

RESEARCH ARTICLE

Immediate effect of taping in physical performance of osteoarthritis of knee joint

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ABSTRACT


Background: Osteoarthritis (OA) is a degenerative joint disease which is an arthritic condition in which the articular cartilage has begun to erode and become soft and frayed. Current treatment is aimed at reducing symptoms and improving functions. Taping of the patella to pull it medially, followed by exercises, has been recently recommended for the treatment of knee OA. **Aims and Objectives:** This study aims to study the effect of taping in improving physical performance of OA of knee joint. **Materials and Methods:** The research project was conducted after getting clearance from Human Research Ethics Committee of the H M Patel Institution for Education and Research center. In this randomized control trial study, 50 subjects were included from the Outpatient Department of the Physiotherapy, Shree Krishna Hospital. Participants were divided into two groups; there were 25 participants in each group. One group received only exercise and the other group received tapping along with exercise. Outcomes were measured by Western Ontario and McMaster Universities OA Index (WOMAC) and timed up and go test (TUG). **Results:** Data are analyzed by finding *P* value. And also by correlating between prevalues and postvalues of outcomes measured. There was statistically significant improvement in WOMAC ($P < 0.001$) as well as TUG ($P = 0.058$), in the group which includes both taping and exercises. There was statistically significant improvement in WOMAC ($P < 0.002$) in the group which included only exercises, whereas there was no statistically significant improvement in TUG ($P = 0.123$). **Conclusion:** Taping is effective to improve the functional outcome of the patients with the OA of knee joint.

KEY WORDS: Osteoarthritis; Kinesio Tapping; Rehabilitation; Functional Independence; Musculoskeletal Disorders; Knee Pain

INTRODUCTION

Osteoarthritis (OA) is a degenerative joint disease which is an arthritic condition in which the articular cartilage has begun to erode and become soft and frayed. As the cartilage deteriorates, the bones begin to rub together causing pain,

swelling, and decreased ability to tolerate various activities. OA is one of the most prevalent diseases, it is affecting 20.7 million people in the United States, and 1 in 10 Canadians is suffering from OA.^[1,2] OA of knee is a major cause of pain and disability in older people.^[1,2] In India, the prevalence of the OA knee is the 28.7% more prevalent in females than in males.^[3] There is no specific treatment to modify the disease. Current treatment is aimed at reducing symptoms and improving functions.^[3] Analgesics and anti-inflammatory drugs are used widely, in spite of potential side effects and doubts about their efficiency, some forms of physical therapy, such as quadriceps exercises are known to be of benefit,^[4] and walking aids can improve functions. Most studies have evaluated the effect of quadriceps strength on the

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tibiofemoral joint of the knee. The quadriceps muscle also has important biomechanical effects at the patellofemoral joint, a site of frequent cartilage loss in addition to pain and disability among persons with knee OA of this part of joint can cause severe pain, particularly when the patient is using stairs, squatting, or kneeling.^[5,6] Misalignment or abnormal position of patella with consequential abnormal force distribution on the lateral facet is thought to be the cause of symptoms of wear and tear of the cartilage leading to pain, swelling, injury to cartilage, and then joint. Taping of the patella pull toward medially, followed by exercises, has been recently recommended for the treatment of knee OA.^[7] Weakness of the vastus medialis obliquus component of the quadriceps muscle has been reported to contribute to lateral subluxation or partial dislocation of the patella.^[8] The optimal conservative management of knee OA requires a combination of pharmacological and non-pharmacological treatment modalities. Various studies that found high-to-moderate medical evidence for exercise, TENS, low-level laser therapy, acupuncture, patient education, and self-management but also evidence against short-wave therapy.^[9] The medical evidence to support therapeutic ultrasound, thermotherapy, braces and orthotics, tapping, massage, traction, stretching, advice on physical therapy, and weight reduction was low or none.^[10] It needs to be stressed that all the recommendations above provide only symptomatic relief, but they cannot modify the degenerated cartilage structure. Hence, this study is conducted to know the immediate/short-term effects of the taping for osteoarthritic knee pain, so that it can be helpful to be included as a part of treatment for OA of knee joint.

Objectives

The objective of this study was to study the effect of taping in improving physical performance of OA of knee joint.

MATERIALS AND METHODS

Study Design: Computerized randomized control trial (RCT).

Study Population: Indian population having OA of knee joint who fulfill inclusion criteria.

