

## ROLE OF KINESIOLOGY TAPING IN PATELLO FEMORAL PAIN SYNDROME

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### Abstract

**Background:** Kinesiology tape has multiple benefits including decreasing pain, increasing proprioception, increasing quadriceps muscle strength, and improving lymphatic circulation at the knee joint. The aim is to evaluate the effectiveness of kinesiology tape in chronic knee pain due to patello femoral pain syndrome. **Materials and Methods:** A prospective study was done from July 2020 to July 2022 in Nscb medical college jabalpur on 35 patients with Patello femoral pain syndrome (PFPS) of knee joint were taken in which kinesiology tape was applied over knee for 6 days by an orthopaedic surgeon and followed up at end of 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> week and outcomes were measured using WOMAC (western Ontario and mcmaster university arthritis index) and Vas (visual analogue scale) scores. **Result:** VAS score (pre application:6.82, after 4 weeks:4.48) and WOMAC score (pre application:45.65, after 4 weeks:34.57) showed a statistically decrease in scores in cases of PFPS. (p value <0.001). **Conclusion:** Kinesiology tape appears to be an effective, easy and cheap method in cases of patello femoral pain syndrome.

## INTRODUCTION

Patellofemoral arthritis affects the underside of the patella (knee cap) and the channel-like groove in the femur that the patella rests in. It causes pain in the front of the knee and can make it difficult to kneel, squat, and climb and descend (go down) stairs.

**Anatomy:** The patella is a small bone located in front of the knee joint where the femur and tibia meet. It protects your knee and maintains the extensor mechanism of the knee.

The patella rests in a groove on top of the femur called the trochlear groove. At full extension the patella does not articulate with the knee. At around 30 degree of flexion the patella sits in the trochlear groove and articulates with the knee joint.

A slippery substance called articular cartilage covers the ends of the femur, trochlear groove, and underside of the patella. Articular cartilage helps your bones glide smoothly against each other as you move your leg.

Patellofemoral arthritis occurs when the articular cartilage along the trochlear groove and on the underside of the patella wears down and becomes inflamed.

When cartilage wears away, it becomes frayed and, when the wear is severe, the underlying bone may

become exposed. Moving the bones along this rough surface may be painful.

### Role of kinesiology taping in patello femoral pain syndrome:

Kinesiology taping is a non-pharmacological, low-cost therapy procedure utilized by healthcare practitioners in musculoskeletal and sports contexts for the prevention and rehabilitation of musculoskeletal injuries, as well as pain management. Kinesiology taping entails employing a variety of techniques to apply thin, elastic cotton-based water-resistant adhesive kinesiology tape to the skin. To support soft tissues and joints without impeding movement, kinesiology tape can be stretched longitudinally 60 percent or more of its resting length (property of kinesiology tape) and worn continuously for 6 days. (in our study the patient wore the kinesiology tape for 6 days and removed the tape on 6th day and took a one day off and then again the tape was applied for 6 days)

This is in contrast to traditional therapeutic tapes, which are hard or barely elasticated and intended to offer structural support at joints and soft tissues. Kinesiology taping is used to treat chronic pain caused by musculoskeletal problems that are common in the adult population, such as lower back pain, shoulder discomfort, and knee pain.

As a result, kinesiology taping complies with best practise guidelines and has the potential to be used as a therapy option for musculoskeletal discomfort due to arthritis.

## MATERIALS AND METHODS

A total of 35 consenting patients with Patello Femoral Pain Syndrome who presented to Orthopaedics Outpatient Department (OPD) at Netaji Subhash Chandra Bose Medical College, Jabalpur, Madhya Pradesh, between august 2020 and January 2022.

### Inclusion Criteria

- Patients aging from 50-75 years with anterior knee pain.
- Patients with no history of trauma.
- Patient willing for regular follow up.

### Exclusion Criteria

- Patient with history of trauma.
- Patients with skin allergy.

