Effect of Iliotibial Band Myofascial Release on Functional Disability in Patients with Knee Osteoarthritis

Ebtessam Fawzy Gomaa and Lilian Albert Zaky

Department of Physical Therapy for musculoskeletal disorders and their Surgery, Faculty of Physical Therapy, Cairo University

Address For Correspondence:
Ebtessam Fawzy Gomaa
Department of Physical Therapy for musculoskeletal disorders and their Surgery, Faculty of Physical Therapy, Cairo University
E-mail: Ibtisam.fawzy@pt.cu.edu.eg

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ABSTRACT

Background: Knee osteoarthritis is a heterogenous disease that needs comprehensive assessment and treatment techniques to address specific problems such as iliotibial band myofascial trigger points; creating undue joint stress & pain. Purpose: The purpose of this study was to investigate the effect of iliotibial band myofascial release technique on functional disability in patients with knee osteoarthritis. Design and methods: Parallel group randomized controlled trial; comprising four weeks intervention period. Subjects: Thirty-six knee osteoarthritis patients aging between 50-59 years; were randomly distributed into two groups: Group A (control): 17 patients which were treated by exercise program, Group B (experimental): 19 patients which were treated by exercise program in addition to iliotibial band myofascial release technique. Intervention: two techniques were used in combination; the ischemic compression (IC) technique and neuromuscular technique (longitudinal strokes). Outcomes: Functional performance was assessed using step up test, timed up & go test (TUG) and WOMAC index. Results: Both groups showed a significant improvement (P-value <0.05) in all evaluated measures to the favor of experimental group (B). Conclusion: The proposed exercise program alone or in combination with ITB, MFR technique has a significant effect in improving functional disability in patients with KOA.


INTRODUCTION

Knee osteoarthritis (KOa) is a common disease, with a prevalence of 12.5% in populations’ aging 45 years & older [1]. In North Africa, the incidence of KOA is more frequent than hip OA [2]. OA is the most widespread cause of pain and disability in populations after retirement age; making OA the fourth suspected leading cause of disability in the general population by the year 2020 [1].

Heterogeneity of KOA as a disease results in a wide range of clinical presentations and varying rates of progression [3]. Subjects with KOA exhibit a characteristic pattern of decrements in function, generally concerning mobility, transfer from seated or supine position to standing, and activities of daily living (ADLs) involving the lower extremities [4].

Degenerative changes in KOA including medial compartment cartilage loss, joint narrowing and tibial plateau collapse leads to increased adduction moment and varus deformity [5], altering the relationship of the ITB and the lateral epicondyle with the possibility of an increased friction leading to inflammation of the lower part of ITB near the knee joint [6]. Also, weakness of the hip abductor muscles is believed to play a role in the development of iliotibial friction syndrome (ITBFS) [7].
Clinically, patients with medial sided KOA, occasionally complain of laterally located pain. ITBF is unrecognized cause for lateral knee pain in patients with medial compartment KOA [6].

Myofascial trigger points (MTrPs) contribute to increased tension in the ITB [7]. MTrPs also, cause spot tenderness, muscle tightness, and fascial restriction [8]. These spots also give rise to referred pain which arises from the distal portion of ITB to the lateral aspect of the knee joint [9] about 0-3 cm (mostly 2 cm) proximal to the lateral femoral epicondyle [10].

If the myofascial tightness remains untreated, the normal pain-free function, and smooth muscle contraction cannot be resumed [11]. When direct pressure is exerted on the soft tissue; it causes the fascia to stretch and increase ROM [12]. This allows for the breaking apart of fibrous adhesions between the different layers of the fascia and restores the soft tissue extensibility [13].

Although recognizing the burning lateral knee pain of ITBFS is not difficult, treating the condition can be a challenge in KOA, because of the underlying myofascial restrictions and MTrPs which can significantly contribute to the patient’s pain and disability [14]. Also MTrPs are unbelievably commonly overlooked or poorly treated while they are a major cause of a patient’s musculoskeletal pain complaint [15].

New developments in manual physiotherapy have demonstrated very promising improvements in pain and physical function [16] but effectiveness has not yet been definitively established [17]. Further studies are required to investigate the effects of the different manual therapies that are being used in clinical practice [18] this presents an obvious need to document the effects of MFR [19].

