A comparative study on immediate effects of kinesiotaping and rigid taping on kinesiophobia in patients with patellofemoral arthritis

Dr. Mansi Chaudhari[1], Dr. Roopa Desai[2]

[1]Assistant Professor, [2]Associate Professor
[1]Musculoskeletal Physiotherapy Department,
[1]LSFPEF's College of Physiotherapy, Nigdi, City, Pune, India.

Abstract: In India, Arthritis of knee joint has a prevalence of 22-39 percent. Patellofemoral arthritis is a musculoskeletal condition that presents as an anterior knee pain which provokes by physical activities that load or stress the patellofemoral joint. Pain is prominent while ascending or descending the stairs, squatting or sitting for long periods with knees flexed. Patients who develop patellofemoral pain are susceptible to biopsychosocial impairments. These impairments can have a negative impact in long term which includes quality of life and physical activity levels. Therapeutic taping techniques utilize an adhesive tape as a segment of management for patients with musculoskeletal conditions. The tape is used to reinforce the structures in their relaxed position and protects injured tissue from further damage. Methods: Once the patient fitted the criteria of the study then the patient was given "Fear – Avoidance Questionnaire" for assessing kinesiophobia. Then the patient was sorted in two groups: Group A (Kinesiotaping) and Group B (Rigid Taping). The outcome measures were FAQ(Marathi) and NPRS. Results: When effects of group A and group B were compared for kinesiophobia and pain it resulted in statistically insignificant difference. The statistical analysis shows that group A and group B individually have improvement in kinesiophobia and pain. Conclusion: Thus, it is concluded that Kinesiology tape and rigid tape have similar immediate effects on pain and kinesiophobia in patients with patellofemoral arthritis.

Index Terms: Knee pain, Taping techniques, Fear of movement, Knee Osteoarthritis.

I. INTRODUCTION

Knee joint is formed by the condyles of femur, the patella and the condyles of tibia. The patella is a sesamoid bone situated in front of lower end of femur about 1cm above the knee joint. Patella is an inverted triangle with its apex directed inferiorly[1]. Patella has much smaller articular surface area than its femoral counterpart which makes patellofemoral joint one of the most incongruent joint of the body. Patellofemoral joint reaction force is influenced by both the force generated by quadriceps and the knee angle. The patellofemoral joint can undergo very high stresses during activities of daily living. During stance phase, when peak knee flexion is only 20º, the patellofemoral compressive force is approximately 25% - 50% of body weight. With greater knee flexion and greater quadriceps activity, as during running patellofemoral compressive forces have been estimated to be between five to six times body weights.[1]

Patellofemoral arthritis occurs as a result of loss of cartilage of patella and trochlear groove and chondral wear which is prevalent in lateral patellar facet. Lateral facet arthritis is generally caused by patellar malalignment or tilt[2].

Causes for patellofemoral arthritis include instability, osteoarthritis, inflammatory arthritis, obesity and genetic quality of cartilage. Patellofemoral arthritis can be observed in 17-34% of female patients and 18-19% of male patients[2]. In India, Arthritis of knee joint has a prevalence of 22-39%[3]. Patellofemoral arthritis is a musculoskeletal condition that presents as an anterior knee pain which provokes by physical activities that load or stress the patellofemoral joint[4]. Patients generally note the insidious onset of an ill-defined anterior knee pain behind patella. Pain is prominent while ascending or descending the stairs, squatting or sitting for long periods with knees flexed.[1] Patient complains of pain on palpation of patellar retinaculum. Radiographic diagnosis can be done with 45º skyline view which allows for assessment of proximal patellofemoral joint[2].

Kinesiophobia is disproportionate and irrational fear of movement as an outcome of painful experience. It is suggested that reducing the level of pain related fear will lead to reduction in pain, as pain resulted fear can be more debilitant to the patient than the pain itself[6]. Based on fear-avoidance model, when pain is perceived as a threatening sensation, pain catastrophizing occurs which may develop pain-related fear leading to avoidance behavior. This behavior becomes an adaptation to the pain in long term and it would develop disuse, disability and depression[7,8]. Patients who develop

patellofemoral pain are susceptible to biopsychosocial impairments. These impairments can have a negative impact in long term which includes quality of life and physical activity levels. Thus, it is important to examine kinesiophobia in patients with patellofemoral arthritis. The Tampa scale is used to evaluate kinesiophobia[6].

