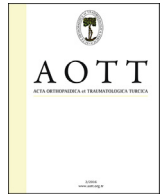




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## Comparison of short-term effects of mobilization with movement and Kinesiotaping on pain, function and balance in patellofemoral pain

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## ABSTRACT

**Objective:** The aim of this study was to compare the short-term effects of Mobilization with movement (MWM) and Kinesiotaping (KT) on patients with patellofemoral pain (PFP) respect to pain, function and balance.

**Methods:** Thirty-five female patients diagnosed with unilateral PFP were assigned into 2 groups. The first group (n = 18) received two techniques of MWM intervention (Straight Leg-Raise with Traction and Tibial Gliding) while KT was applied to the other group (n = 17). Both groups received 4 sessions of treatment twice a week for a period of 2 weeks with a 6-week-home exercise program. Pain severity, knee range of motion, hamstring flexibility, and physical performance (10-step stair climbing test, timed up and go test), Kujala Patellofemoral Pain Scoring and Y-Balance test were assessed. These outcomes were evaluated before the treatment, 45 min after the initial treatment, at the end of the 4-session-treatment during 2-week period and 6 weeks later in both groups.

**Results:** Both treatment groups had statistically significant improvements on pain, function and balance (p < 0.05). Pain at rest (p = 0.008) and the hamstring muscle flexibility (p = 0.027) were demonstrated significant improvements in favor of MWM group.

**Conclusions:** Our results demonstrated similar results for both treatment techniques in terms of pain, function and balance. The MWM technique with exercise had a short-term favorable effect on pain at rest and hamstring muscle flexibility than the KT technique with exercise in patients with PFP.

**Level of evidence:** Level I, therapeutic study.

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### Introduction

Patellofemoral Pain (PFP), also known as the anterior knee pain, is one of the most common musculoskeletal disorders. Women are two times susceptible to PFP than men and it comprises 13–18% of knee problems in females 18–35 years old.<sup>1–3</sup> The symptoms are usually in the form of permeating pain that starts from the anterior part of the knee, and the pain increases during the activities, such

as prolonged sitting, stair climbing or descending, kneeling and squatting.<sup>4–8</sup>

In the treatment of PFP, conservative treatment methods are preferred prior to surgical ones.<sup>9–11</sup> Conservative treatment involves a multimodal physiotherapy approach including patient education, activity modification, neuromuscular electric stimulation on quadriceps, therapeutic ultrasound, biofeedback, exercises for enhancing the activity of Vastus Medialis Obliquus (VMO) muscle, lower extremity-strengthening exercises, proximal stabilization, stretching exercises on tight structures, bracings, foot orthoses, manual therapy and taping techniques.<sup>9,11–13</sup>

In recent years, one of the increasingly widespread practices in PFP treatment is the Kinesiotaping (KT). There have been studies regarding the fact that this technique alleviates pain and edema by enhancing circulation, and that it improves the walking pattern as well as healing the muscle strength and function.<sup>14–20</sup> One of the current treatment methods used in musculoskeletal problems is

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the concept called Mobilization with Movement (MWM) approach which is a current and pain-free manual method of treatment that involves gliding performed by the physiotherapist, along with an active movement in the painful joint.<sup>21,22</sup> This method was shown to have alleviated the pain in musculoskeletal problems and to have improved the functioning, as well.<sup>23–30</sup> There is no study in which MWM method was used and in which the effects of it was shown and compared with KT has been found so far with respect to the treatment of PFP.

The main purpose of this clinical study was to compare the short-term effects of MWM and KT interventions in addition with the exercise therapy in terms of pain, function and balance in patients with PFP.

## Methods

### Subjects

This study was approved by the Non-Interventional Ethical Committee of University (26/05/2013, LUT 12/175) ([ClinicalTrials.gov](http://ClinicalTrials.gov) NCT02707679). All the patients were informed, after which they signed their written informed consent forms. Forty-one female patients at the age range of 20–45 who had been diagnosed with PFP by a specialist of orthopedics and traumatology were incorporated into the study.

