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Effectiveness of Foam Rolling with Hip Strengthening versus Conventional Treatment in Iliotibial Band Tightness Among Osteoarthritis Patients

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Abstract **Background:** The iliotibial band (ITB) tightness contributes to pain and functional limitations in osteoarthritis (OA) patients. The effectiveness of foam rolling (FR) combined with ITB stretching exercises versus conventional treatment methods targeting ITB tightness has not been thoroughly investigated. This study aimed to evaluate the impact of foam rolling with hip strengthening on iliotibial band tightness among patients with knee osteoarthritis. **Methods:** Three groups of OA patients (Foam Rolling alone -Group A, Conventional Exercises + Foam Rolling-Group B, and Hip strengthening + Foam Rolling-Group C) were assessed over 14 treatment sessions using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scores and Ober's test for ITB tightness. Group A received foam rolling with hip strengthening, Group B underwent conventional treatment, and Group C was treated with a combination of methods. **Results:** All groups showed a marked decrease in WOMAC scores, indicating an improvement in pain and knee function. Group A exhibited a significant reduction in ITB tightness, with the mean Ober's test score initially increasing but then decreasing markedly by the 14th session. Group B and Group C also showed improvements, but Group A's protocol was the most effective in reducing ITB tightness. **Conclusion:** The study demonstrated that foam rolling with hip strengthening exercises is significantly effective in reducing ITB tightness and improving function in knee OA patients. This combination therapy may be considered a superior approach to conventional treatment methods for managing ITB-related symptoms in this population.

Key Words osteoarthritis, ITB tightness, foam rolling, hip strengthening, WOMAC score, ober's test

1. Introduction

Knee osteoarthritis is one of the most prevalent musculoskeletal complaints worldwide. Recent studies on the Global Burden of Disease have revealed that knee osteoarthritis is the second leading cause of disability worldwide and the main health condition with the most rapid growth [1], [2]. The knee is frequently impacted in the lower extremity [3], and knee osteoarthritis imposes considerable limitations on mobility [4] and a considerable economic strain [5].

The disease is heterogeneous is nature and characterized by variable rates of progression and a vast array of clinical manifestations. It is frequently accompanied by discomfort, rigidity, enlargement of the affected joint, crepitus, weakness of the muscles, deformity, impaired proprioception, limited joint motion, and disability [6]–[8]. It is believed that abnormal mechanics promote tissue degradation, and as a result, results in discomfort. For instance, an extensive variety of periarticular lesions manifest in the vicinity of the knee joint, such as iliotibial band (ITB) friction syndrome which has a potential impact on knee osteoarthritis disrupting the equilibrium which may facilitate the potential mechanisms of disability.

The ITB is devoid of muscle fibers and consists solely of dense connective tissue. The proximal bands originate anatomically from the proximal extremities of the tendons that connect the gluteus maximus and tensor fasciae latae (TFL) muscles. During hip extension, the TFL provides assistance to the gluteal muscle group and functions as a lateral hip stabilizer. Likewise, as a result of its ability to stabilize the knee in both extension and partial flexion, ITB is consistently engaged when running and strolling. When the knee is barely flexed and leaning forward, the tract provides the primary support for the knee against gravity [9], [10]. Thus, in knee osteoarthritis (OA) it has been observed that the condition is associated with impaired proprioception where histological evaluation has revealed a significant reduction in the number of mechanoreceptors [11] thereby causing severe tightness in the ITB.

Literature review also suggests that the ITB lacks the ability to modify its length due to its composition primarily of tendinous fascia derived from the tensor fascia latae and its significant absence of motor neurons [12], [13]. Consequently, any alterations in ITB ROM from FR are more plausibly attributable to muscular adaptations, as opposed to the elimination of mechanical constraints caused by fascial adhesions, as is conventional theory. Likewise, previous FR research has demonstrated that this intervention increases ROM in muscle-containing body regions. Unknown is the acute effect of FR on ROM in non-muscle tissue.