Multimodal intervention for patellofemoral arthritis includes exercises to strengthen the gluteal and quadriceps musculature, manual therapy, taping and activity modification[9].

Therapeutic taping techniques utilize an adhesive tape as a segment of management for patients with musculoskeletal conditions. The tape is used to reinforce the structures in their relaxed position and protects injured tissue from further damage. There are different types of tape – non-elastic and elastic are two main types. Rigid and athletic are types of non-elastic tapes. These are preferred for joint injuries that need support and immobilization to facilitate healing. Elastic adhesive tapes permit some flexibility and movements so that muscles can contract and relax while still being supported. Kinesiotape is a type of elastic tape. It is a cloth tape with acrylic glue that allows for ventilation, good adhesion with minimal skin reactions. The type of tape to be used can be selected depending upon condition and functional requirement of the patient[10]. Kinesiotape has become a worldwide tool which is used to treat and assist musculoskeletal conditions.

Thus, the study was aimed to find out the immediate effect of kinesiotape and rigid tape on kinesiophobia in patients with patellofemoral arthritis.

Aim of the study was to compare the immediate effect of kinesiotaping and rigid taping on kinesiophobia in patients with patellofemoral arthritis. The objectives were to find the immediate effect of kinesiotaping and, rigid taping on kinesiophobia in patellofemoral arthritis and comparing them.

II. MATERIALS & METHODOLOGY

The study was an experimental type. The study was conducted at Dr. D. Y. Patil Physiotherapy OPD. The target population was Patients with Patellofemoral Arthritis. The inclusion criteria were - Male and female patients with patellofemoral arthritis, Age group 40-60 years, Clarke's Sign: positive[11]. The exclusion criteria were Knee ligament injuries and lower limb post-operative cases. The sampling method was Purposive sampling and Sample size was 30. The outcome measures are Fear- Avoidance Questionnaire – Marathi (FAQ-M) and Numerical Pain Rating Scale (NPRS)[19].

III. PROCEDURE

The project was conducted after the approval of ethical committee of Dr D. Y. Patil College of Physiotherapy. The patient was informed in detail about the study and signed consent form was obtained from them.

Pre-assessment

Patient's coming to the physiotherapy OPD were screened on the basis of their major complaint of anterior knee pain. Then patient was assessed to find out if he/she fits in the criteria given above for the study and their demographic data was collected. This assessment was based on presence of patellofemoral arthritis. Once the patient fitted the criteria of the study then the patient was given "Fear – Avoidance Questionnaire - Marathi" (FAQ-M) for assessing kinesiophobia and Numerical pain rating scale (NPRS) for pain. Then the patient was sorted in two groups by chit method.

Treatment Protocol –

Group A: Kinesiotape

Patient's position: Supine lying with knee kept in extension.

Therapist's position: Standing beside the patient.

Technique:

- Step 1: The patient was asked to wash and trim the skin around the knee joint.
- Step 2: Allergic test for the tape was done.
- Step 3: Measurement for the tape was done and "I-Y strip" was cut.
- Step 4: Apply the anchor at mid-thigh down to the knee with no stretch.
- Step 5: Apply the tails with 50% stretch around the patella and end with 0% stretch.
- Step 6: I checked if the patient is comfortable and is able to move his knee.
- Step 7: I asked the patient to perform functional activities such as walking and squatting[10].

Post treatment - I asked the patient to fill the Fear-Avoidance questionnaire and NPRS after the taping and after 24 hours to compare the results pre and post taping.

Fig 1: Application of Kinesio tape for Patellofemoral Arthritis

Group B: Rigid tape

Patient's position: Supine lying with knee extended.
Therapist's position: Standing on the experimental side.
Technique:

- Step 1: The patient was asked to wash and trim the hair around the knee joint.
- Step 2: Allergic test for the tape was done.
- Step 3: Measurement for the tape was done and tape was cut into 3 strips.
- Step 4: The first strip was applied to maintain the medial shift of patella provided by therapist.
- Step 5: The next step involves medially tilting the patella and applying the second strip to hold it in position.
- Step 6: The final step involves medially rotating the patella and applying the third strip of tape to maintain the rotation.
- Step 7: I asked the patient if he/she is comfortable[12].

