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Effectiveness of Various Mulligan Techniques on Hamstring Flexibility in College Level Cricketers

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Abstract:

BACKGROUND

Cricket is a popular global sport that requires a combination of physical fitness, skill, and strategy. It is a noncontact sport, overuse and impact injuries are common.Players engage in a wide range of physical activities, including running, throwing, batting, bowling, catching, and diving.Hamstring strains are common in cricket and can occur when overloaded eccenterically.

AIM

This aim is to find out the effectiveness of Mulligan's bent leg raise and traction straight leg raise along with static stretching in improving hamstring flexibility in college level cricketers.

METHODS

The Experimental study was conducted in 30 college level cricketers who were divided in 2 groups with 15 participants in each.Group A - Bent leg raise, Group B - Traction straight leg raise. All received intervention for 2 weeks. The outcome measure used was Active knee extension test.

STATISTICAL ANALYSIS

Statistical analysis was performed using Active knee extension test. Mean value and mean difference are used to compare pre-post differences in each group.

RESULT

Bent leg raise showed remarkable increased ROM than Traction straight leg raise.

CONCLUSION

The bent leg raise is effective than Traction Straight Leg Raise in improving hamstring muscle flexibility. There is significant difference in improvement of hamstring muscle flexibility in Bend leg raise technique.

Keywords: College level cricketers, Mulligan's bent leg raise, Traction straight leg raise, Hamstring, Static stretching.

Introduction

The most ingenious compilation of manual techniques has been developed by Brian Mulligan. Unlike the other mobilization procedures, Mulligan performed while patients were performing a resisted muscle contraction or while they were moving, either actively or passively. Other than many other manual therapy approaches this technique is performed in symptom free range of motion a factor that probably makes it safer.

Therefore it is crucial for college level cricketers to have good hamstring flexibility in order to prevent injuries and optimize their performance. The effectiveness of Mulligan techniques in improving hamstring flexibility can be analysed by understanding the physiological mechanisms behind these techniques and

their impact on the musculoskeletal system. These techniques aim to improve joint range of motion and muscle flexibility by combining passive mobilization with active movement.

Traction Straight Leg Raise (TSLR) and Bent Leg Raise Techniques (BLR) has been described by Mulligan in patients with low back pain which are said to improve range of motion of hip flexion. It can be applied on any patient who has limited or painful SLR. The Traction Straight Leg Raise and Bent Leg Raise are painless interventions that are said to have benefits immediately.

Flexibility is considered an essential element for normal biomechanical function. The flexibility of hamstring muscle is crucial for general and athletic population .

Hamstring tightness leads to high risk of recurrent injury, It changes the normal alignment of body posture. Decreases the performances in athletes, lead to post- exercise soreness and decrease coordination among athletes. The hamstring muscles have been coupled with low back pain and gait abnormality and commonly linked with movement dysfunction at the lumbar spine, pelvis and lower limbs.

Limited flexibility causes neuro musculoskeletal symptoms. These neuro musculoskeletal symptoms will lead to decrease in strength, stability. Endurance and much more. All these will lead to recurrent injury and might affect psychosocial aspect of the cricketers.

Hamstring strains are quite common in cricket and can occur when overloaded eccentrically, like if the hamstring attempts to control a rapidly flexing hip/trunk or an extending leg, or both. This can happen during bowling, running between wickets or sprinting in the outfield, so every player is a potential victim. These techniques can be specifically applied to target the hamstrings, which are essential for activities such as running, jumping, and kicking. By improving hamstring flexibility, athletes can achieve greater range of motion and reduce the risk of injury.

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ANATOMY OF HAMSTRING MUSCLES

HAMSTRING MUSCLES

The hamstring muscles are group of three muscles which predominantly act to flex the knee. Hamstrings consist of 3 muscles:

1.SEMIMEMBRANOSUS
2.SEMITENDINOSUS
3.BICEPS FEMORIS

1.SEMIMEMBRANOSUS

ORIGIN:

The upper lateral facet on the ischial tuberosity.

INSERTION:

The horizontal groove on the posteromedial surface of the medial Tibial condyle.