To the author’s knowledge, no published studies investigated the effect of MFR of ITB in treatment of KOA. Therefore the present study was applied to investigate the combined effect of two ITB MFR techniques on functional disability in patients’ with KOA.

Subjects And Methods:
Participants:

Thirty-six physically active patients with tibio-femoral and patello-femoral joint OA were included in this study. They met the clinical criteria for diagnosis of KOA according to American College of Rheumatology [20]. Also, they had the following criteria prior to participation in the study: Age ranging between 50-59 years, Pain or difficulty in rising from sitting or climbing stairs, Positive Ober & Nobel tests.

Patients were excluded if they have rheumatoid arthritis, physical impairments preventing safe participation in exercise program or manual therapy or walking, such as: vision problems that affect mobility, body weight greater than 120 kg, neurogenic disorder, back pain, advanced osteoporosis, inability to walk 10 meters without an assistive device, Knee varus deformity > 10°, external tibial rotation, pescavus or any other predominant lower limb deformity that affects knee joint stress.

Randomization and allocation concealment:

Study was conducted in the outpatients’ clinic of physical therapy faculty, Cairo University. After all baseline criteria have been met, participants were randomized using sealed preset envelopes method; all patients were asked to sign a consent form for ethical issue.

The patients were randomized to: Group A (control): consisted of 17 patients which were treated by exercise program designed for KOA. Group B (experimental): consists of 19 patients which were treated by the same exercise program in addition to ITB MFR.

Blinding:

• Allocation using sealed envelopes, assures blinding of both patient and researcher at admission and in intial evaluation.
• The statistician conducted the statistical analysis was blind to group allocation until the analysis were completed.
• The participants were informed that they are in a "physiotherapy trial group" but were not told which group is the experimental one.

Assessment measures:

• Pain, stiffness and self-reported functional disability on WOMAC index.
• Functional performance using step test and TUG test.

Evaluative procedure:

• Evaluation procedure were done as a baseline measure after all inclusive measure proved to be positive before randomization process; and at four weeks follow up period. All evaluative measures were recorded from the most affected limb from patient prospective.
1. **Functional Performance:**
   Functional Performance was measured using step up test which is a standing balance test with known reliability and validity [21], and TUG test which is a validated and is a reliable test of function in older individuals [22].
   
   o **Step test:**
     Barefooted in front of a 15 cm step, patients stood on the least affected side, whilst stepping the opposite foot (the most affected one) on and off the step as many times as possible over 15 seconds. The number of times the participant could place the foot on to the step and return it to the floor was recorded, with higher scores indicating better balance [21].
   
   o **TUG:**
     Patients were instructed to rise from a standard armed chair, walk around a cone on the floor 3 m away, return to the chair and sit down again, whilst being timed by a stop watch. Patients performed the test barefoot, once only and at their own pace [22].

2. **Pain, stiffness and physical function on WOMAC:**
   The WOMAC scale was designed to measure dysfunction and pain associated with OA of the lower extremities in ADL, by assessing 17 functional activities (physical function scale), five pain related activities (pain scale), and two stiffness categories (stiffness scale) [23]. This is a disease-specific instrument [24] which is widely used, reliable, valid and responsive measure of outcome in people with osteoarthritis of the hip or knee [25].
   
   In this study the Arabic version of the WOMAC was used; which worded in simple and currently used literal Arabic language to allow for its use in the largest possible Arab population. The translated and adapted scale has good repeatability as well as each of its subscales (Pain, Stiffness and modified Physical Function) [2]. We used the likert boxes version; the score for each section (Pain, Stiffness and modified Physical Function) were recorded and analyzed separately.

**Interventions:**
**Timing protocol:**
   After the patients complete the baseline evaluation; the patient started the treatment program the next day according to patient allocation. Exercise session duration ranges between 20-30 min; each other day for four weeks (12 sessions). MFR has added between 5-20 min to the session duration depending on the targeted number of TrPs.
   
   This timing was recommended based on Simons et al. [26] who stated that manual methods are more likely to require several treatments and the benefits may not be as fully apparent for a day or two.