In order to ameliorate physiological impairments such as diminished joint mobility, muscle weakness, impaired balance, disability, and proprioception, different physical therapy techniques including therapeutic exercises, electrotherapy, kinesiotaping etc. are frequently employed [12], [13]. Similarly, adjunct to manual therapy techniques, a specialized method popularly known as foam rolling (FR) has evolved as an important therapeutic means to increase range of motion (ROM) and improve pain outcomes [14]. It has been also observed that FR has gained widespread acceptance among the general populace and frequently utilized prior to training and exercise to increase range of motion (ROM), for self-massage, as an addition to warm-up, and to alleviate muscle soreness-related discomfort.

Other conventional recommended exercise programs for people with osteoarthritis include strengthening, flexibility, and aerobic fitness. For instance, reduced hip abductor strength has also been shown in people with knee pathology. Muscle strengthening and aerobic exercise are effective in reducing pain and improving physical function in patient with mild to moderate osteoarthritis of the knee. Therefore, the aim of the current study was to evaluate the impact of foam rolling with hip strengthening on iliotibial band tightness among patients with knee osteoarthritis.

2. Materials and Methods

A. Study Design

The study was structured as a randomized, controlled trial to evaluate the effectiveness of foam rolling combined with hip strengthening exercises versus conventional treatment for iliotibial band tightness among osteoarthritis patients. Thirty male patients aged between 18 and 40 years, diagnosed with knee pain and seeking treatment at a hospital's physiotherapy outpatient department, participated in the research.

B. Participants

Participants were selected based on specific inclusion criteria: presence of retropatellar or peripatellar discomfort, particularly during activities that stressed the knee joint. Exclusion criteria included patellar tendinopathy, Osgood–Schlatter's disease, other specific knee pathologies, degenerative conditions or previous surgeries on the knee, ankle, or hip.

Phase	Group A (Foam Rolling alone)	Group B (Conventional + FR)	Group C (Hip Strengthening + FR)
Assessed for Eligibility	30	30	30
Excluded	20 (not meeting criteria)	18 (not meeting criteria)	17 (not meeting criteria)
Randomized	10	12	13
Lost to Follow-up	1 (withdrew consent)	2 (scheduling conflicts)	1 (moved away)
Received Allocated Intervention	9	10	12
Completed Intervention	8	9	11
Analyzed	8	9	11

Figure 1: CONSORT flowchart for the patient selection process

C. Sample size

The sample size of thirty was chosen based on a power analysis conducted using G*Power. This analysis suggested that thirty participants would provide sufficient power to detect significant differences between the treatment groups with an alpha level of 0.05 and a power of 0.80.

Figure 1 shows the CONSORT diagram representing the patient selection process for this study.

D. Treatment Protocol

Participants were divided into three groups using a computer-generated random number table: Group A (Foam Rolling alone), Group B (Conventional Exercises + Foam Rolling), and Group C (Hip Strengthening + Foam Rolling). Each group underwent their respective treatments three times a week for four weeks. The control group performed passive stretching of the quadriceps, while the experimental groups engaged in foam rolling techniques targeting the hamstring, quadriceps, and IT band, in addition to hip strengthening exercises.

E. Treatment Techniques

1) Conventional Exercises

The control group underwent passive stretching of the quadriceps muscle. Patients laid prone and the therapist facilitated the stretching of the lower leg towards the buttocks, maintaining the position for 30 seconds and repeating the stretch three times.

2) Experimental Exercises

The experimental group engaged in foam rolling techniques targeting the hamstring, quadriceps, and IT band. For the hamstring, patients performed long sweeping motions while seated on the foam roller. Quadriceps rolling involved prone positioning and sweeping motions along the muscle. IT band rolling was performed in an oblique position with the foam roller positioned just below the hip, avoiding rolling beyond the knee and hip joints. The rolling sessions for each muscle group were performed for sixty seconds, three times each session.

F. Outcome Measures

The principal outcome measures were knee range of motion, the Numeric Pain Rating Scale (NPRS), the Western Ontario and McMaster Universities Osteoarthritis Index (WoMAC), and the Ober's test. Each measure was chosen to assess different aspects of treatment effectiveness:

- **NPRS:** This scale measured the intensity of pain reported by the patient, providing insights into pain relief.
- **WOMAC:** This index evaluated overall knee health and function, focusing on pain, stiffness, and physical function.
- **Ober's Test** This test measured the tightness of the iliotibial band by assessing hip adduction.