NERVE SUPPLY:

Tibial division of sciatic nerve (L5, S1, S2)

BLOOD SUPPLY:
Branches from internal iliac, popliteal, and profunda femoris arteries
ACTION:
Hip extension
Knee flexion
Internal rotation of lower leg when the knee is flexed.

2.SEMITENDINOSUS:
ORIGIN:
The lower medial facet of the lateral section of the ischial tuberosity.
INSERTION:
A vertical line on the medial surface of the medial condyle of the tibia.
Just behind the insertion of sartorius and behind and below the attachment of gracilis.
NERVE SUPPLY:
Tibial division of the sciatic nerve (L5, S1, S2)
BLOOD SUPPLY:
Branches from the internal iliac popliteal and profunda femoris arteries
ACTION:
Hip extension
Knee flexion
Internal rotation of the lower leg when the knee flexed.

3. BICEPS FEMORIS
- LONG HEAD
- SHORT HEAD

I.BICEPS FEMORIS LONG HEAD
ORIGIN:
The lower medial facet on the ischial tuberosity with the tendon of semitendinosus, spreading onto the Sacro tuberous ligament.
INSERTION:
The head of the fibular the lateral tibial condyle and the posterior aspect of the lateral intermuscular septum.
NERVE SUPPLY:
Tibial division of sciatic nerve (L5, S1, S2)
BLOOD SUPPLY:
Perforating branches of profunda femoris, inferior gluteal and medial circumflex femoral arteries
ACTION:
Knee flexion
Hip extension
External rotation of the lower leg when knee sightly flexed.

II.BICEPS FEMORIS SHORT HEAD

ORIGIN:

The lower half of the lateral hip of the linea aspera.

INSERTION:

The head of the fibular the lateral tibial condyle and the posterior aspect of the lateral intermuscular septum.

NERVE SUPPLY:

The common peroneal division of the sciatic nerve (L5, S1, S2)

BLOOD SUPPLY: Perforating branches of profunda femoris, inferior gluteal, and Medial circumflex femoral arteries.

ACTION:

Knee flexion

External rotation of the lower leg when slightly flexed.

FUNCTION OF THE HAMSTRING MUSCLE COMPLEX

The hamstring muscles extends the hip and flex the knee. The hamstring plays an important part in the complex gait cycle during walking, which includes absorption of kinetic energy and protection of the knee and hip joint.

During the swing phase of walking, the hamstrings decelerate the forward motion of the tibia. There is a complex interplay between hamstrings contraction and Quadriceps contraction which is an antagonist muscle of hamstrings.

The hamstring muscle located at the back of the thigh and play a crucial role in various functions of the lower body.

One of the primary functions of the hamstring muscle complex is knee flexion. During activities like sprinting or kicking, the hamstring muscles generate a significant amount of force to propel the body anterior or execute powerful movements.

Another important function of the hamstring muscles is hip extension. When the hip joint is extended, the thigh moves posterior, allowing for movements like pushing off during walking or running.

The hamstring muscles also contribute to hip rotation,both internal and external rotation of the hip joint, which is important for activities that involve twisting or turning of the lower body.

In addition to these primary functions, the hamstring muscle complex also provides stability to the pelvis and helps maintain proper posture. Strong and flexible hamstrings are essential for maintaining balance and preventing injuries, particularly in activities that involve quick changes in direction or explosive movements.

Overall, the hamstring muscle complex is a vital group of muscles that contribute to various functions of the lower body, including knee flexion, hip extension, and hip rotation. Maintaining good flexibility and strength in these muscles is crucial for optimal performance and injury prevention in activities such as cricket.

NEED FOR THE STUDY

The need for this study arises from the importance of hamstring flexibility in college level cricket players. All cricket players need to generate powerful running and jumping movements in their legs. Hamstring tightness can be leads to reduced range of motion of hip and knee joints.

Therefore, purpose of the conducting this study is to compare the effect of mulligan's BENT LEG RAISE and TRACTION STRAIGHT LEG RAISE along with static hamstring stretching to improve hamstring flexibility in college level cricket players, thereby potentially reducing the risk of hamstring injuries and enhancing athletic performance.

AIM

The aim of this study is to investigate the efficacy of Mulligan's bent leg raise and traction straight leg raise along with static stretching in improving hamstring flexibility in college level cricket players .

OBJECTIVES

The objective of this study is to determine the efficacy of various Mulligan techniques to improve hamstring flexibility in college level cricket players.
To evaluate the effect of mulligan's bent leg raise.
To evaluate the effect of traction straight leg raise.
To study the effectiveness of mulligan's bent leg raise and traction straight leg raise along with static stretching in college level cricketers.

DESIGN AND METHODOLOGY

Study Design: Experimental Study
Study Setting: Thanthai Roever College of Physiotherapy, Perambalur.
Type of sampling: Convenient sampling
Sample size: 30
No. of groups: 2
Group A : Bent leg raise: 15 subjects
Group B: Traction straight leg raise: 15 subjects
Study duration:2 weeks

INCLUSION CRITERIA:

• Age 18-23
• Only males
• College level cricket players

EXCLUSION CRITERIA:

• Females are excluded
• Recent injuries
• Fractures
• Other sports players such as football, volley ball players are excluded
• Above 24 years of age are excluded

MATERIALS:

Foot stool
Stop watch
Universal Goniometer

Paper
Pen
Couch

OUTCOME MEASURES

ACTIVE KNEE EXTENSION TEST : The Active knee extension test is an active test that involves movement at the knee joint, and most considers it safe, as the patient dictates the end point of movement.

Purpose

The Active Knee Extension Test is used to assess hamstring muscle length and the range of active knee extension in the position of hip flexion. The hamstrings length has been associated with altered lordotic posture and increased incidence of lower limb injuries.

Traditionally the length of hamstrings was measured by an SLR , however due to the pelvis movement without stabilisation, the hamstring length could no be isolated. The SLR applies tension to the sciatic nerve and hence is a key neurodynamic evaluation tool, as compared to the active knee extension test.

TECHNIQUES

The subject is positioned on the examination table in supine position , the lower limb that is'nt examined is positioned in stabilised on the support surface(couch).

The opposite limb is elevated so that the hip is in 90degrees of flexion and the knees are extended to reach a position perpendicular to the ground.

A lag of 20degrees is considered normal from full extension, less than 20degrees is considered as hamstrings tightness.

This range needs to be measured using a goniometer placed at the knee with the fulcrum at the lateral epicondyle, the stationary arm parallel to the thigh pointing to the greater trochanter and the moveable arm parallel to the leg pointing to the lateral malleoli.

MULLIGAN TECHNIQUES FOR HAMSTRING TIGHTNESS

PROCEDURE

Samples were selected according to the inclusion and exclusion criteria.

The aim and procedure of the study was explained to the selected participants. Participants were divided by envelop method in two groups, Group A and Group B.

Group A received Bent Leg Raise technique and static stretching.

Group B received Traction Straight Leg Raise and static stretching.

Participants were assessed for hamstring tightness with Active Knee Extension Test (AKET).

Assessment was done on pre and post intervention on Day 1, 4, 7, 10 and 14. Assessment was done in all session for 2 weeks Intervention was given thrice per week and thrice per session for two weeks.

Mulligan's Bent Leg Raise:

Therapist stands at the limited hamstrings flexibility side of the supine subject on the plinth. Therapist place the subject's flexed knee over therapist's shoulder and now asks the subject to push the therapist with his leg and then relaxes. At this point therapist push subject's bent knee up as far as possible in the direction of therapist's shoulder on the same side. Sustain this stretch for 30 seconds and then lower the leg to the plinth and repeat for 3 repetitions, and 1 minute rest between each stretch. And same procedure is done for the other side of limited hamstrings flexibility.

Traction Straight Leg Raise:

This technique involves sustained traction applied to the limb with the knee extended. The subject is in supine lying on a very low bed or on the floor and therapist stand facing subject's affected side. Subject actively does the SLR and therapist note the range. Therapist now grasp subject lower leg proximal to the ankle joint and raise it off the bed to a position just short of the painful range. Therapist flexes his knees and holds the clasped leg to therapist's chest. When the therapist extend his knees this will effectively apply a longitudinal traction to the leg provided the bed is low enough and the therapist is tall enough. Sustain this traction and undertake a straight leg raise as far as it will go provided there is no pain.
If there is pain slightly rotate, abduct or adduct the hip while raising the leg. When pain free SLR with traction is given for three times.

STATIC STRETCHING

Static stretching (SS) is a slow-paced controlled physical activity which involves putting the body part in a comfortable position that elongates the muscle without causing pain with low force for a prolonged duration of time (usually 30 seconds).
It is often used as a warm-up or cool-down technique before or after physical activity. Static stretching helps improve flexibility, increase range of motion, and reduce muscle tension. It is commonly used to stretch the muscles surrounding the knee joint, such as the quadriceps, hamstrings, and calves, to improve knee function and prevent injuries.
Procedure
It was given in supine position by performing passive SLR and end range was hold for 30 seconds.

DATA ANALYSIS AND SATISTICS

A sample of 30 subjects were included for the study. Mean and mean difference calculated. The test was applied to the group pre and post treatment values.
FORMULA OF MEAN
M = X/N
X - SUM OF ALL SUBJECTS
N - NUMBER OF SUBJECTS

TABLE 1 : PRE AND POST TEST VALUE OF ACTIVE KNEE EXTENSION TEST
GROUP A : RIGHT KNEE AKET VALUE

S.NO	RIGHT POST TEST	RIGHT POST TEST
1.	128	159
2.	110	146
3.	123	154
4.	134	159
5.	118	148
6.	115	145
7.	132	157
8.	124	154
9.	117	147
10.	131	149
11.	126	155

12.	122	153
13.	130	161
14.	129	157
15.	137	163
MEAN	125.06	153.8

GROUP B : LEFT KNEE AKET TEST

S.NO	LEFT PRE TEST	LEFT POST TEST
1.	112	153
2.	128	158
3.	118	154
4.	134	160
5.	121	155
6.	119	149
7.	135	155
8.	125	158
9.	120	152
10.	123	159
11.	136	162
12.	138	156
13.	116	145
14.	142	155
15.	132	160
MEAN	126.6	155.4

TABLE 2 : PRE AND POST TEST VALUE OF ACTIVE KNEE EXTENSION TEST

GROUP B : RIGHT KNEE AKET TEST

S.NO	RIGHT PRE TEST	RIGHTPOST TEST
1.	127	146
2.	115	137
3.	117	151
4.	131	149
5.	130	153
6.	120	152
7.	125	149
8.	124	145
9.	139	157
10.	117	151
11.	135	152
12.	123	145
13.	138	159
14.	132	149

15.	119	142
MEAN	126.1	142.4

GROUP B : LEFT AKET VALUE

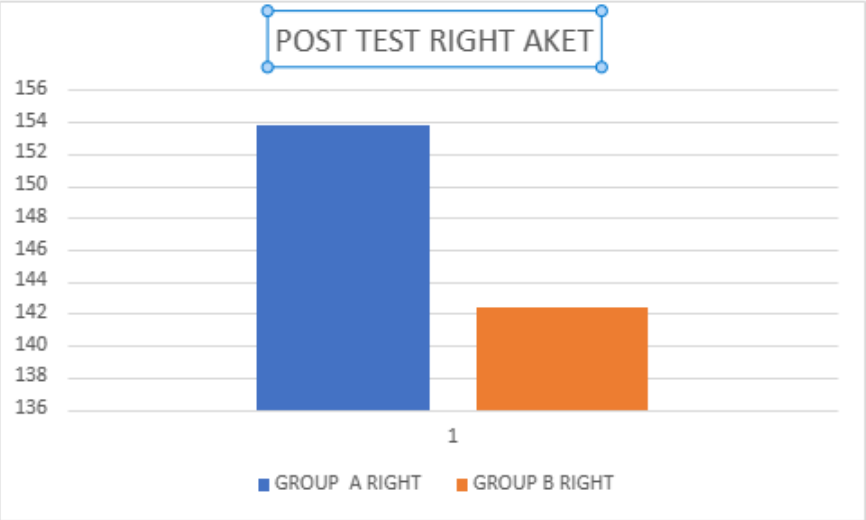
S.NO	LEFT PRE TEST	LEFT POST TEST
1.	121	148
2.	114	140
3.	120	146
4.	127	150
5.	124	152
6.	130	148
7.	133	152
8.	122	135
9.	126	142
10.	119	147
11.	129	151
12.	121	148
13.	132	150
14.	119	140
15.	128	147
MEAN	124.3	146.4