**Myofascial release technique:**
   The patient is on side lying position to treat the superior limb; which was slightly flexed at both hip and knee to be advanced forward and completely supported on the bed to gain maximum relaxation for effective release [15]. The adduction gained by positioning and gravity put the muscle in elongated position as emphasized by Lewit, [27] for effective passive release and gently helps the patient relax more completely as recommended by Simons, [15].

   A. **Ischemic compression technique:**
      This technique consists of applying a relevant pressure by the pad of the therapist’s thumb on the skin of the patient, in order to get ‘contact’ with the fascia (fig. 1a) while putting the TrPs halfway between the fingers (index & middle) (fig. 1b) to keep it from sliding to one side during the release [28]. The therapist’s thumb remained in contact with the skin overlying the MTrPs for the entire procedure to ensure accurate re-location of pressure for MFR [29].
      
      Patients received a TrPs pressure release technique over each TrPs that was found. This consisted of sustained deep pressure with the thumb to the TrPs for 30 s - 1 min. Pressure was released when there was decreased tension in the TrPs or when the TrPs was no longer tender or one minute had elapsed, whichever occurred first [26]. The total time of successive pressures was for five minutes or more (upon each TrPs) until the release is felt by the therapist's thumb [30]. This sequence was methodologically similar to a chiropractic technique developed earlier by Nimmo,[31].

   B. **neuromuscular technique:**
      Patients also received a neuromuscular technique (longitudinal stroke) [32]. The thumb of the therapist was placed over the taut band and longitudinal strokes were applied slowly with moderate pressure which was not
painful for the patient (fig. 1c), the technique was applied for 3 min as recommended by Fernández-de-las-Peñas et al. [18]. This technique has been found to be effective for reducing TrPs pressure sensitivity [33].

![Image](image_url)

**Fig. 1:** a & b ischemic compression technique. c: longitudinal stroke.

**Exercise Program:**

We had used a proposed program developed by Quilty et al. [34] and recommended by Bennell et al. [35] and was proved to be effective in improving motor control and function [36], particularly around the hip and pelvis, rather than on lower limb strengthening and aerobic fitness [35], also showed little increase in quadriceps strength [34] (Table 1).

This exercise program was used to avoid the direct major effect of pure strengthening exercise on either pain or function [37], strengthening exercise although widely used could have masked the true results of experimental intervention (MFR) already used.

**Table 1:** brief description of exercise program.

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Holding time</th>
<th>Repetitions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buttock squeeze</td>
<td>5 s hold</td>
<td>5 repeats</td>
<td>contraction of hip adductors</td>
</tr>
<tr>
<td>SLR</td>
<td>10 s hold</td>
<td>5 repeats</td>
<td>On each side.</td>
</tr>
<tr>
<td>Terminal knee extension</td>
<td>5 s hold</td>
<td>5 repeats</td>
<td>On each side.</td>
</tr>
<tr>
<td>Leg press</td>
<td>5 s hold</td>
<td>5 repeats</td>
<td>done against the wall.</td>
</tr>
<tr>
<td>Half squats</td>
<td>5 repetitions</td>
<td></td>
<td>with co-contraction of the gluteus and hip adductors</td>
</tr>
<tr>
<td>Step ups</td>
<td>5 repetitions</td>
<td></td>
<td>on each leg</td>
</tr>
<tr>
<td>Hamstring stretch</td>
<td>15-20 s hold</td>
<td>5 repeats</td>
<td>on each leg</td>
</tr>
<tr>
<td>ITB stretch</td>
<td>15-20 s hold</td>
<td>5 repeats</td>
<td>on each leg</td>
</tr>
<tr>
<td>Standing balance</td>
<td>15-20 s hold</td>
<td>5 repeats</td>
<td>on each leg with a piece of theraband</td>
</tr>
<tr>
<td>Hip abductor strengthening</td>
<td>5 s hold</td>
<td>5 repeats</td>
<td>On each leg</td>
</tr>
</tbody>
</table>

**Results:**

All raw collected data of measured variables were subjected to normality testing using both Kolmogorov-Smirnov statistic, with Lilliefors significance level and Shapiro-Wilkin order to determine the type of statistical analysis. For normally distributed data (pre-treatment and post-treatment), the multivariate ANOVA is used in testing the differences amongst the groups also the pre-post testing for each variable. As for not normally distributed data comparison between two groups was done using Mann-Whitney test Wilcoxon-signed ranks test was used to compare two consecutive measures in the same group.