Post treatment - I asked the patient to fill the Fear – Avoidance questionnaire and NPRS right after the taping and after 24 hours to compare the results pre and post taping.

Fig 2: Application of Rigid tape for Patellofemoral Arthritis

IV. DATA ANALYSIS AND RESULTS

In group A, we checked the immediate effects of K-taping on kinesiophobia (FAQ-M) and pain (NPRS). The result of the experiment says that K-tape shows significant reduction in kinesiophobia($P < 0.001$) in the patients post application and after 1 day after application. The test that was used to compare the results of kinesiophobia between pre, post and carry over was ANOVA. It also shows reduction in pain ($P = 0.000$) post application of K tape. The test used to compare effect on pain pre and post taping was paired t-test.

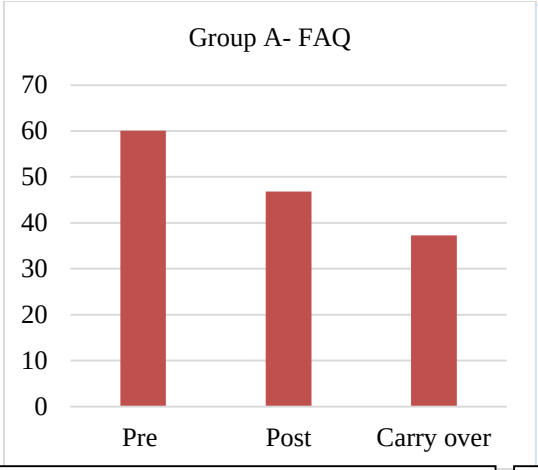

Fig 3: FAQ-M of Group A

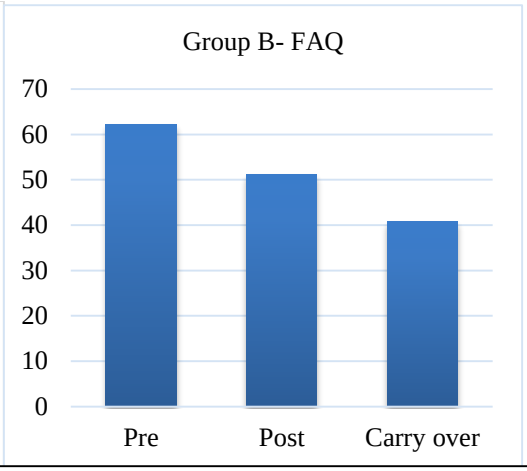

Fig 4: FAQ-M of Group B

In group B, we checked the immediate effects of rigid taping on kinesiophobia and pain. The result of the experiment says that rigid tape shows statistically significant reduction in kinesiophobia ($P < 0.001$) post application and 1 day after application. The test used for comparing effects on kinesiophobia pre, post and carry over was ANOVA test. It shows significant reduction in pain ($P = 0.000$) post application of rigid tape. The test used to compare pre and post effects on pain after taping was paired t-test.

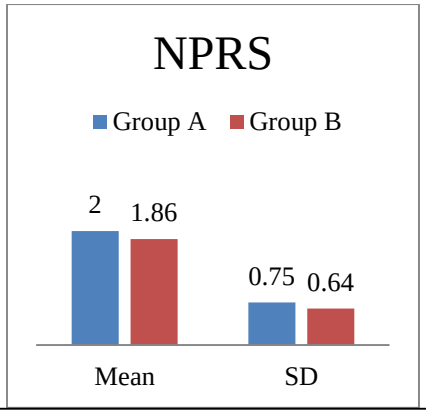

Fig 5: NPRS of Group A and B

When effects of group A and group B were compared for kinesiophobia it resulted in statistically insignificant difference ($P = 0.229$). When effects were compared for pain it also resulted in statistically insignificant difference ($P = 0.606$). The test used to compare the effects in group A and group B was unpaired t-test. The statistical analysis shows that group A and group B individually have improvement in kinesiophobia and pain.