### Procedure

The study was described to the participants verbally and a written consent form was provided.

Symptoms that may occur after the KT is applied were explained to each participant, including possible skin irritation, skin discoloration, rashes, and discomfort around the knee joint.

Participants were instructed to wear shorts or loose-fitting pants that could roll above the knees. Males participating in the study were instructed to shave around both knees before arriving to be tested.

Each participant's age and gender were also recorded.

Next, Kinesiology Tape, precut to a length of 6 inches was applied to the right knee: Two 6-inch strips of KT applied at 0% elongation, two 7.5-inch strips at 25% elongation, and two 9-inch strips at 50% elongation and were applied in Y shaped technique as seen in picture 1 and 2.

(Land marks used were tibial tuberosity, quadriceps as shown in image 1 and 2).

The applied tapes were rubbed so as to dissipate the lymphedema and to adhere the tape properly to the skin.

A ruler was used to verify the length of tape after each application. Tape was applied to the lateral and medial side of the patella with the participant in a seated position and the knee joints at a 90-degree angle.



**Y technique used for PFPS right knee joint**

The anterior, lateral and medial border of the patella was used as landmarks as the initial placement of the KT. [Picture 1 and 2]

The patient was instructed to keep the tape on for 6 days and remove the tape on day 6 and then come for review on the 7th day for the next application.

The participant was not given any analgesics and was advised static and dynamic quadriceps exercise.

### Outcome measurement

WOMAC (Western Ontario and McMaster universities OA index) and VAS (visual analogue scale) scores. The WOMAC consists of 24 items divided into three subscales. To suit the WOMAC score with Indian rural population, we had replaced the item getting in/out of a car with getting in/out of auto, and putting on/taking off socks with cleaning of ankles.

Each item of WOMAC score described in terms of none, mild moderate, severe, and extreme. These correspond to an ordinal scale of 0 to 4. Each component of the WOMAC score ranges between 0 to 20 for pain, 0 to 8 for stiffness, and 0 to 68 for functionality. A total WOMAC score was created by summing the items for all three subscales, ranging from 0 to 96. Outcome measured was quantified in percentage of improvement. The means of each parameter and total WOMAC score were calculated. VAS is a straight line with the left end of line representing no pain and right end of line representing worst pain. There are four categories:

- A. None (0)—no pain for activity.
- B. Mild (1–3)—pain present occasionally while at work.
- C. Moderate (4–6)—pain present but can continue with work.
- D. Severe (7–10)—pain forces discontinuation of the work but can be resumed after rest.

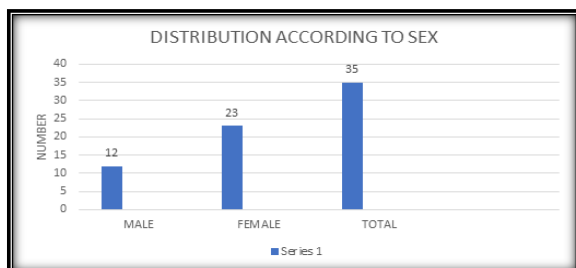
These values were subjective and a VAS chart was used and the patient was asked to mark the level of pain he/she had at every follow up.

### Statistical Analysis

Nonnumeric entries were coded numerically into nominal/ordinal distribution before analysis. Key for numerical coding was prepared (attached). The data obtained was analysed using the Statistical Package for the Social Sciences (SPSS) 21.0 version. All

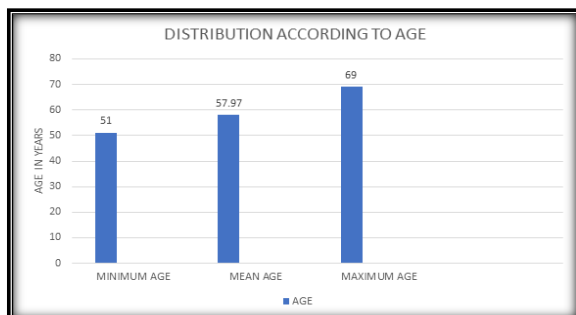
continuous data was expressed in terms of the mean and the standard deviation of the mean. To assess the differences in the mean of the two groups, t-test was performed. The nonparametric Pearson's chi-squared test was performed to investigate the relationships between grouping variables. For all these tests,  $p < 0.05$  was considered significant.

## RESULTS



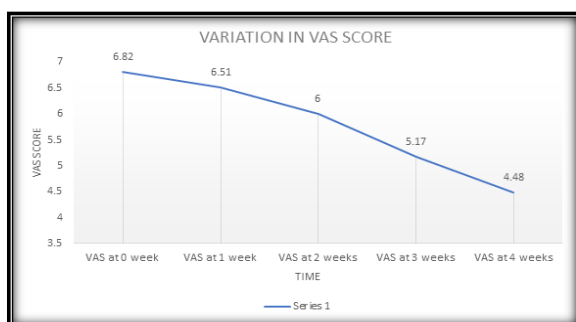
**Figure 1: Distribution according to sex**

Total of 35 cases have been selected: 12 were male and 23 were female as shown in [Figure 1].



**Figure 2: Distribution according to age**

The above graph shows that minimum age taken in this study was 51 years and maximum of 69 years with a mean of  $57.97 \pm 4.96$ . [Figure 2]

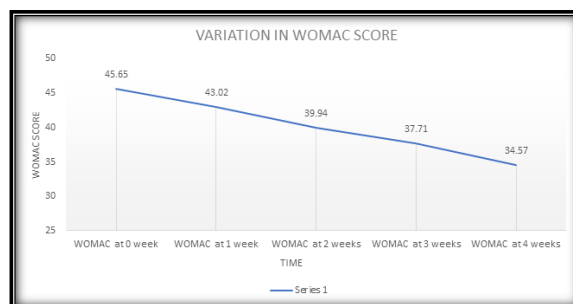


**Figure 3: The variation in VAS score was as follows**

[Figure 3] showing decrease in vas score over subsequent weeks.

The mean VAS score at the time of presentation  $6.82 \pm 1.17$ , this gradually decreased to  $6.51 \pm 0.91$  at 1 week, followed by  $6.00 \pm 0.84$  at 2 weeks, followed by  $5.17 \pm 0.74$  and the mean VAS at the last follow up (at 4 weeks)  $4.48 \pm 0.74$ . [Figure 3]

The p-value for the change from first to last follow-up was 0.001, which was significant.



**Figure 4: Variation in WOMAC Score was as follows**

[Figure 4] Showing Decrease in Womac Score Over Subsequent Weeks.

The mean WOMAC score at the time of presentation  $45.65 \pm 3.12$ , this gradually decreased to  $43.02 \pm 2.80$  at 1 week, followed by  $39.94 \pm 2.49$  at 2 weeks, followed by  $37.71 \pm 2.57$  at 3 weeks and the mean WOMAC at the last follow up (at 4 weeks)  $34.57 \pm 3.38$ . [Figure 2] The p-value for the change from first to last follow-up was 0.001, which was significant.