The results of the MANOVA tests showed that there was no significant difference between groups in the pre-treatment scores of Pain, physical function and TUG. There was a significant difference between groups in the post-treatment scores of Pain, physical function, TUG.

The results of MANOVA tests for control group (A) revealed significant improvement in pain score by 14.34% decrease, Physical disability score by 30% decrease (NS), TUG score by 17.25% decrease after treatment; also in experimental group (B) showed highly significant improvement in pain score by 36.53% decrease, Physical disability score by 45.2% decrease, TUG score by 31.24% decrease after treatment as showed in Tables (2, 3&4) and Figure (2).

Comparing the median values of Stiffness score, Step test score between the two groups pre-treatment using Mann-Whitney test revealed no significant difference. Comparing the median values of Stiffness score, Step test score between the two groups post-treatment showed a significant improvement, in favor of experiment group.

Wilcoxon test results of the control group revealed significant improvement in stiffness score by 24.7% decrease, Step test score by 34.67% increase, after treatment; also the results of the experiment group revealed highly significant improvement by 49% decrease, Step test score 60% increase after treatment as shown in Tables (5&6) and Figure (2).
Table 2: Illustrating pain across groups and pre-post differences.

<table>
<thead>
<tr>
<th></th>
<th>CONT. A</th>
<th>EXP. B</th>
<th>CONT. A</th>
<th>EXP. B</th>
<th>CONT. A</th>
<th>EXP. B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>14.765 ± 1.88</td>
<td>14.842 ± 2.36</td>
<td>12.65 ± 1.93</td>
<td>9.42 ± 1.8</td>
<td>14.765 ± 1.88</td>
<td>12.65 ± 1.93</td>
</tr>
<tr>
<td>Levene's test</td>
<td>F = 0.711 P-value = 0.405</td>
<td>F = 0.151 P-value = 0.700</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type III Sum of Squares</td>
<td>0.054</td>
<td>93.375</td>
<td>44.474</td>
<td>48.955</td>
<td></td>
<td></td>
</tr>
<tr>
<td>df</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Square</td>
<td>0.054</td>
<td>93.375</td>
<td>44.474</td>
<td>48.955</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-Test</td>
<td>0.012</td>
<td>26.788</td>
<td>7.170</td>
<td>25.529</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p-value</td>
<td>0.915</td>
<td>0.000</td>
<td>0.011</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of improvement</td>
<td>↓ 14.34%</td>
<td>↓ 36.53%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Illustrating Physical disability across groups and pre-post differences.

<table>
<thead>
<tr>
<th></th>
<th>CONT. A</th>
<th>EXP. B</th>
<th>CONT. A</th>
<th>EXP. B</th>
<th>CONT. A</th>
<th>EXP. B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>54.12 ± 5.14</td>
<td>54.842 ± 5.689</td>
<td>37.88 ± 7.2</td>
<td>30.05 ± 8.79</td>
<td>54.12 ± 5.14</td>
<td>37.88 ± 7.2</td>
</tr>
<tr>
<td>Levene’s test</td>
<td>F = 0.118 P-value = 0.733</td>
<td>F = 2.159 P-value = 0.151</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type III Sum of Squares</td>
<td>4.709</td>
<td>550.038</td>
<td>226.480</td>
<td>328.266</td>
<td></td>
<td></td>
</tr>
<tr>
<td>df</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Square</td>
<td>4.709</td>
<td>550.038</td>
<td>226.480</td>
<td>328.266</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-Test</td>
<td>0.159</td>
<td>8.421</td>
<td>2.995</td>
<td>17.011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p-value</td>
<td>0.692</td>
<td>0.006</td>
<td>0.093</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of improvement</td>
<td>↓ 14.34%</td>
<td>↓ 36.53%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Illustrating TUG across groups and pre-post differences.

