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RESEARCH ARTICLE

A PROSPECTIVE STUDY TO EVALUATE EFFECTIVENESS OF KINESIO TAPING IN NON-TRAUMATIC CHRONIC KNEE PAIN

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Kinesio Taping, Vas, Womac, K/L Scoring, Patellofemoral Arthritis

Abstract

Background: Kinesio tape has multiple benefits including decreasing pain, increasing proprioception, increasing quadriceps muscle strength, and improving lymphatic circulation at the knee joint.

To evaluate the effectiveness of kinesiotope in non-traumatic chronic knee pain.

Material and Methods: A prospective study was done from August 2020 to January 2022 in NSCB Medical College Jabalpur on 80 patients with patello femoral arthritis of knee joint and early grade medial joint line arthritis of knee joint (Kellgren-Lawrence grading) in which kinesio tape was applied over knee for 6 days by an orthopaedic surgeon and followed up at end of 1st, 2nd, 3rd, 4th week and outcomes were measured using WOMAC (Western Ontario and McMaster University Arthritis Index) and Vas (Visual Analogue Scale) scores.

Results: VAS score (pre application: 7.12, after 4 weeks: 4.68) and WOMAC score (pre application: 46.18, after 4 weeks: 35.65) showed a statistically decrease in scores in cases of patellofemoral arthritis and early grade medial joint line arthritis of knee joint (p value < 0.001).

Conclusion: Kinesio tape appears to be an effective, easy and cheap method in early symptomatic patello femoral osteoarthritis and early grade medial joint line arthritis of knee joint.

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Introduction:-

Osteoarthritis (OA), commonly known as wear and tear arthritis, is a condition in which the protective cartilage on the ends of the bone forming a synovial joint wear down over time¹. OA is the most common type of arthritis in both developed and developing countries. About 9.6% of men and 18.0% of women above 60 years have symptomatic OA worldwide as per the World Health Organization (WHO)².

OA has been studied in detail for more than a century now with the opinions regarding its cause changing from time to time. It has been established that no single cause leads to it and hence is considered to be of multifactorial origin.

Role Of Kinesio Taping In Osteoarthritis:

Kinesio 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. Kinesio taping entails employing a variety of techniques to apply thin, elastic cotton-based water-resistant adhesive kinesio tape to the skin. To support soft tissues and joints without impeding movement, kinesio tape can be stretched longitudinally 60 percent or more of its resting length (property of kinesio tape) and

worn continuously for 6 days.(in our study the patient wore the kinesio 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. Kinesio 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.

Kinesio taping has a low risk of hazard probability and severity, with just a tiny percentage of people experiencing minor skin irritation. Kinesio taping is a low-cost, non-prescription treatment that can be applied by the patient or caregiver after a few simple instructions or training. As a result, kinesiotaping complies with best practise guidelines and has the potential to be used as a therapy option for musculoskeletal discomfort due to arthritis.

Material And Methods:-

A total of 100 consenting patients with early-stage OA (grade 1 and grade 2 kellgen Lawrence scale) who presented to Orthopedics Outpatient Department (OPD) at Netaji Subhash Chandra Bose Medical College, Jabalpur, Madhya Pradesh, between august 2020 and January 2022.

Osteoarthritis Knee Joint were screened for the study out of which 80 were selected who qualified the inclusion criteria and were divided into two groups—35 patients with patella femoral arthritis and 45 for early medial joint line arthritis.

Inclusion Criteria:

1. Patients aging from 50-75 years with no history of trauma.
2. Patients with early (Grade I) to moderate(Grade II) medial joint line osteoarthritis of the knee.(kellgen Lawrence scale)
3. Patients with patellofemoral arthritis.
4. Baseline WOMAC score of

Exclusion Criteria:

1. Patient with history of trauma.
2. Patients with skin allergy.
3. Patient who have been operated over knee.
4. Patient with Grade III and Grade IV arthritis. (kellgen Lawrence scale)

Procedure:-

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

Ethical clearance was taken by the ethics committee of nscb medical college Jabalpur.

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, Kinesio 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% of 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.

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.



