
P value	=0.000	
T	13.347	
Significance	Extremely statistically significant	

GROUP B PNF STRECHING

Comparison of pre and post treatment active ROM of knee extension in group B (PNF stretching) using paired t test.

TABLE NO.3

GROUP B	PRE	POST
Mean	28.25	11.5
SD	5.684	5.405
P value	=0.000	
T	13.180	
Significance	Extremely statistically significant	

Comparison of pre and post treatment ROM of active knee extension mean difference vaules between the groups.

TABLE NO.4

GROUP	GROUP A mean difference	GROUP B mean difference
Mean	24.60	16.75
SD	8.451	5.684
P value	0.002	
T	3.381	
Significance	Statistically significant	

IV. Discussion

To increase flexibility an activity that is more dynamic in nature are of importance. Dynamic nature of activity would cause warming effect in muscle and the muscle would be more pliable and accommodating to the stretch leading to an increase flexibility of the muscle. The study was aimed to compare the effect of eccentric training and hold relaxes PNF technique in male football players of age group 15 to 21 years with reduced hamstring flexibility. A comparative study of 40 subjects was carried out. They were grouped in 2 group's one in eccentric and other in PNF, 20 in each group respectively. Group A received eccentric training and group B received PNF technique. Pre treatment ROM of active knee extension was measured, treatment was given according to the group after which immediately the active ROM of the knee extension was checked and noted. The data collected of 40 athletes was analyzed and showed statistically significant reduction in hamstring

tightness. However, when comparison was done between two groups of eccentric training and PNF technique eccentric training proved to be more effective than the PNF technique in reducing hamstring tightness. As the p value is <0.0001 in group A, it is statistically significant. The goal of clinicians and the patients is a restoration of the normal functional motion. In order to achieve normal functional motion the patient must have flexibility and strength to perform the movement. Strengthening through full range of motion not only maintain the achieved range but also helps ensure that patient is able to use range functionally (Russell T Nelson).⁽¹⁾ The reasoning behind the greater gain in flexibility when adding eccentric resistance to DSMS may be found in rapid training effect, which has been explored in few studies on eccentric exercises by Lynn and Morgan (1994) and Lynn (1998). The training effect refers to improvement in functional ability and strength due to change in muscular, cardiovascular and neurological system.⁽⁶⁾ They found that in group of untrained college students, eccentric training was more effective than concentric strength training on peak isokinetic eccentric hamstring torque after 6 weeks of training of a leg curl machine.⁽¹³⁾ The p value of group B is <0.00001 , which means it is statistically significant. During PNF stretching autogenic inhibition of the target muscle takes place for example Moore and colleagues (1991) approved the theoretical basis of PNF stretching and proposed that relax portion of hold relax maneuver should be applied quickly after the hold position. Therefore the results of this study can be correlated with the popular belief that PNF stretching leads to relaxation and inhibition of the stretched muscle via two physiological mechanism proposed by Sherrington (1940) namely reciprocal inhibition and autogenic inhibition.⁽²⁾ Studies of PNF stretching technique suggested that autogenic inhibition of the stretched muscle provides increase ROM.⁽²⁾ Autogenic inhibition of homonymous muscle alpha motor neurons by the stimulation of Golgi tendon organ. This inhibitory effect is thought to diminish muscle activity and therefore allows the relaxation so that the muscle could be stretched. However when comparing between the two groups, eccentric training and PNF. Group A that is eccentric training was found to be more effective than group B that is PNF technique. The group performing eccentric training showed significant gain in flexibility than the group receiving PNF technique. The results supported the theory that immediate effect of performing eccentric training has been shown to increase flexibility.⁽²⁾ Eccentric training is stretching the muscle by having it contracted as it lengthens. The cross bridge do not complete the full cycle during eccentric contraction. They become suspended in an active state bounds to actin and become forcibly detached followed by a rapid re attachment, because a full cross bridge cycle is not completed less ATP is required to maintain force. Cortical excitability is enhanced during eccentric training. There is spinal inhibition that reduces the motor activity during eccentric training. Thus eccentric training is clinically more effective than the PNF stretching to reduce the hamstring tightness and increase the flexibility.

V. Conclusion

The study therefore concluded that eccentric training and PNF stretching both are equally effective in decreasing tightness and improving active knee extension ROM.

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