<table>
<thead>
<tr>
<th></th>
<th>CONT. A</th>
<th>EXP. B</th>
<th>CONT. A</th>
<th>EXP. B</th>
<th>CONT. A</th>
<th>EXP. B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>36.588 ± 4.032</td>
<td>36.895 ± 5.689</td>
<td>30.17 ± 3.33</td>
<td>25.37 ± 3.05</td>
<td>36.588 ± 4.032</td>
<td>30.17 ± 3.33</td>
</tr>
<tr>
<td>Levene’s test</td>
<td>F = 2.514 P-value = 0.122</td>
<td>F = 0.015 P-value = 0.896</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type III Sum of Squares</td>
<td>0.843</td>
<td>207.414</td>
<td>90.906</td>
<td>117.351</td>
<td></td>
<td></td>
</tr>
<tr>
<td>df</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Square</td>
<td>0.843</td>
<td>207.414</td>
<td>90.906</td>
<td>117.351</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-Test</td>
<td>0.069</td>
<td>20.329</td>
<td>4.604</td>
<td>44.616</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p-value</td>
<td>0.794</td>
<td>0.000</td>
<td>0.039</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of improvement</td>
<td>↓ 17.25%</td>
<td>↓ 31.24%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Table 5:** Illustrating stiffness across groups and pre-post differences.

<table>
<thead>
<tr>
<th>Stiffness</th>
<th>Pre treatment</th>
<th>Post-treatment</th>
<th>Pre versus post-treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CONT. A</td>
<td>EXP. B</td>
<td>CONT. A</td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>5.23 ± 0.97</td>
<td>5.36 ± 1.3</td>
<td>3.94 ± 1.03</td>
</tr>
<tr>
<td>Median</td>
<td>0*</td>
<td>1*</td>
<td>5</td>
</tr>
<tr>
<td>Minimum–Maximum</td>
<td>4 – 7</td>
<td>2 – 6</td>
<td>4 – 8</td>
</tr>
<tr>
<td>U-value</td>
<td>156.500</td>
<td>76.500</td>
<td>-3.372</td>
</tr>
<tr>
<td>z-value</td>
<td>-0.165</td>
<td>-2.769</td>
<td>0.001</td>
</tr>
<tr>
<td>p-value</td>
<td>0.869</td>
<td>0.006</td>
<td>0.001</td>
</tr>
<tr>
<td>% of improvement</td>
<td>↓ 24.7 %</td>
<td>↓ 49 %</td>
<td></td>
</tr>
</tbody>
</table>

**Table 6:** Illustrating step test across groups and pre-post differences.

<table>
<thead>
<tr>
<th>Step test</th>
<th>Pre treatment</th>
<th>Post-treatment</th>
<th>Pre versus post-treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CONT. A</td>
<td>EXP. B</td>
<td>CONT. A</td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>4.41 ± 1.1</td>
<td>4.73 ± 1.1</td>
<td>5.94 ± 0.9</td>
</tr>
<tr>
<td>Median</td>
<td>0*</td>
<td>1*</td>
<td>5</td>
</tr>
<tr>
<td>Minimum–Maximum</td>
<td>3 – 6</td>
<td>5 – 8</td>
<td>3 – 6</td>
</tr>
<tr>
<td>U-value</td>
<td>135</td>
<td>37.5</td>
<td>-3.473</td>
</tr>
<tr>
<td>z-value</td>
<td>0.415</td>
<td>0.000</td>
<td>0.001</td>
</tr>
<tr>
<td>p-value</td>
<td>0.415</td>
<td>0.000</td>
<td>0.001</td>
</tr>
<tr>
<td>% of improvement</td>
<td>↑ 34.67 %</td>
<td>↑ 60 %</td>
<td></td>
</tr>
</tbody>
</table>

**Fig. 2:** illustrating all measured variables pre-posttreatment across groups.

**Discussion:**

After 4 weeks of intervention (3 sessions /week). Both groups showed a significant improvement in functional disability to the favor of experimental group. To the author's knowledge, no published studies investigated the effect of MFR of ITB in treatment of KOA.

Previous studies on MFR were short period, although their results were effective this is not applied in clinical practice, our results after relatively long period of treatment (four weeks) supported the short term effect of the previous studies as well as the long term effect of MFR.