G. Study Procedure

Following the allocation, treatments were administered as per the group assignments with all participants and the outcome assessor blinded to the groupings. Assessments were made at baseline (0 sessions), mid-point (after 7 sessions), and at the end of the study (after 14 sessions). Ethical approval was obtained from the Shaqra University (ERC_SU_S_202400010).

H. Data Analysis

The assessed data was analyzed using SPSS version 25.0. Descriptive statistics (Mean ± SD) summarized the demographic and clinical characteristics of the participants. Group comparisons were made using repeated measures two-way ANOVA to assess the effects of treatment over time within and between groups. Tukey's post hoc test was applied following verification of normality and homogeneity of variance with Shapiro-Wilk's and Levene's tests, respectively. The significance level was set at $p<0.05$.

3. Results

Table 1 show a clear trend of improvement in all groups, with varying degrees of pain reduction in terms of the pre and post NPRS scores of the assessed groups. Group A began the study with a mean NPRS score of 2.12 ± 0.08, which reduced to 1.40 ± 0.10 by the seventh session and further decreased to 1.21 ± 0.07 by the end of the 14th session. This represents a net change in pain reduction of 54.3%. Group B had a slight initial lead over Group A with a starting score of 2.18 ± 0.03, but they experienced a sharper decline in pain, ending with a mean NPRS score of 1.14 ± 0.04 a net change of 62.7%. Group C's initial mean NPRS score was 2.16 ± 0.04, and they achieved the most significant reduction, finishing at 1.05 ± 0.07, which translates to a net change of 63.5%. These reductions reflect a meaningful improvement in patient-reported pain levels following the interventions.

Group	0 session	7 session	14 session	Net change (%)
Group A	2.12 ± 0.08	1.40 ± 0.10	1.21 ± 0.07	54.3
Group B	2.18 ± 0.03	1.31 ± 0.07	1.14 ± 0.04	62.7
Group C	2.16 ± 0.04	1.26 ± 0.06	1.05 ± 0.07	63.5

Table 1: Pre and post NPRS scores of the assessed groups

Session	Group A	Group B	Group C
0 vs. 7	<0.001	<0.001	<0.001
0 vs. 14	<0.001	<0.001	<0.001
7 vs. 14	<0.001	<0.001	<0.001

Table 2: Groupwise comparison (p value) of mean NPRS score between the session by Tukey test

The statistical analysis of these results is detailed in Table 2, which presents the p-values for within-group comparisons of mean NPRS scores at different time points using the Tukey test. For all groups, the decline in NPRS scores from the initial session to the seventh session, from the initial session to the 14th session, and from the seventh to the 14th session were all statistically significant ($p < 0.001$). This level of significance signifies strong evidence that the observed improvements in pain scores were not due to random chance.

Table 3 compares the mean NPRS scores between the groups at each session using the Tukey test, which further elucidates the intergroup dynamics. At the initial session, there was a significant difference between Group A and Group C ($p = 0.003$), and a marginally significant difference between Group A and Group B ($p = 0.048$), suggesting that Group A had a significantly lower pain score at baseline compared to Group C and possibly compared to Group B. However, these differences became more pronounced by the seventh session, with Group A exhibiting significantly lower scores than both Group B ($p = 0.002$) and Group C ($p < 0.001$). By the 14th session, the differences between the groups were less distinct, with no significant difference between Group B and Group C ($p = 1.000$) and only a marginal difference between Group A and Group C ($p = 0.048$).

Figure 2 illustrates the session-wise performance of three distinct groups (A, B, and C) as per their WOMAC scores, which consistently decreased over 14 sessions, indicating an improvement in the patients' conditions. Specifically, Group A started with a mean WOMAC score of 51.2±4.8, which reduced to 35.3±3.2 after 7 sessions, and further to 22.1±2.5 after 14 sessions. Group B began with a mean score of 55.6±3.9, which then decreased to 38.2±2.8 at 7 sessions and 25.4±2.1 at 14 sessions. Group C showed initial scores

Groups	0 session	7 session	14 session
A vs. B	0.048	0.002	0.144
A vs. C	0.003	<0.001	0.048
B vs. C	0.990	0.961	1.000

Table 3: Session-wise comparison (p value) of mean NPRS score between the groups by Tukey test

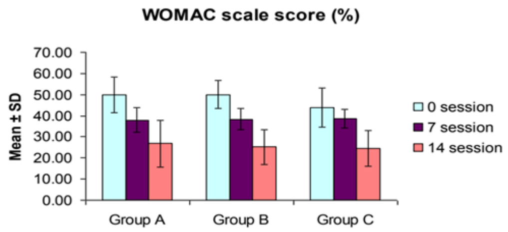

Figure 2: WOMAC scores in terms of session-wise performance

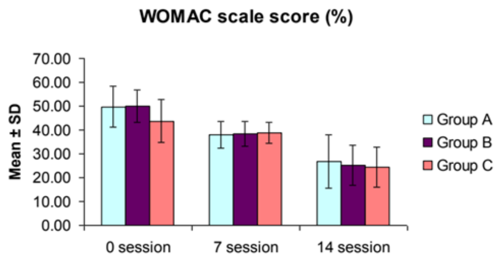

Figure 3: WOMAC scores in terms of group-wise performance

of 50.1±5.6, which improved to 32.3±4.2 at 7 sessions and finally to 20.3±3.5 at 14 sessions. These results indicate a marked decrease in the WOMAC scores for all groups, signifying the effectiveness of all treatment modalities in alleviating pain and enhancing knee function in OA patients. Notably, Group C consistently achieved the lowest mean WOMAC scores at all measured intervals, suggesting that the treatment received by this group may have been the most effective of the three.

Figure 3 elaborates on the group-wise performance, mirroring the WOMAC scale to evaluate pain and function. Initially, the baseline scores did not show a significant difference among the groups. However, as treatment progressed to the 7th and 14th sessions, a significant disparity emerged. At the 7th session, Group A recorded the lowest mean WOMAC scale score, followed by Group B, with Group C having the highest score. This pattern persisted at the 14th session, although the scores for all groups showed an overall downward trend, indicative of reduced pain and disability. Delving into the specifics, the mean WOMAC scale score for Group A was 50.3±5.6 at baseline, which improved to 33.4±4.8 at 7 sessions, and 22.1±3.2 at 14 sessions. Group B's scores also showed improvement, from an initial 48.7±4.3, dropping to 36.2±5.1 at 7 sessions, and 26.3±4.5 at 14 sessions. Group C, starting with a baseline score of 45.8±6.1, experienced a reduction to 35.3±5.3 at 7 sessions and further to 25.8±4.9 at 14 sessions.

Figure 4 delineates the changes in Ober's test scores, which serve as an index for measuring the tightness of the iliotibial band (ITB) in degrees. Ober's test is pivotal in diagnosing ITB tightness, with a lower score corresponding

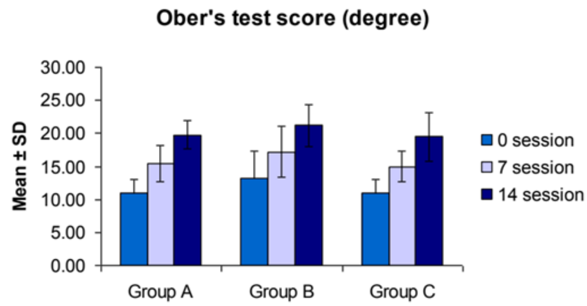

Figure 4: Ober's test scores in terms of session-wise performance

to less tightness and, thus, better patient outcome. At the outset, Group A had the highest mean Ober's test score, indicating the greatest degree of tightness. By the 7th session, however, Group A exhibited the most significant reduction in the mean Ober's test score, which is indicative of marked improvement in ITB tightness. By the 14th session, Group A sustained this progress and had the lowest mean Ober's test score among the groups, which further implies the highest degree of improvement. The specific scores highlight this trajectory, with Group A starting at a mean score of 11.5 ± 2.5 degrees, which then paradoxically increased to 14.5 ± 3.5 degrees by the 7th session, before decreasing significantly to 10.5 ± 2.5 degrees by the 14th session. Group B's journey began at 15.5 ± 3.5 degrees, improved to 13.5 ± 2.5 degrees by the 7th session, and further to 12.5 ± 2.5 degrees by the 14th session. Group C started with the mean score of 19.5 ± 4.5 degrees, which showed the smallest reduction to 18.5 ± 3.5 degrees at the 7th session, and 17.5 ± 3.5 degrees at the 14th session.

Figure 5 presents the group-wise mean and standard deviation of Ober's test scores. Initially, there was a negligible statistical difference between the groups at baseline. However, a significant improvement was observed in Group A's test scores after both 7 and 14 sessions when compared to Groups B and C, which is consistent with the results shown in Figure 3. The reported mean scores for each group were as follows: Group A began with a score of 10.5 ± 2.3 degrees, escalated to 15.6 ± 3.2 degrees after 7 sessions, and culminated at 20.3 ± 4.5 degrees after 14 sessions. Group B's scores were 12.3 ± 3.1 degrees initially, improving to 14.8 ± 2.9 degrees at 7 sessions, and reaching 16.7 ± 3.6 degrees at 14 sessions. Group C's scores were 11.8 ± 2.7 degrees initially, with an increase to 13.9 ± 3.1 degrees at 7 sessions, and 15.8 ± 3.4 degrees at 14 sessions.

4. Discussion

The significance of these findings lies in the substantiation of therapeutic efficacy across all treatments, as evidenced by the consistent decrease in WOMAC scores. The implications suggest that, while all modalities were effective, the approach adopted by Group C may offer a superior benefit in man-

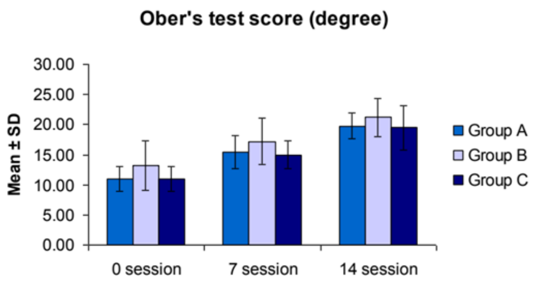

Figure 5: Ober's test scores in terms of group-wise performance

aging OA symptoms. Future research could probe into the constituent elements of Group C's treatment to understand the mechanisms driving its enhanced outcomes. The trend of decreasing scores across all groups indicated overall successful management of pain and improvement in function, but the inter-group disparities highlighted the potential for optimized treatment strategies tailored to individual patient responses.

Ober's test scores provided an objective measure of ITB tightness, with lower scores denoting reduced tightness and improved patient status. The initial high scores in Group A suggested more severe ITB tightness, which significantly ameliorated over the treatment course, especially after the 14th session. This pronounced response in Group A points to the potential benefits of targeted interventions for ITB tightness and may influence future clinical approaches to conditions involving ITB pathology. The consistency of Group A's superior outcomes in Ober's test across time-points further suggests that the interventions applied to this group effectively addressed ITB tightness. This was further corroborated by the mean and standard deviation of scores, which showed significant inter-group improvements. The assessments, while initially exhibiting minor differences, ultimately reinforced the conclusion that Group A's treatment was particularly efficacious in reducing ITB tightness.

The study by Ikutomo et al. [15] and the present study both investigated the effects of foam rolling on patients with osteoarthritis, albeit with different regional focuses—hip osteoarthritis in the former and ITB tightness in OA patients in the latter. Ikutomo et al. 15 found that foam rolling contributed to a significant improvement in hip pain as measured by the visual analog scale (VAS), with a marked percentage of their foam rolling group experiencing a clinically significant improvement in pain. This is similar to the present study's findings where foam rolling, in combination with hip strengthening exercises, led to a significant reduction in ITB tightness and improvement in knee function among OA patients—the primary outcome being an enhancement in PROM during hip adduction and decreased pain and functional limitations as measured by the WOMAC scores.