Sample Size: A total of 50 participants who are suffering from the OA knee pain.

Source of Sample: Outpatient Department of the K. M. Patel Institute Of Physiotherapy, Shree Krishna Hospital, Karamsad.

Criteria of Selection

Inclusion criteria

- Patients who are diagnosed as having OA of knee joint.
- Patients whose age group of 40–60 years.
- Both genders.

Exclusion criteria

- Patients with any fracture or injury.
- Patients with any carcinoma.
- If patient having any other systemic illness.
- Participants included in other ongoing departmental research project.

Materials

- Plinth.
- Alignment pad.
- Tap.
- Scissor.
- Chair with armrest.
- Stopwatch/wristwatch.

Methodology of Study

The research project was conducted after getting clearance from Human Research Ethics Committee of the institution. A computerized RCT was conducted targeting the Indian population having OA of knee joint and 50 subjects were selected according to the inclusion and exclusion criteria. Then, written consent from the subject was taken. The study comprised 1 week intervention period with follow-up visits to the hospital. Participants were assessed before treatment (baseline) and after 1 week of treatment. For that, the subjects were divided into two groups by computerized randomization Group A and Group B, for the participants from the both groups brief assessment was taken. In Group A, participants were treated with taping along with exercises (straight leg raise, straight leg abduction, straight leg extension, last degree extension, and static quadriceps), while in the Group B, participants were treated only with the exercises [Figure 1].

For the tapping, McConnell Patellar tapping technique was used. For that, the patient was positioned in long sitting position; affected knee joint was exposed. As per McConnell patellar taping technique, tape was applied from superior and lateral patellar borders, maximally pulling it medially. A second strip can be used for reinforcement, but it should not cover the popliteal fossa.^[13] This protocol was continued for three sessions for 1 week. To observe the immediate effects of tapping for the successive week of tapping procedure, participants of both the groups were reassessed for WOMAC and timed up and go test (TUG)^[11] scales at the end of the third session (1 week) of taping in context of physical performance in patients with OA of knee joint. WOMAC and TUG were taken as below:

WOMAC: WOMAC is standardized questionnaire to evaluate the condition of the participants who were suffering from OA of the knee joint. Hence, examiner had asked the series of the questions from the WOMAC regarding pain, stiffness, and physical function to the participants and participants had answered from 0 to 4, where 0 means no

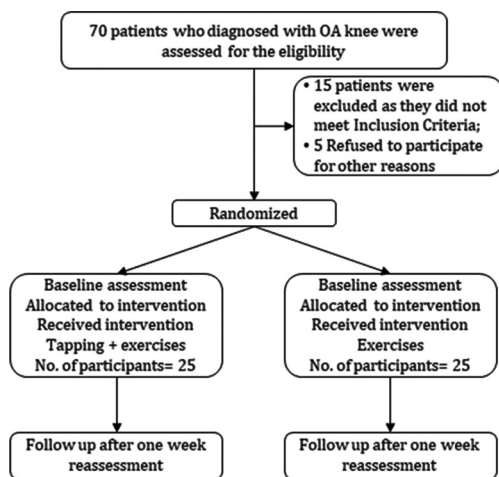


Figure 1: Study flowchart

affection and 4 means maximum affection. As per the answer of the participants, data were recorded.^[12]

TUG: Participants are allowed to wear their usual footwear. They are asked to sit in a chair with their back supported to the standard chair and their arms resting on the armrest. Participants are supposed to stand up from chair and walk a distance of 10 feet (3 m) then turn around and walk back to chair and sit down. Time assessment begins when the persons begin to rise from chair and ends when he or she returns to the chair and sits down. Participants were given one practice trial and then three actual trials. The average of the time assessed from three actual trials was considered.^[13]

RESULTS

In this study, total 50 participants were recruited, 25 participants in each group.

Table summarizes the analysis of the data. It shows there pre- and post-comparison of the score of the WOMAC and tug for both the groups [Table 1].

In the present study, we found that there was a statistically significant improvement in WOMAC with $P < 0.001$ in group taping and exercises, while in only exercise group $P = 0.002$, that shows less statistically significant than taping and exercise group [Table 1].

There were significant changes in TUG value in the group which were includes both taping and exercises with $P = 0.05$, then compared to only exercise group, it shows $P = 0.123$ [Table 1].

Hence, results suggested from the current study that there was statistically significant improvement in WOMAC ($P < 0.001$) as well as TUG ($P < 0.005$), in the group which includes both taping and exercises. Whereas, there was no statistically significant improvement in TUG ($P < 0.123$) and there was only

statistically significant improvement in WOMAC ($P < 0.002$) in the group which includes exercises only [Table 1].

DISCUSSION

In the limelight of the objectives, current study reveals that taping along with the exercise is easier, patient-friendly and more effective treatment than only treating with only exercises for the OA knee pain. In group taping with the exercises, there was statistically significant in TUG and WOMAC which are the representative of the functional measurement of the participants, whereas there was not much statistically significant in TUG and WOMAC in group only exercise.

The study was aimed to evaluate the effectiveness of taping added to exercise regimen used in OA of knee. There is statistically significant improvement in WOMAC as well as TUG with $P \leq 0.001$ in experimental group. Hence, in present study shows a positive impact of taping on OA knee that provides more evidence to support the use of tape in managing painful OA knee. A pain relief by taping can be by relieving pressure on the damaged lateral facet of the patellofemoral joint and improving tracking of the patella and function of the quadriceps mechanism.^[14] Medially-directed patellar tape is commonly applied clinically to treat chronic knee pain, where there is lateral displacement of patella relative to femoral trochlear groove resulting in increased peak patellofemoral contact pressures and loading of lateral facet.^[10] Taping may provide neural inhibition through large fiber input to the anterior knee because large fiber input sensory signals are transmitted faster to the brain than pain signals, the large fiber input from the tape may override the pain signals. Therefore, the patient may experience a decrease in the perceived pain, that's why it was speculative and further study is needed to determine the effect of patella taping on neural inhibition (e.g., Hoffman reflex).^[11] Bockrath *et al.* suggested that the mechanical advantage of quadriceps is maximized due to increased leverage by the patella through a medial shift as it returns to the trochlear groove of femur.^[15,16] The protocol was emphasized on strengthening quadriceps muscles as well as other muscles surrounding the knee joint and working on knee which contributes in maintaining stability of the knee. Among knee OA patients Herrington have reported decrease in sensorimotor function of quadriceps.^[17] The exercise treatment for OA knee patients may increase sensitivity of the sensorimotor structures of quadriceps including muscle spindle and Golgi tendons.^[19] Herrington^[18] investigated the effects of patellar taping on stride characteristics and joint motion in patients with patellofemoral pain syndrome. Patellar taping had statistically significant increase in loading response knee flexion under all conditions. It can be explained by that this increase in loading response knee flexion may have enhanced patients willingness to load the knee joint which may improve shock absorption, quadriceps activity,

Table 1: Comparison of study parameters between groups

Characteristics	Number	Minimum	Maximum	Mean±SD
Tapping+exercise				
Age year	25	40	60	53.82±5.89
	Mean±SD		P	
WOMAC tapping+exercise				
WOMAC				
Pre	99.733±18.13			P<0.001
Post	39.200±9.90094			P<0.001
WOMAC exercise only				
WOMAC				
Pre	96.933±6.616			P=0.002
Post	89.667±10.54			P=0.002
TUG exercise+tapping				
TUG				
Pre	12.66±1.72			P=0.058
Post	12.48±1.59			P=0.058
TUG exercise only				
TUG				
Pre	14.22±2.07			P=0.123
Post	14.10±2.12			P=0.123

SD: Standard deviation, TUG: Timed up and go test, WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index

and tolerance to increased patella-femoral joint reaction force. Hence, control group is not showing much improvement because exercises take long time for biomechanical alteration and change in loading over the patellofemoral joint for showing improvement when compared to taping and exercise.

Limitation for the present study was that it was conducted on the small sample size and this study was performed over a relatively short period and does not prove that taping is either safe or effective in the long term. Further, trials to investigate taping in other patient groups, with longer periods of taping, and to test the relative costs and benefits of this and other interventions in knee OA should be undertaken. Strength of present study is that taping is a simple, safe, non-invasive, and low-cost physical treatment procedure with long-lasting improvement patient's symptoms. Relief of symptoms might be maintained by concurrent exercises to strengthen the medial part of the quadriceps muscle to permanently realign the patella.

CONCLUSION

From the current study, we concluded that there are improvements in both pain and physical functions using various outcome measures. More importantly, we observed beneficial effects of knee taping in people with generalized, non-specific degeneration of the knee joint. In the end, it was concluded that taping is effective to improve the functional outcome of the patients as it gave good results in functional improvement short term.

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