

Effectiveness of Kinesio Taping along with Strengthening Exercise in Reducing Pain on Patients with Chondromalacia Patellae

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(Received: 06 March 2023; Revised: 10 April 2023; Accepted: 12 May 2023; Published: 20 May 2023)

(Published by Research Trend)

ABSTRACT: The objective of this study is to assess the efficacy of kinesio taping in conjunction with strengthening exercises as a means of alleviating pain in individuals diagnosed with chondromalacia patellae. A total of fifteen subjects who met the established selection criteria were chosen through the utilisation of a simple random sampling technique. A pre-test assessment was conducted on all subjects to measure pain levels using the visual analogue scale. Following the initial assessment, the experimental group underwent a 4-week intervention consisting of kinesio taping in conjunction with strengthening exercises. Subsequently, on the 30th day, a post-test assessment was conducted to measure pain levels using a visual analogue scale, mirroring the methodology employed during the pre-test assessment. The findings of the study indicated that the experimental group, which received both kinesio taping and strengthening exercises, demonstrated a favourable outcome in terms of pain reduction for patients diagnosed with chondromalacia patellae. This combination of interventions was found to be significantly effective.

Keywords: Kinesio taping, Strengthening exercise, Chondromalacia patellae, knee pain patellofemoral pain syndrome.

INTRODUCTION

Chondromalacia patellae, alternatively referred to as patellofemoral pain syndrome, is a medical condition distinguished by the presence of pain localised in the anterior aspect of the knee joint. The condition commonly arises due to the irritation or degeneration of the cartilage located on the inferior aspect of the patella or kneecap (Crossley *et al.*, 2004). Athletes are more likely to develop this condition due to the increased strain placed on the musculotendinous tissues that encircle the knee during activities like cycling and running. It's frequent among athletes because of the aberrant biomechanics that lead to higher intra-articular stress on the patellofemoral joint, especially during drop landings with knee valgus (Sheehan *et al.*, 2012). Chondromalacia patellae might be brought on by a number of different things, including misalignment of the patella, weakness and imbalance in the quadriceps, an angle in the quadriceps, the location of the foot and ankle, and a loss of proprioception and neuromuscular control. Patellar malalignment is one of them that has the potential to disrupt the extensor mechanism (Tahmasebi *et al.*, 2019).

In recent years, in addition to taping, a number of various strengthening exercises and stretching regimens have also been recommended to patients suffering from

a variety of disorders in order to increase their production (Gohil *et al.*, 2021).

KT utilises a type of adhesive tape that exhibits enhanced flexibility and possesses the ability to stretch to a range of 130% to 140% of its initial length. This characteristic enables a suitable extent of motion (Crossley *et al.*, 2001). Clinicians use patellar tape as part of the therapy for patellofemoral pain in order to lessen the severity of the patient's discomfort (Kellish *et al.*, 2020) increase quadriceps strength, (Herrington 2001) facilitate neuromuscular recruitment (Crossley *et al.*, 2000).

When treating anterior knee discomfort, one of the most essential goals in therapy is to strengthen the vastus medialis (Landry 2014). Both the vastus medialis and the vastus medialis oblique may be engaged in a manner that is distinct from one another, and the features of their motor unit recruitment are influenced by factors such as sex and hip position (Garrick 1989). Kinesio Taping on patellofemoral pain syndrome (PFPS) showed no significant difference in quadriceps strength (Lee *et al.*, 2023).

Given the existing knowledge deficit, the present study aimed to evaluate the effectiveness of kinesiology tape (KT) in individuals diagnosed with patellofemoral pain syndrome (PFPS) and abnormal patellar tracking, who were concurrently undergoing exercise therapy. The primary focus was to investigate the impact of KT on

functional outcomes, including quadriceps muscle strength and rate of force generation, as well as patient-reported outcomes, such as the Kujala anterior knee pain scale (AKPS). We postulated that the utilisation of KT may yield supplementary advantages in relation to functional and patient-reported outcomes.