Inclusion criteria were: (i) durations lasting longer than two months, (ii) pain scoring three or more according to Visual Analogue Scale (VAS) during at least two activities (prolonged sitting, ascending-descending stairs, squatting, kneeling and jumping-running), (iii) age between 20 and 45 (to reduce the risk of osteoarthritic changes in patellofemoral joint). The patients who had meniscus tear, bursitis, ligament injury, patellar tendon lesions, joint degeneration, patellofemoral dislocation and/or recurrent subluxation as well as those who had undergone lower extremity surgery were excluded. Patient with knee pain caused by the hip, lumbal spine or ankle joint were also excluded. Thirty-five female patients diagnosed with unilateral PFP were randomized into 2 groups with the help of a computer-generated randomization. The patients in the first group (n = 18) received two techniques pertaining to MWM intervention (Straight Leg-Raise with Traction and Tibial Gliding) along with an exercise therapy. In the second group (n = 17), however, KT practice and exercise therapy were performed on the patients. The patients received 4 sessions of treatment twice a week for a period of 2 weeks and were, then, followed up in accordance with a 6-week-home exercise program (Fig. 1).

### Assessment parameters

All the patients were evaluated before the treatment, 45 min after the initial treatment, at the end of the 4-session-treatment during 2-week period and 6 weeks later. Age, height, body weight, body mass index (BMI), and pain durations were recorded. In order to evaluate the knee pain in the course of resting and activity (climbing up-down the stairs), the visual analogue scale (VAS) was used.<sup>31</sup> The Kujala Patellofemoral Scoring test which was evaluated over 100 points and which questioned pain, functional performance, limping, applying load on both of the lower extremities, walking, climbing up-down the stairs, squatting, running, jumping, sitting for a long time with bent knees, swelling, abnormal and painful patellar movement, flexion deficit and femoral atrophy was performed under the guidance of physiotherapist.<sup>32,33</sup>

Universal goniometer was used for evaluating the knee joint range of motion and hamstring flexibility. To evaluate the functional performances of the patients, 10-step-ascent & descent stair-climbing test and timed up&go test (TUG) were used.<sup>15,34</sup>

The dynamic balance measurements of the patients were evaluated through Y-Balance Test. Each measurement was repeated 3 times, after which the mean value was obtained in cm. Prior to the beginning of the test, the patient was allowed to do some practice a couple of times and then to start the test when she was ready.<sup>35,36</sup>

### Treatment program

#### MWM technique

The two techniques of MWM method were performed on the patients.<sup>22,37</sup>

- **Straight Leg-Raise with Traction:** The extremity on which the practice would be performed in supine position was grasped from the ankle level and was, then, subjected to traction longitudinally. Afterward, the knee was lifted up passively while in extension and was kept for waiting for a few seconds at the point where tension was felt and was, then, returned to its initial position. The practice was repeated 10 times, and 3 sets of practice at 1-min-intervals were performed (Fig. 2).
- **Tibial Gliding:** The patients were asked, in the first place, whether or not they felt any pain in the course of the active knee flexion–extension movement while in supine position. In the patients who had pain, the treatment was started on in the position in which no load was transferred onto the knee joint. Each patient was tested in every direction in the course of the active knee flexion–extension movement so as to find out the best pain-free gliding direction (medial–lateral part of the tibia, anterior–posterior, internal–external rotation). While a hand femur was being fixated in accordance with the treatment direction selected by the therapist, the other hand was subjected to gliding towards tibia, and at that moment, the patient was asked to perform 10 repetitive active knee flexion–extension. The practice was performed by doing 10 repetitions for 3 sets and by providing 1-min-resting time between the sets. Throughout the treatment process, particular attention was paid to allowing the position of the hands, the gliding direction and force to remain the same all through the movement process.<sup>25,37</sup> If the patient felt no pain in supine position both during and after the practice, the position in which weight/load was conveyed was started to be performed (Fig. 3). This group of patients was also given an additional home exercise program specific to the technique and in the direction selected for the treatment (Fig. 4).

#### Kinesiotaping

To maintain proprioceptive stimulation in the quadriceps (from origo towards insertio) and to alleviate the tension of hamstring muscle, a 'Y'-shaped kinesiotape was applied by using the muscle technique. Afterward, 2 pieces of 'I'-shaped tapes were stretched by 75% through the mechanical correction technique and were applied around the patellar circumference in the way that it would allow the patella to move naturally in the femoral cavity while the knee was in 45° flexion (Fig. 5).

#### Home exercise program for both group

All the patients were provided with exercises within the scope of the home exercise program; hamstring muscle stretching (8–10 reps of 20 s hold), straight leg raise (3 sets 10 reps), bridge exercise (3 sets 10 reps), clamshell exercise for gluteus medius (3 sets 10 reps), 4-way- hip strengthening exercises with elastic bands (2 sets 10 reps), terminal knee extension with elastic band while patients were in standing position (2 sets 10 reps), and mini-squatting exercises (2 sets 10 reps). They were asked to do these exercises in 3 sets a day along with 10 repetitions for a period of 6 weeks.

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