The improvement in functional disability could be explained due to decreased pain level in MFR group (B) more than group (A) which was consistent with the finding of a systematic review by Vernon and Schneider, [38]; found moderate to strong evidence supporting the use of TrPs, MFR for immediate pain relief

Simons, [15] suggested that MFR modify the length of sarcomeres. Also some studies indicated that blood supply may be limited in the neighborhood of the palpable MTTrPs [26]. It seems that MFR could be effective
when ischemia and hypoxia are removed from the area. After pressing the MTrPs, ischemia may be created, and when that pressure was released, a sudden increment in local blood flow was inevitable. Consequently, increasing local blood flow may clean out pain-producing substances from the area, and stimulation of pain receptors may be reduced accordingly [39]. Local nutritive blood flow was similarly increased which would therefore be expected to remove lactate from the interstitium [40]. Finally, by returning the condition of the area to normal, sarcomeres might be relieved from the short position and pain, and poor blood flow may be decreased or eliminated [15].

The improvement in functional disability could be explained by decreased tension in the ITB. As MTrPs cause spot tenderness, increased muscle tightness, and fascial restriction [9]. These physiological changes may result in restricted tissue mobility, altered neuro-dynamics, limited joint ROM, and ultimately influence function [41]. The goal of soft tissue mobilization is to rehydrate connective tissue, stimulate the production of ground substance, assist in orienting of collagen fibers, and break micro-adhesions [42]. The result is improved soft tissue mobility, reduced stress on pain sensitive structures, and better function [41].

The decreased tension in ITB could be attributed to global muscle relaxation as manual touch stimulates some Ruffini endings which then trigger the central nervous system to change the tonus of some motor units in muscle tissue which is mechanically connected to the tissue under the hand. Deep manual pressure specifically if it is slow or steady stimulates interstitial and Ruffini mechanoreceptors, which results in an increase of vagal activity, which then changes not only local fluid dynamics and tissue metabolism, but also results in global muscle relaxation, as well as a more peaceful mind and less emotional arousal. Myofascial manipulation involves a stimulation of intra-fascial mechanoreceptors. Their stimulation leads to an altered proprioceptive input to the central nervous system, which then results in a changed tonic regulation of motor units associated with this tissue [43].

Although Myofascial release therapy is effective in reducing pain and improving ADL, according to the author knowledge there are very few literatures supported this concept.

The present study is in agreement with Deyle et al. [44] who compared a supervised clinical exercise and manual therapy procedure V/S a home exercise program and showed that there was a double improvement in pain, stiffness, and function seen in the clinic treatment group compared to home exercise group.

The present study is in agreement with Pollard et al. [45] who showed that the manual therapy knee protocol demonstrated significant short-term relief of self-reported pain and dysfunction in participants with knee osteoarthritis;

Arun [46] showed that following the application of various myofascial release therapy, the pain related disability, quality of sleep and depression level were considerably reduced.

The improvement in functional disability could be explained by improving patients' self-reporting of pain and dysfunction as stated by Raj, [47] who found that Myofascial release allows freedom of movements called unwinding; this can release trapped emotions, fears and holding patterns. It helps in emotional well-being of the person.

Regarding exercise effect in control group; our results supports the large body of evidence demonstrating the beneficial clinical effects of exercise in patients with knee OA, exercise therapy is regarded as the cornerstone of conservative management [48]. Exercise can improve physiological impairments associated with OA including muscle strength, joint range of motion, proprioception, balance and cardiovascular fitness [49]. Other potential benefits of exercise include improvements in mobility, falls risk, body weight, psychological state and metabolic abnormalities [50].

In our present study, an important consideration revealed in the post treatment was the issue of pain and discomfort created during MFR sessions; but no participants reported adverse effects/discomfort later. Small sample size limits results generalization, also results in wide confidence intervals. We only examined the short-term effects of MFR and Post-treatment follow up was not included.

In the present study the BMI of included patients was high, which may influence knee joint stress as being well documented risk factor of OA [51]; and could minimize the effect of MFR. All evaluative measures were taken from the most affected limb although the MFR techniques were applied to both limbs; which also, could mask the true effect of MFR.

Randomized controlled design with control group received hands-on intervention strengthens the evidence of clinical effectiveness which should not be underestimated. Only one researcher applied all measurements pre and post treatment which improved consistency and reliability of measurements. It is unlikely that the results for the MFR could be explained by spontaneous remission or through natural resolution, as it was a requirement of the study for the KOA to have been a chronic stable condition.

Conclusion:
The proposed exercise program alone or in combination with ITB, MFR technique has a significant effect in improving functional disability in patients with KOA.
REFERENCES