MATERIAL AND METHODS

The volunteers for this research were chosen at random using techniques of simple random selection, and there were fifteen of them, all of whom were between the ages of 35 and 45. Subjects were not allowed to participate in the research if they had a history of knee or lower limb surgery, including arthroscopy of the knee, patella femoral dislocation, subluxation, osteoarthritis, an open wound, infection, dysfunction of knee ligaments, bursae, menisci, or patellar tendon, or an open wound. The individuals who met the inclusion criteria and went to the outpatient physiotherapy department at the Vinayaka Mission's Kirupananda Variyar Medical College in Salem were the ones who were chosen to participate in the study. The significance of the investigation was conveyed to each and every participant in the study. Only those participants in the research who provided their written informed permission were counted. A visual analogue scale was used in order to conduct a pre-test evaluation of the individuals' levels of discomfort.

A. Pain measures: During the course of two different activities, the level of discomfort that was experienced was measured using a visual analogue pain scale that ranged from 0 (no pain) to 10 (very excruciating anguish). The first objective was to ascend seven flights of stairs without help, and the second task was to descend them. Following the pre-test evaluation, the people underwent kinesio taping for a period of four weeks in addition to participating in strengthening activities.

B. Patellar taping: A kinesio taping approach that was implemented based on a prior research by (Logan *et al.*, 2017) was utilised. The dimensions of the tape employed were as follows: width: 5 cm; thickness: 0.5 mm; manufacturer: Nitto Denk Top®, Osaka, Japan. As indicated in Figure 1, the patella was stabilised by wrapping the tape around the patella along the quadriceps muscle. This was done in order to prevent the patella from moving. Kinesio taping was used for the very first time at our facility over a period of thirty minutes of cautious therapeutic activity. After that, the patients were instructed on the proper use of the tape method so that it could be utilised throughout their workouts at home as well as their regular activities. The taping was done throughout the whole of the therapy as well as the follow-up phase, which lasted a combined total of one month.

C. Quadriceps strengthening exercise: The VMO is a specific portion of the vastus medialis muscle that lies closer to the inside (medial) aspect of the knee. It is often highlighted due to its unique fiber orientation,

which is oblique in nature. The VMO functions to provide medial stabilization to the patella during knee movements.

D. Quadriceps setting (quad sets): Patient was instructed to sit in long-sitting position with knee extended (or flexed a few degrees), but not hyperextended. Position was maintained for the duration of the procedure. The patients were given instructions to do an isometric contraction of the quadriceps, which would cause the patella to glide proximally. After this, they were told to maintain this position for a count of ten, and the process was then repeated ten times.

E. Straight-leg raising (SLR): Position of the patient:

1. The patient was repositioned such that they were resting supine with their knees outstretched. This exercise combines the dynamic flexion of the hip with the static extension of the knee. The opposing hip and knee are flexed, and the foot is put flat on the exercise table. This helps to stabilise the pelvis and low back.

2. Patients were given the instruction to first activate the quadriceps muscle, then to elevate the leg to about 45 degrees of hip flexion while maintaining an extended knee posture, then to hold the leg in that position for a count of ten, and finally to drop it. Ten times through, the exact identical process was carried out. Once students have mastered this method, they will advance to elevating their hips just 30 degrees and holding that position for a count of 10 for 10 sets. This will be repeated 10 times. As soon as they had achieved this level of mastery, they progressed to the next level, which consisted of elevating the leg (which included bending the hip by just 15 degrees) and holding it in that position for a count of 10 for 10 sets.

3. The patient's ankle was cuffed with weight to enhance resistance to the rectus femoris.

4. The patient was then told to do the SLR in the supine position with isometric adduction of the hip, which would specifically target the VMO and VM muscles (Peng *et al.*, 2018).

On day 30, a follow-up test was administered in a way that was similar to the first evaluation. One month before the main trial, a pilot study with 5 individuals was undertaken to determine its viability. Statistical tests were run on the information gathered. To examine whether or not the data supported the hypothesis, the "t" test was used.

RESULTS AND DISCUSSION

The outcome of the research was determined by doing statistical analysis with the use of the paired "t" test.

According to Table 1, the findings of a paired "t" test demonstrated that kinesio taping and strengthening exercises are considerably beneficial in lowering pain experienced by individuals who have chondromalacia patellae.

Kinesio taping and strengthening exercises provide the joints and muscles with support and stability without having an effect on circulation or range of motion. The use of kinesio tape is a method that is predicated on the

inherent recuperative capabilities of the human body. The stimulation of the neurological and circulatory systems is what gives kinesio taping its effectiveness as a treatment method.

Based on previous studies and the current data, we may hypothesise the following explanations: According to the gate control hypothesis, the pain in the patella might be alleviated by applying a tactile stimulation of KT to the area, which would activate the function of the substantia gelatinosa cell and prevent the pain from reaching the spinal cord (Gilleard *et al.*, 1998; Cowan *et al.*, 2002; Irish *et al.*, 2002). Furthermore, upon application of the tape, the muscle undergoes maximal elongation, resulting in the appearance of skin wrinkles as the tape reverts back to its original length (Bakhtiary and Fatemi 2008). Consequently, the fascia located beneath the skin is effectively isolated from the skin, thereby facilitating enhanced blood or lymphatic circulation within the interstitial compartment. This heightened circulation enables the prompt elimination of pain-inducing substances. (Christou 2004; Yam *et al.*, 2019; Halseth *et al.*, 2004).

Despite the frequent prevalence and enduring characteristics of patellofemoral pain syndrome (PFPS), there exists a dearth of agreement regarding the optimal therapeutic strategy. A recent extensive evaluation

utilising network meta-analysis was conducted to assess the relative efficacy of different interventions for patellofemoral pain syndrome (PFPS). Nevertheless, the review reached the determination that there is an inadequate amount of evidence to substantiate the superiority of any particular physical intervention, such as exercise, orthoses, or patellar taping, in comparison to alternative treatments. However, it stressed the importance of utilising some form of physical intervention rather than adopting a passive approach of simply waiting and observing.

On the other hand, the most recent clinical practise guidelines for patellofemoral pain emphasise the potential advantages of employing patellar tape as a means to promptly alleviate pain and enhance the effectiveness of exercise-focused interventions within a period of four weeks. The recommendations were derived from preexisting guidelines. The research findings presented in our study provide additional support for the proposition that exercise therapy should be prioritised as the central component of treatment for patellofemoral pain syndrome (PFPS). The therapeutic approach should involve a blend of open and closed kinetic chain exercises, with a focus on addressing proprioception and neuromuscular control.



Fig. 1. Kinesio taping technique.

Table 1: Paired “T” Test (Kinesio Taping and Strengthening Exercise).

Variables	“t” calculated value	“t” table value
Pain	5.580	2.145

CONCLUSION

In PFPS patients who had aberrant patellar tracking after one month, adding KT to exercise treatment did not result in any further advantages for quadriceps muscular strength or anterior thigh power score (AKPS). There is a risk that KT will have a negative impact on the amount of strength that is gained in the quadriceps over the course of one month. Because of its widespread availability, low cost, and anecdotal benefits, patellar taping has been and will continue to be used as a treatment for PFPS. It is imperative for clinicians and physical therapists to possess knowledge regarding the contradictory and limited scientific evidence pertaining to the efficacy of patellar taping as a treatment for patellofemoral pain syndrome (PFPS). Furthermore, it is essential that they communicate this information transparently to patients who express an interest in utilising taping as a therapeutic intervention.

FUTURE SCOPE

With the limited effectiveness of patellar taping demonstrated in this study, the focus should shift toward optimizing exercise therapy protocols for PFPS management. Identifying the most effective exercises, dosage, progression strategies, and addressing individual patient factors can contribute to better treatment outcomes. Overall, the future scope lies in conducting further research, investigating the mechanism of action, promoting evidence-based practice, educating patients, and optimizing treatment strategies to enhance the management of PFPS.

Acknowledgement. The authors express their gratitude to Vinayaka Mission's Research Foundation (DU) for the provision of facilities and support.

Conflict of interest: None.

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How to cite this article: Perumal M., Sam Thamburaj A., Mallika S. and Sudhakar T. (2023). Effectiveness of Kinesio Taping along with Strengthening Exercise in Reducing Pain on Patients with Chondromalacia Patellae. *Biological Forum – An International Journal*, 15(5): 1415-1418.