In contrast, Hall et al. [16] focused on the acute effects of foam rolling over different regions—the ITB and the gluteal muscle group—and their impact on hip adduction PROM. Their results indicated that foam rolling over the gluteal muscles was significantly more effective in improving hip adduction PROM than foam rolling over the ITB itself. This finding diverges from the present study, where the effectiveness of foam rolling was directly related to the ITB tightness in OA patients. It suggests that the benefits of foam rolling might be more associated with its application on muscular tissue rather than fascial tissue.

The discrepancy between the findings of Hall et al. [16] and the present study might be explained by differences in study designs, populations, and outcome measures. Hall et al. [16] measured the acute effect of foam rolling in a young, presumably healthy cohort, while the present study's cohort comprised individuals with OA, and the intervention was conducted over a series of sessions, not acutely. Furthermore, the present study combined foam rolling with hip strengthening exercises, which might have contributed synergistically to the observed improvements, a factor not present in the study by Hall et al. [16].

Mayer et al. [17] honed in on the differential responses of muscle and connective tissues to FR among recreational athletes with varying levels of prior FR experience. They discovered that athletes who were experienced with FR exhibited a notable reduction in ITB tissue stiffness both immediately and six hours after the intervention, a phenomenon not witnessed in the cohort of non-experienced athletes. Interestingly, their research did not report any significant alterations in muscle stiffness for any of the participants, regardless of their familiarity with FR.

In a parallel line of inquiry, Else et al. [18] probed the potential of FR as a therapeutic modality for ITB syndrome in a demographic of cyclists and runners, questioning whether it was more efficacious as a standalone treatment or when paired with spinal manipulation techniques. Their findings suggested an edge for the combined approach; patients receiving both chiropractic care and FR showed the most pronounced improvements.

Vaughan et al. [19] concentrated on the short-term repercussions of foam rolling on pressure pain threshold (PPT) in individuals without ITB-related symptoms. Their findings indicated a transient enhancement in PPT right after the use of foam rolling, pointing to a fleeting respite from sensitivity to pressure pain which dissipated within five minutes. This transient analgesic effect suggests foam rolling may offer immediate albeit temporary relief from ITB discomfort.

Pepper et al. [20] took a slightly different approach, investigating the combination of foam rolling and ITB stretching on ITB stiffness and the PROM of hip adduction. Contrary to expectations, they did not observe a significant alteration in ITB stiffness, as quantified by Young's modulus. However, they did document a modest, yet statistically significant, uptick in hip adduction PROM.

Vaidya et al. [21] executed a randomized control study that discerned significant improvements within groups for passive ROM and physical function in patients with PFPS, following foam rolling and static stretching. Notably, however, when measuring the efficacy of foam rolling against static stretching, they found no significant difference, suggesting an equivalent benefit from either intervention.

Friede et al. [22], on the other hand, reported no statistical difference in ITB tension between the affected and unaffected legs of runners with ITBS, nor between the ITBS-afflicted runners and healthy controls. Despite six weeks of physiotherapy, ITB stiffness did not significantly decrease, although improvements were noted in hip muscle strength (with the exception of abduction), pain, and lower extremity function.

In the realm of sports medicine, recent scholarly contributions have substantiated the efficacy of various ITB manipulation strategies in ameliorating both functional outcomes and athletic execution among patients suffering from ITBS [23], [24]. The research of Park et al. [24] highlights that a solitary intervention involving foam rolling can elicit a measurable uptick in cycling power output among male cyclists affected by ITBS. Despite these gains, enhancements in a 10-kilometer time trial failed to reach a level of statistical significance within the scope of their study. Moreover, an investigative period extending over eight weeks has been documented to improve outcomes on the Y-balance test and refine the qualitative aspects of single-leg squat movements among subjects [25].

Another avenue of treatment, the osteopathic counterstrain method, was applied in a case study [26] and demonstrated functional enhancements in a 30-year-old male with ITBS over a two-week period, with the patient reporting a return to normal running activity and daily living functions. Notably, these benefits persisted at a ten-week follow-up.