Picture 1

picture 2

Y technique used for osteoarthritis right knee joint

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

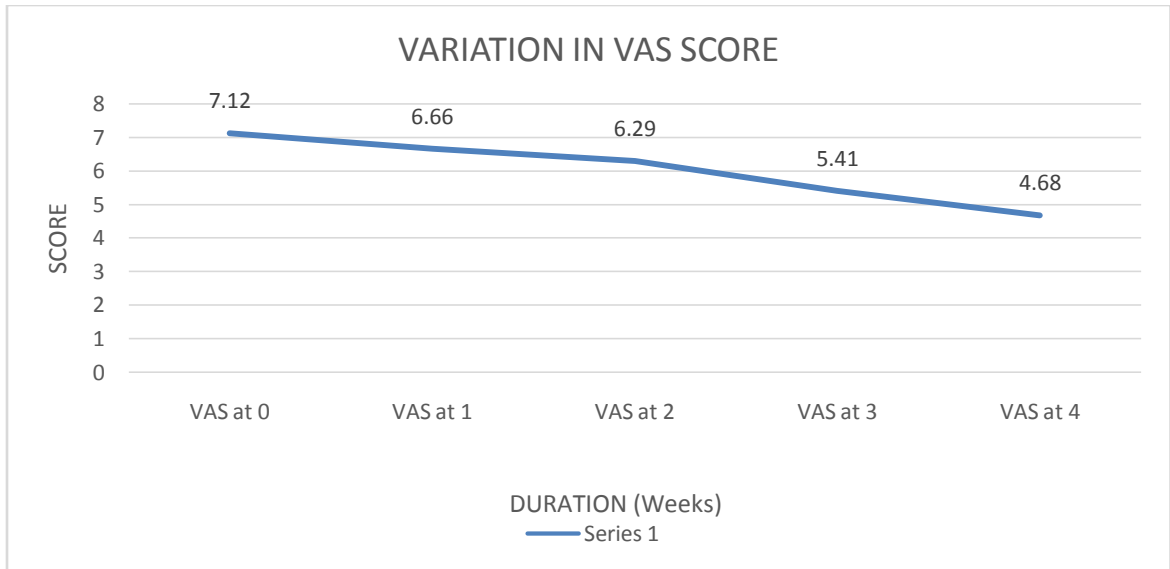
Nonnumeric entries were coded numerically into nominal/ordinal distribution before analysis. Key for numerical coding was prepared (attached). The data obtained was analyzed using the Statistical Package for the Social Sciences (SPSS) 21.0 version. All continuous data was expressed in terms of the mean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

Observation And Results:-

The basic demographic and patient variables are quoted in. Their distribution among both the limbs of the study was proven to be statistically insignificant ($p > 0.05$), thereby nullifying their distribution overall. Majority of the patients in our study belonged to age group 50 to 75 years. Mean age of the study was 58.86 years. Of the 80 patients enrolled in the study, 55 were females and 25 were males. Sex distribution in both the groups was comparable with higher number of females in both the limbs of the study. p-Value using chi-squared test was 0.841 rendering the gender factor insignificant. In our study, medial joint knee OA (56.2%) was more compared with patella femoral arthritis knee (43.8). 33 patients in our study had grade I Kellgren-Lawrence OA of knee joint, 12 patients had had grade II Kellgren-Lawrence OA of knee joint, 35 patients had patella femoral arthritis. The mean height in our study was 164.75 ± 12.32 cm ranging from 152 to 176 cm. The mean weight in our study was 72.67 ± 8.72 kg ranging from 52 to 90 kg. In our study, majority of the patients were having high body mass index (BMI) of more than 25 kg/m² constituting 61% of the study patients (with obese constituting 24% among them and the remaining 76% being overweight as per the WHO categories of obesity). The mean BMI was 25.71 ± 3.70 kg/m² ranging from 18.24 to 40.28 kg/m².

| Score | Mean | t value | p value | Conclusion |
|---------------|-----------------|---------|---------|-------------|
| VAS at 0 Week | 7.12 ± 1.25 | 7.22 | 0.001 | Significant |
| VAS at 1 Week | 6.66 ± 0.92 | | | |
| VAS at 0 Week | 7.12 ± 1.25 | 13.90 | 0.001 | Significant |
| VAS at 2 Week | 6.28 ± 0.98 | | | |
| VAS at 0 Week | 7.12 ± 1.25 | 28.77 | 0.001 | Significant |
| VAS at 3 Week | 5.41 ± 0.88 | | | |
| VAS at 0 Week | 7.12 ± 1.25 | 30.88 | 0.001 | Significant |
| VAS at 4 Week | 4.67 ± 0.75 | | | |
| VAS at 1 Week | 6.66 ± 0.92 | 6.88 | 0.001 | Significant |
| VAS at 2 Week | 6.28 ± 0.98 | | | |
| VAS at 1 Week | 6.66 ± 0.92 | 25.65 | 0.001 | Significant |
| VAS at 3 Week | 5.41 ± 0.88 | | | |
| VAS at 1 Week | 6.66 ± 0.92 | 47.66 | 0.001 | Significant |
| VAS at 4 Week | 4.67 ± 0.75 | | | |
| VAS at 2 Week | 6.28 ± 0.98 | 23.51 | 0.001 | Significant |
| VAS at 3 Week | 5.41 ± 0.88 | | | |
| VAS at 2 Week | 6.28 ± 0.98 | 27.98 | 0.001 | Significant |
| VAS at 4 Week | 4.67 ± 0.75 | | | |
| VAS at 3 Week | 5.41 ± 0.88 | 14.02 | 0.001 | Significant |
| VAS at 4 Week | 4.67 ± 0.75 | | | |