MEAN DIFFERENCE

POST TEST RIGHT AKET VALUE

SIDE	MEAN VALUE	MEAN DIFFERENCE
GROUP A RIGHT	153.8	11.4
GROUP B RIGHT	142.4	

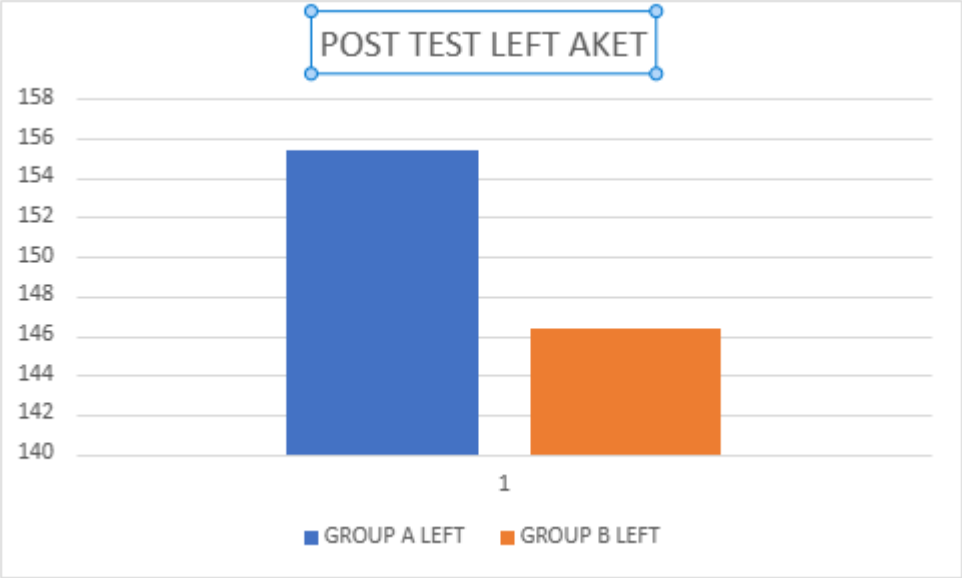
GRAPH 1: REPRESENTS POST TEST RIGHT AKET VALUE



POST TEST LEFT AKET VALUE

SIDE	MEAN VALUE	MEAN DIFFERANCE
GROUP A LEFT	155.4	9
GROUP B LEFT	146.4	

GRAPH 2 : REPRESENTS POST TEST AKET VALUE



RESULT

The results of this study showed that Mulligan's bent leg raise and traction straight leg raise are effective in improving hamstring flexibility in college level cricketers. But when both techniques were compared it found that Mulligan's bent leg raise is more effective in improving hamstring flexibility than traction straight leg raise.

Group A Bent leg raise showed remarkable increased ROM than group B Traction straight leg raise in hamstring muscle flexibility.

DISCUSSION

The purpose of this study was to compare effects of Bent Leg Raise and Traction Straight leg Raise on hamstring muscle flexibility. 39 participants were approached out of 5 participants were excluded according to inclusion and exclusion criteria,1participant dropped out due fracture and 3 participants dropped out of the study.

The results of the present study shows that there is significant improvement of hamstring flexibility by Mulligan berit leg raise as compared to Mulligan traction straight leg raise.

The present study by stating that Mulligan BLR increases immediate post intervention hamstring flexibility and range of motion.