## DISCUSSION

Aytar et al. (2011) carried out a study on 20 patients diagnosed with PFPS in order to analyse the short-term effects of KT on pain.<sup>[1]</sup> The study did not show any improvement in pain and proprioception. Akbas et al. (2011) compared two groups that did the same type of strengthening and flexibility exercises for lower limbs and did not show much improvement.<sup>[2]</sup> Campolo et al. (2013) Kinesio Taping and Patellofemoral Pain Syndrome found a beneficial effect of KT in patients diagnosed with PFPS in functional activities such as climbing stairs or standing up from a sitting position.<sup>[3]</sup> Jancaitis et al. (2007) observed that after applying KT on patients with PFPS,<sup>[4]</sup> they could walk down stairs better than before; but he concluded that kinesiology tape had a placebo effect as the results were statistically insignificant. Kuru et al. (2012) conducted a comparative study to show which of the two treatments (KT or electrostimulation) reported greater improvements on PFPS.<sup>[5]</sup> 30 patients were separated into two groups: one of the groups had KT applied and were given knee exercises and the other had electrostimulation applied and had to perform exercises. The study showed improvement in pain in both the groups. Yang et al. (2014) achieved improvement in muscle activity of hamstring and rectus femoris after KT application.<sup>[6]</sup> Chen et al. (2008) demonstrated the effectiveness of KT,<sup>[7]</sup> showed improved patellar stability and anterior knee pain improvement in women diagnosed with PFPS compared to normal healthy women. Bayracki et al. (2008) obtained improvement on the physical condition of healthy subjects but not on patients with PFPS after using KT.<sup>[8]</sup> Chang et al. (2012) checked effect of KT on muscle activity of lateral quadriceps and vastus medialis obliques and found out that KT applied around patella improved the function of patella femoral joint.<sup>[9]</sup> In the same vein, other

authors agree with these results (Hassan et al. 2002; Yang et al. 2014; Chen et al. 2012).<sup>[10-12]</sup> Miller et al. (2013) applied KT on the gluteus Medius; this was combined with lumbo-pelvic osteopathic manipulation on 18 patients with unilateral patellar pain, who obtained improvement over postural stability of the lower limbs.<sup>[13]</sup>

To sum up, from the results mentioned above it can be concluded that there is a discrepancy regarding the effectiveness of KT on the treatment of anterior knee pain; some studies show statistically significant improvement in the pain variable after applying KT and others are inconclusive.<sup>[14-18]</sup>

#### Outcome assessment of present study:

##### VAS SCORE

The mean VAS score at the time of presentation  $6.82 \pm 1.17$ , this gradually decreased to  $6.51 \pm 0.91$  at 1 week, followed by  $6.00 \pm 0.84$  at 2 weeks, followed by  $5.17 \pm 0.74$  and the mean VAS at the last follow up (at 4 weeks)  $4.48 \pm 0.74$ . [Figure 1]

The p-value for the change from first to last follow-up was 0.001, which was significant.

##### Womac Score

The mean WOMAC score at the time of presentation  $45.65 \pm 3.12$ , this gradually decreased to  $43.02 \pm 2.80$  at 1 week, followed by  $39.94 \pm 2.49$  at 2 weeks, followed by  $37.71 \pm 2.57$  at 3 weeks and the mean WOMAC at the last follow up (at 4 weeks)  $34.57 \pm 3.38$ . [Figure 2]

The p-value for the change from first to last follow-up was 0.001, which was significant.

## CONCLUSION

The management of osteoarthritis has undergone a tremendous change during the last century with the spectrum of treatment options ranging from conservative methods like lifestyle changes, physiotherapy to joint replacement arthroplasty. One such ideology is based on the beneficial effect of Kinesiology taping in musculoskeletal pain due to arthritis. Our study relied on Y shaped kinesiology taping over knee joint and observing the patients for reduction in symptoms of pain, stiffness and improvement in physical function.

Our study has revealed a consistent reduction in pain, stiffness and overall improvement in functional status of the patients with PFPS who have been treated with Kinesiology tape. The efficacy of Kinesiology tape in Patello femoral pain syndrome was found to be effective.

No major side effects were noted throughout the course. We can thus safely conclude that Kinesiology taping is a low-cost, non-prescription treatment that effective in PFPS. As a result, kinesiology taping complies with best practise guidelines and has the potential to be used as an adjuvant therapy option with NSAIDs and disease modifying medicine for musculoskeletal discomfort.

Kinesiology taping has been proven to be efficient in the management of PFPS but has not been standardised in terms of volume of administration.

Physiology of improvement in pain is poorly understood at present. Further studies need to be carried out with respect to this to ensure universal results.

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