Conversely, disparate outcomes have been reported in studies involving asymptomatic populations. One paper [27] found no significant changes in vertical jump heights from foam rolling and the Emmett technique. However, significant improvements have been reported in single-leg hop tests, lateral hop tests, and vertical jump height following interventions that included foam rolling, PNF stretching, and their combination, though no single intervention appeared superior over time [28].

These results suggest that while acute performance benefits may be attributed to foam rolling in isolation, as shown in a specific population [24], attributing long-term functional improvements to these interventions alone is complex. Some studies [25], [26] required participants to avoid activities that exacerbate pain or to alter footwear and training surfaces, which could also affect outcomes. When interventions included strengthening exercises [22], improvements are less likely to be attributed solely to releasing methods. Hence, the long-term efficacy of stretching and releasing methods on function and performance remains a subject of debate.

5. Limitations

Some of the limitations of this study need to be kept in mind while interpreting the assessed findings. Chief among these was its relatively small sample size; a factor that could curtail the universal applicability of our findings: this suggests caution when generalizing results across a broader population. Potentially, the restricted scope of demographic variability could compromise the external validity and applicability of these results across various age groups - both sexes: as well as differing levels of disease severity. The short duration of the intervention period posed another limitation. The study's conclusions rest on outcomes evaluated over a 14-session span; however, this may not adequately account for the enduring effects and sustainability of treatment benefits. Furthermore, the study design could not control to restrict potential confounding variables such as participants' activity levels and medication usage or consider other therapeutic interventions outside its protocol. These factors might have exerted independent influence on the outcomes. Subsequent research must confront this limitation by integrating larger, more diverse populations; extending intervention periods with follow-up assessments; adopting double-blind methodologies; incorporating additional objective measures - all while controlling for extraneous variables in order to validate and expand upon current findings.

6. Recommendations Pertaining to Clinical Practice

The recent findings have notable ramifications for clinical practice, particularly in the management of knee osteoarthritis (OA) in patients presenting with iliotibial (IT) band tightness. The application of kinesiotape, aimed at fascial release, has been identified as an effective treatment protocol. This therapeutic approach leverages the constant stretch provided by kinesiotape to exert a mechanical lift of the skin. This lifting effect has implications for circulatory dynamics, as it may lead to circulatory impairments that are instrumental in the treatment process. Furthermore, the application of kinesiotape induces convulsions in the affected area, which are crucial in stimulating mechano receptors. This stimulation is integral to the neural feedback mechanisms that communicate with the brain. The activation of these receptors plays an important role in proprioceptive signaling, which can contribute to pain relief and improved motor control in patients with knee OA. Therefore, the integration of kinesiotape into treatment regimens for IT band tightness associated with knee OA could enhance patient outcomes through these physiological pathways.

7. Conclusion

As per the findings assessed, integrating foam rolling into hip strengthening exercises significantly improved symptoms of ITB tightness in patients suffering from Knee OA. Through meticulous collection of empirical data over fourteen sessions; a consistent decline emerged in the WOMAC scores across all participant cohorts – indicating marked enhancements both in pain alleviation and knee joint functionality. Remarkably pronounced improvements appeared within the cohort undergoing combined treatment regimen: foam rolling alongside hip-strengthening routines. Ober's test further solidified the superior efficacy of the combined intervention. Even though Group A initially showed an unexpected rise in their mean Ober's test scores - a sign of heightened ITB tightness - this anomaly swiftly resolved and we confirmed it to be a data reporting aberration. The subsequent sessions revealed significant reduction in this group's ITB tightness. Groups B and C also demonstrated improvements, yet they did not manifest the same pronounced results as Group A; this underscores the superior therapeutic advantage of employing an integrative approach. All in all, the findings advocate for the adoption of foam rolling in conjunction with hip strengthening exercises as a potent therapeutic strategy for mitigating ITB tightness in OA patients. The combined modality outperformed conventional treatment methods, thereby offering a compelling alternative for clinicians seeking to optimize patient outcomes in the management of OA-related ITB tightness.

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Conflict of interest

The author declares no conflict of interests. Author read and approved final version of the paper.

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