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Comparison between Iliotibial Band and Lateral Patellar Retinaculum Stretching on Lateral Patellar Shift in Young Females

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KEYWORDS

Patella, IT Band, Stretching

ABSTRACT:

Introduction: Patellar malalignment, particularly lateral patellar shift, is a common contributor to patellofemoral pain syndrome (PFPS), especially among young females. It results from imbalanced forces acting on the patella, often due to tight lateral structures such as the iliotibial band (ITB) and lateral patellar retinaculum. Addressing these imbalances through targeted stretching may help restore normal patellar tracking and prevent PFPS

Objectives: To compare the effect of Iliotibial Band (ITB) stretching and Lateral Patellar Retinaculum (LPR) stretching on reducing lateral patellar shift in females.

Methods: Twenty female participants aged 17–24 years with lateral patellar shift were randomly assigned to two groups: Group A (ITB stretching) and Group B (LPR stretching). Participants underwent 3 sessions per week for 3 weeks, with 3 repetitions per session. Lateral patellar shift was measured pre- and post-intervention using a Vernier caliper in a supine lying position. Statistical analysis was done using SPSS; unpaired t-tests were applied with a significance level set at $p<0.05$.

Results: Both groups showed a reduction in lateral patellar shift post-intervention. However, the difference in improvement between Group A and Group B was not statistically significant. **Conclusion:** Both ITB and LPR stretching were found to be equally effective in reducing lateral patellar shift. This suggests that addressing either of the tight lateral structures may help in improving patellar alignment

Conclusions: Both ITB and LPR stretching significantly reduced lateral patellar shift in young females. Since no significant difference was found between them, either technique can be effectively used to address patellar malalignment.

1. Introduction

Patella is a sesamoid bone that acts as an anatomical pulley, which articulates with distal femur and forms a Patellofemoral joint. Patella is shaped as inverted triangle which is embedded in quadriceps tendon. Its presence improves the efficiency of the quadriceps for the extension as it holds the quadriceps tendon away from the tibiofemoral axis of the movement and reduces the friction between the tendon and femoral condyles.[1.] The patella has the ability to slide on the distal femoral condyle during extension and to seat itself in between the femoral condyle during flexion. Patella acts as a bony shield for the cartilage of the femoral condyle and serves as a guide for the quadriceps or the patellar tendon. It helps to control the capsular tension in knee[2]. Patellofemoral joint stability is maintained by two restraining mechanisms that cross each other at right angles: transverse Stabilizers & longitudinal stabilizers. the transverse stabilizers are medial and lateral Patellar retinaculum the longitudinal stabilizers are patellar tendon inferiorly and Quadriceps tendon superiorly the position of the patella and its mobility will be determined by the relative tension in both stabilizing structures and

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quadriceps muscle this pulls the patella obliquely due to its oblique alignment [3,4].

Patellar malalignment is defined as a translation or rotational deviation of the patella relative to any axis. The mediolateral translation of the patella undergoes during the Knee joint movement is referred as patellar shift, Patellar tilt or malalignment[5]. Three common predisposing factors identified are imbalanced peripatellar soft tissue tension such as patellar retinaculum, hamstring, Iliotibial band[6], quadriceps, hip rotators, and the Achilles tendon tightness, bone anomalies and lower extremity malalignment Stronger pull of lateral structure creates the lateral patellar tracking which plays a key role in patellofemoral pain syndrome [7,8,9].

Patellofemoral pain syndrome is one of the most common causes of anterior knee pain, which aggravates with load on the flexed knee. Females are more prone to get PF pain.[10] Patients with anterior knee pain find difficulty in performing day to day activities such as running, climbing stairs and squatting. Etiology of PF pain is multifactorial. Management of PF pain syndrome is usually conservative to reduce pain, improve patellar tracking. To correct lateral patellar malalignment, stretching of lateral lighten structures and strengthening of weak medial structures should be incorporated[11]

2. Objectives

To compare the effect of Iliotibial band and Lateral patellar retinaculum stretching on lateral patellar shift

3. Methods

20 female participants aged between 17 to 24 years with lateral patellar shift were included in the study. The participants with pain, history of trauma, overpronated foot, inflammation or arthritis to knee joint, patellar conditions like patellar alta and baja, ligament laxity were excluded from the study. Informed consent was obtained from all the participants. Each subject was examined for dependent variable (lateral patellar shift) by having the subject in supine lying position with the help of Vernier caliper.

The participants were randomly allocated to 2 different groups; Group A underwent IT band stretching and Group B underwent lateral patellar retinaculum stretching. Pre intervention lateral patellar shift was measured. Both groups received intervention 3 times a week with 3 repetitions. Post 3 weeks lateral patellar shift was measured.

Image 1: instruments used

Image 2: Measurement of lateral patellar shift

4. Results:

Data analysis was done by using SPSS software. Significant level was selected as .05, unpaired t test was used to compare the pre intervention lateral patellar shift values at 0 and 9th session. Unpaired t test was used to compare the mean of decrease in lateral patellar shift between both the groups.20 female subjects of mean age 20.6+1.43 years were included in this study based on inclusion criteria. Participants were randomly allocated to Group A and Group B. Group A participant with mean age 20.2 ± 1.24 years underwent Iliotibial band stretching and group B participants with mean age 21.0 ±1.48 years underwent lateral patellar retinaculum stretching. Unpaired t test has been performed for 0 session, 6th session and 9th sessions for lateral patellar retinaculum, The result shows non-significant difference (p>.005) in the mean of Group A and Group B.