Table 1:- Showing decrease in VAS scores in subsequent weeks.



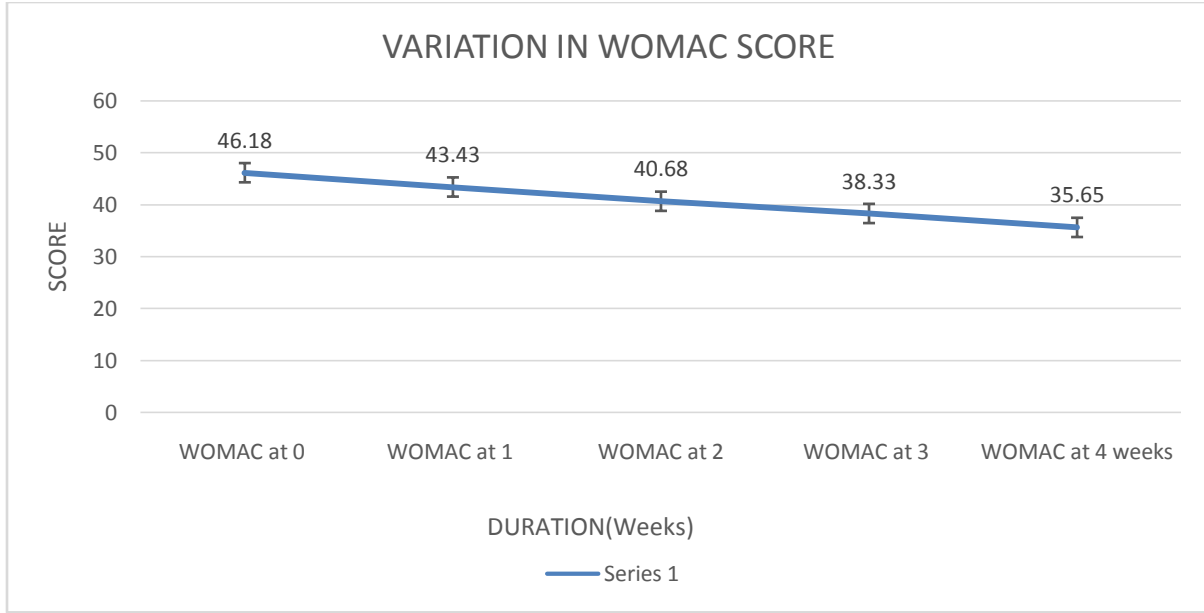
Graph 1:- Showing Decrease In Vas Score Over Subsequent Weeks.

The mean VAS score at the time of presentation 7.12 ± 1.25 , this gradually decreased to 6.66 ± 0.93 at 1 week, followed by 6.29 ± 0.98 at 2 weeks, followed by 5.41 ± 0.88 and the mean VAS at the last follow up (at 4 weeks) 4.68 ± 0.76 .(GRAPH 1)

The p-value for the change from first to last follow-up was 0.001, which was significant. (TABLE 1)

Table 2:- Showing Decrease In Womac Score Over Subsequent Weeks.

| Score | Mean | t value | p value | Conclusion |
|-----------------|------------------|---------|---------|-------------|
| WOMAC at 0 Week | 46.17 ± 3.35 | 25.24 | 0.001 | Significant |
| WOMAC at 1 Week | 43.42 ± 2.95 | | | |
| WOMAC at 0 Week | 46.17 ± 3.35 | 31.23 | 0.001 | Significant |
| WOMAC at 2 Week | 40.67 ± 2.88 | | | |
| WOMAC at 0 Week | 46.17 ± 3.35 | 42.64 | 0.001 | Significant |
| WOMAC at 3 Week | 38.32 ± 2.78 | | | |
| WOMAC at 0 Week | 46.17 ± 3.35 | 57.20 | 0.001 | