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Effectiveness of Mulligan Bent Leg Raise Technique for Hamstring Tightness in a College Level Badminton Player: A Case Study

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ABSTRACT

Introduction: Badminton demands quick reactions, precise footwork, and balance. Flexibility is crucial, correlating with effective lunge step execution. Hamstring tightness increases injury risk, and thus role of flexibility in conditioning programs is very important. Shortening of hamstring due to various factors impacts flexibility and increases susceptibility to injury. Physiotherapy techniques such as Mulligan Bend Leg Raise can potentially address this issue.
Objective: To determine the effectiveness of Mulligan Bent Leg Raise technique for hamstring tightness in a college-level badminton player.
Materials and Method: In this study, the participant underwent four weeks of supervised physiotherapy intervention involving Mulligan Bent Leg Raise technique and patient education. Outcomes were assessed using the popliteal angle measurement and the Sit and Reach test.
Results: Improvements were observed in hamstring flexibility and overall range of motion, as indicated by increased popliteal angles and sit-and-reach measurements.
Conclusion: Treatment using Mulligan Bent Leg Raise is effective in enhancing hamstring flexibility, evidenced by improved popliteal angle measurements and Sit and Reach Test measurements. Beneficial for badminton players, it may have advantages to athletes across sports. It is recommended for patients with hamstring tightness for comparable benefits.

***Keywords*:** Mulligan Bent Leg Raise, Hamstring Tightness, College level Badminton players

INTRODUCTION

Badminton is a popular racquet sport that requires quick reflexes and good footwork. The primary motor demands of this sport include reaction time, foot placement, and static or dynamic balances. A commonly executed move in badminton, the lunge step accounts for about 15% of all on-court actions and a proper lunge technique often goes hand-in-hand with good flexibility. Players must therefore require substantial joint flexibility, power, and agility[1]. It has been suggested that hamstring strains are caused by a lack of flexibility. Thus regularly incorporating flexibility exercises into a conditioning program is crucial for enhancing mobility, optimizing athletic performance, and reducing the risk of injuries. Some beneficial effects of good flexibility are that it improves posture, relives muscular pain, relaxes the muscle, reduces stress and improves agility[2].

When hamstring tightness occurs, the musculotendinous units in the hamstrings have a reduced ability to extend due to a decrease in the number of sarcomeres or a reduction in the length or elasticity of connective tissues. A limitation in knee extension beyond 160 degrees with the hip at a 90-degree angle, suggests hamstring tightness. Lack of hamstring flexibility is a critical element of hamstring injuries in athletes [1]Normal hamstring flexibility is impacted by various components which include age, sexual orientation, ethnicity, temperature of the tissue, weight training, stiffness, poor posture, and shorter warm-up during exercise. Physical therapists can utilize various approaches such as electrical stimulation and manual therapy, to address hamstring tightness. The approaches include different techniques of stretching such as muscle energy technique, position release techniques, and myofascial release techniques[3].

Mulligan Bent Leg Raise offers a pain-free approach to improving limited or uncomfortable straight leg raises (SLR) for many patients. This technique involves progressively stretching the hamstring in specific directions while gradually increasing hip flexion; the expected outcomes are improved hamstring flexibility with increased range of motion of active knee extension[4].

MATERIALS AND METHODS

This case study aimed to investigate the effects of Mulligan Bent Leg Raise on hamstring flexibility in a 24-year-old college-level badminton player, who attended the outpatient physiotherapy department. The participant underwent pre-intervention measurements before engaging in a four-week treatment regimen consisting of supervised exercises conducted five days a week for 20-25 minutes per session, totaling 20 sessions. The intervention was repeated three times per session, with the first session incorporating an additional 10-minute educational component on muscle mass and the retraining effects of sports. Patient education remained integral throughout the treatment process. Post-intervention measurements were taken after the completion of the 20 sessions to assess the study outcomes.

Outcome Measure:

The Sit and Reach Test and popliteal angle measurement were used to measure length of hamstring muscle pre- and post- treatment. In Sit and Reach Test, the examiner positioned the patient supine and bent the leg being tested at the hip and knee to 90 degrees. A goniometer was used to measure the angle between the thigh and leg, positioning the axis on the femur and aligning the arms with specific bony landmarks. For popliteal angle measurement, the subject sat with legs straight and reached forward, palms down, along a box for as far as possible without bending their back. The distance was recorded before and after an intervention to see if flexibility improved.

Intervention:

Mulligan Bent Raise Technique was administered using the method described by Chintamani R et al. (2019), the lower extremity being treated was placed on the therapist's shoulder, with the popliteal fossa resting on the shoulder; the other lower extremity lay flat on the treatment table. The hip of the extremity being treated was gradually flexed with the help of the shoulder, till the range where discomfort or pain was felt. At this point, the patient was instructed to push against the therapists' shoulder with the leg being treated; and the therapist provided equal resistance (hold of 5 seconds) and then moved the hip further into flexion. The entire procedure was repeated till the movements were pain-free, and to conclude, the limb was held at the pain-free end range for 20 seconds, and then lowered down to the treatment surface. A traction component was also added to this technique; whilst the bent knee was placed on the shoulder of the therapist.

RESULT AND DISCUSSION

The 24-year-old college level badminton player underwent a pre-assessment, which revealed tightness in the hamstring muscles. A prescribed regimen of exercise sessions, conducted five days a week over four weeks, 20 sessions, was initiated. After the study duration, significant improvement was observed, the popliteal angle increased from 49 degrees to 60.8 degrees reflecting enhanced flexibility in the hamstring muscles Additionally, the sit-and-reach measurement distance increased from 20.98 cm to 23.01cm, demonstrating notable progress in overall flexibility and range of motion.

In outpatient physical therapy settings, hamstring tightness emerges as a prevalent condition, with notable variations in treatment approaches among practitioners. Failing to regularly stretch the hamstring muscle increases the likelihood of it becoming tight. When the fascia tightens as a biomechanical response to trauma, it loses its flexibility and becomes restricted. This can eventually result in compromised muscular biomechanics, changes in structural alignment, and reductions in strength, endurance, and motor coordination. Addressing this issue involves navigating a spectrum of therapeutic strategies, encompassing diverse modalities and techniques. From stretching regimens and manual therapy to targeted strengthening exercises, clinicians tailor interventions to individual patient needs and response profiles. Despite the abundance of available methodologies, determining the most effective course of action often requires a nuanced understanding of both the underlying biomechanical factors and the patient's unique circumstances.

Following treatment, considerable enhancements were observed in sit-and-reach measurements alongside a marked improvement in popliteal angle compared to baseline values. These outcomes highlight the efficacy of the intervention in improving both flexibility and range of motion among the participants. The Mulligan Bent Leg Raise technique offers several advantages due to its simplicity, targeted approach, and minimal risk of overstretching musculotendinous structures.

Hall T et al. (2006) have shown that the hamstrings contribute to peripheral somatic input during hip flexion through muscle contraction, supplemented by the tactile feedback provided by the therapist's cutaneous contact[9].

Waseem et al. (2009) have investigated the effects of static stretching versus eccentric stretching on hamstring flexibility (measured by popliteal angle) in healthy participants. In the study, it was concluded that both groups exhibited significant improvements in flexibility after the intervention, but the static stretching group demonstrated greater gains. This effect was attributed to changes in the viscoelastic properties of the hamstring muscles. The increase in muscle length was probably due to viscoelastic behaviour i.e. changes in the positional sensitivity of the Golgi tendon organs by bringing about changes in the series elastic component. The Bent Leg Raise technique used in the present case study has the advantage of being focussed, simple and causing fewer undue stretches of musculotendinous endings. Hence it can be used with relative ease in clinical settings conveniently and effectively. The result of our study, along with previously available evidence show that the use of Mulligan Bent Leg Raise technique does recruit the hamstring muscles and can help player to improve their flexibility, balance, and agility during their performance.

LIMITATIONS

This study is limited by a relatively small sample size and short duration, which may restrict the generalizability of the findings to larger populations and longer timeframes.

CONCLUSION

The Mulligan Bent Leg Raise technique is effective in improving hamstring flexibility as noticeable improvement was seen in popliteal angle measurements and Sit and reach test measurements.

Declaration by Authors

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Conflict of Interest: The authors declare no conflict of interest.

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