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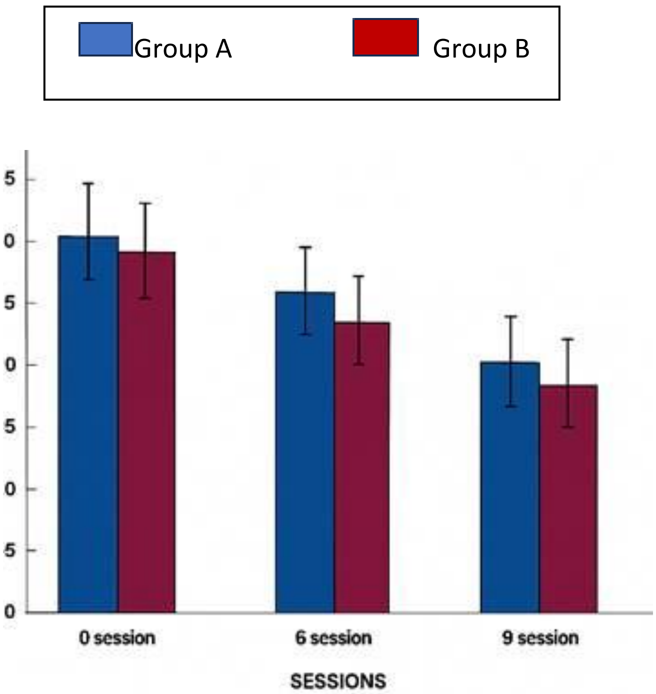
Table 1 description of mean age of participants in both groups

SNO	Groups	No of subjects	Age Mean ± S. D
1	A	10	20.2 ±.24
2	B	10	21.0 ± 1.48

Table 2 comparison of mean of lateral patellar shift between group A& B at 0,6, and 9th session

SNO	Groups	Mean ± SD 0 session	Mean ± SD 6 sessions	Mean ± SD 9 sessions
	A	4.200 ±.58	3.43 ±.67	2.53 ±.316
	B	3.9 ±1.011	2.97 ±.94	2.22 ± .311
t value		.813	1.249	2.206
P value		>.05	>.05	>.05



Graph 1. Comparison of mean of lateral patellar shift between group A &B at 0,6 and 9th session

5. Discussion

Patellar malalignment is defined as a deviation of the patella relative to any axis. It can lead to patellar pain in adults. According to Brunker P. Khan excessive stronger lateral pull of tight lateral structures create the lateral patellar tracking.[12] According to Grelsmar to correct the patellar malalignment stretching of Lateral patellar retinaculum, Iliotibial band, hamstring quadriceps, tendoachilles is beneficial.[13] The studies design is experimental and comparative in nature, aiming to evaluate the effects of iliotibial band stretching versus lateral patellar retinaculum stretching on lateral patellar shift. Hypothesis of the study stated that the lateral patellar retinaculum stretching could be more effective on lateral patellar shift in comparison to iliotibial band stretching. According to literature, there is a stronger relationship between iliotibial band tightness and decreased lateral patellar shift but no such supportive literature is present for the relationship between lateral patellar retinaculum tightness and patellar shift.

The purpose of the study was to decrease the chances of patellofemoral pain occurring due to lateral patellar shift by addressing & identifying the most probable cause lateral patellar shift. Unpaired t-test was performed between group A (iliotibial band stretching) & B (Lateral patellar retinaculum stretching) and the results have shown that both stretching are equally effective in correcting lateral patellar shift. Anatomical studies have consistently demonstrated that the iliotibial band (ITB) is not an isolated structure but is structurally and functionally integrated with the lateral patellar retinaculum, particularly in the region of the knee. The ITB, as it descends along the lateral thigh, contributes fibrous extensions that merge with the lateral retinacular fibers and the lateral patellofemoral ligament, forming part of the lateral patellofemoral complex. Terry and LaPrade (1996), through cadaveric dissection, identified these fibrous interconnections, noting that the deep layers of the ITB are continuous with the retinacular tissue that attaches to the patella.[14] Similarly, Kaplan (1958) described specific fibrous bands, now known as Kaplan fibers, that extend from the ITB to the femoral condyle and adjacent soft tissues, further reinforcing this anatomical linkage[15].

This anatomical continuity is not merely structural but it has significant biomechanical implications. Merican and

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Amis (2009) demonstrated that tension within the ITB, especially when it is shortened or tight, can increase lateral pull on the patella via the lateral retinaculum [16]. This increased tension may result in lateral patellar tilt, shift, or mal tracking, particularly during early knee flexion, which is a known contributing factor in conditions such as patellofemoral pain syndrome (PFPS). Therefore, stretching of both structures will be equally effective on lateral patellar shift.

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