V. DISCUSSION

This study was done to check the immediate effect of Kinesiotaping and rigid taping on Kinesiophobia and pain in individuals with patellofemoral arthritis.

In group A, patients were applied with Kinesiology tape for checking its effect on kinesiophobia using Fear – Avoidance Questionnaire (Marathi) and pain (NPRS). It shows that there is gross reduction in kinesiophobia and pain in individuals of group A. The application of patellar K-tape produced statistically significant improvements in short term. In group B, patients were applied with Rigid tape for checking its effect on kinesiophobia and pain. It shows that there is gross reduction in kinesiophobia and pain in individuals of group B. The application of rigid tape is done to correct the misaligned patella which is done by medial shift, medial tilt and medial rotation of the patella that is maintained with taping.

Kinesiology tapes were designed to mimic the human skin. It provides several benefits depending on the amount of stretch applied during the application of the tape. Some of the benefits are: positional stimulus through skin, align fascial tissue, create more space by lifting fascia and soft tissues, provide sensory stimulus and remove edema. Thus, kinesiology tape helps to reduce pain by positional stimulus through skin and creating more space. Kinesiology tape has an effect on kinesiophobia by providing sensory stimulus.

An article was published by Emma H, Abrianna O, Shelby B, Julie C. in 2018 on "The effectiveness of Kinesio tape in decreasing kinesiophobia in patients with Musculoskeletal pain: A critically appraised topic". This study concluded that Kinesiotaping can provide short-term effects for patients with higher levels of kinesiophobia by decreasing fear and aiding in return to pre-injury functional level[6].

A study done by Milad Gholami et. Al concluded that it seems that by using K-Tapes, by instilling a sense of confidence and support in the joint, that makes the person ready psychologically to return to the functional activities, and exercise and thus reduces their fear of movement and injury. These positive effects are said to be due to the psychological effect of K-taping. This reduced fear and increased self-esteem can also be a reason for improving other individual variables such as balance, agility, and performance level[20].

A study conducted by Arooj Iftikhar et al**.** in 2024 concluded that Kinesiotape was found to be more effective than knee braces in reducing pain, enhancing physical activity levels, and decreasing kinesiophobia in patients with knee OA. K-tapes could be a preferred non-surgical intervention in the management of OA knee[21].

Rigid tapes are used generally to restrict undesired motion and improve patellar positioning. Taping has shown to have immediate and short-term effects while the tape is been worn and also provides benefits for some weeks after tape removal.

An article was published by Pramod PV, Franklin MK. in 2019 on effectiveness of patellar taping and Mulligan's mobilization with movement techniques on pain and knee function among patellofemoral osteoarthritis patients- an experimental study. This study concluded that patellar taping is more effective that mulligan's mobilization with movement techniques in reducing pain and improving knee function among patellofemoral osteoarthritis patients[13].

In a study done by Aya A.E.N. Nada et al, they assessed patients with knee osteoarthritis by using the VAS and gait parameters such as stride length, step length and cadence were assessed pre and post application of a rigid tape. They concluded that after the application of rigid tape there was a significant decrease in the pain intensity and the gait parameters such as step length, stride length and cadence improved in patients with knee osteoarthritis[22].

In our study we found that the similar effects of K-tape and Rigid tape could be due to a positive effect of tapes on mechanoreceptors from the skin and also because of the mechanical correction methods of k-tape and rigid tape, used for correcting the posture and supporting the knee joint. However, when comparisons were made between the group before and after the application of tape, significant improvements were found with regards to pain and kinesiophobia. Pain as well as kinesiophobia was reduced in both groups but when group A is compared with group B they show insignificant statistical difference i.e. both the groups show similar immediate effects.

The limitation of the study is that the carry over effect of taping on pain (NPRS) was not seen as it was the secondary outcome. This could be avoided if the future studies are conducted to check for the same.

VI. Conclusion

Thus, the study concludes that Kinesiology tape and rigid tape have similar immediate effects on pain and kinesiophobia in patients with patellofemoral arthritis.

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