The mechanism involved for the increase in flexibility might be that the intervention consists of contract and relaxes cycles applied to hamstring that provide peripheral somatic input by the way of contracting muscles and the cutaneous contact of the therapist.

The mechanism under increase in flexibility of hamstring muscles after traction straight leg raise may be various receptors exert an inhibitory influence on lower limb alpha motor neuron activity golgi tendon organs around the knee and hip.

Golgi tendon organs are activated during large amplitude stretching movements such as SLR. This processing of information in the nervous system may inhibit the activity of the muscles being lengthened during SLR by dampening the affect afferent activity of type 2 muscle spindles.

Hence, improvement in range SLR may be directly related to inhibition of hamstring muscles rather than to changes to stretch tolerance.

There is a limitation associated with a lack of flexibility of hamstring in this specific population.

We believe that the results of our study will provide valuable insights into the effectiveness of different Mulligan techniques in enhancing hamstring flexibility in college-level cricketers.

CONCLUSION

Through this study we conclude that Bent Leg Raise is effective than Traction Straight Leg Raise in improving hamstring muscle flexibility. There is significant difference in improvement of hamstring muscle flexibility in Bend leg raise technique.

REFERENCES

1. Neha Jain, Khanna GL, Amit Chaudhary, Comparison between straight leg raise and bent leg raise stretching techniques for increasing hamstring flexibility, Indian Journal of Physiotherapy and Occupational Therapy 2009, 3(2)2.
2. Jesudas Mazumdar A Comparison Between Mulligan Traction Straight Leg Raise Technique versus muscle Energy Technique on Hamstring Tightness in Asymptomatic Male International Journal of Physiotherapy and Research, 2014.
3. Erukula G, Demirkan F. Aiper B (2002) Hamstrings shortening in healthy Adults Journal of Back and Musculoskeletal Rehabilitation 16 (2):77-81.
4. Naveen G et al (2014) Comparison between posterior to anterior mobilization and traction sir on pain and neurodynamic mobility in patients of low back pain. International Journal of Physiotherapy and Research, Int J Physiother Res 2(1): 383-87. ISSN 2321-1822.
5. Ishankarweerasekara. The prevalence of Hamstring Tightness among the Male Athletes of University of Peradeniya International Journal of Physical Medicine and Rehabilitation Int Phys Med Rehabil, 2013.
6. Jesudas, Shriwas (2014) A comparison between mulligan traction straight leg raise technique vs muscle energy technique on hamstrings tightness in asymptomatic male. International Journal of Physiotherapy and Research, Int J Physiother Res 2(2): 412-17 ISSN 2321-1822.
7. Hall T, Hardt S, Schafer A, Wallin L (2006) Mulligan bent leg raise technique-a preliminary randomized trial of immediate effects after a single intervention Man Ther. 11(2): 130-5.
8. Hall T, Beryerlein C, Hansson U, Huntech L, Sainburg D (2006) Mulligan traction straight leg raise; A pilot study to investigate effect on range of motion in patient with low back pain. Journal of manual and manipulative therapy 14(2): 95-100.
9. Pratishtha K, Jagga V (2012) Effect of Mulligan Stretching Techniques (TSLR AND BLR) on Biceps Femoris Muscle and Pelvic Rotation by Using Surface EMG and Bubble Inclinometer Respectively. Journal of Exercise Science and Physiotherapy 8(1): 39-42.

10. Russell T. Nelson, William D. Bandy. Eccentric training and static stretching improves hamstring flexibility of high school males. J Athi Train. 2004 Jul-Sep; 39(3): 254-258.
11. Text book of anatomy, volume 2, abdomen and lower limb, vishram singh, 2nd edition.
12. Camparision of mulligans bent leg raise and nordic eccentric hamstring stretching on hamstring flexibility in individuals between18-35 years age group.Dr. Mahesh Mitra, Jaya Varma, Deepali Deo, Dr.Mrunmayee Mande Professor. Intern. Intern, Assistant Professor Department of Musculoskeletal Physiotherapy, MVP's college of physiotherapy. Nashik, India.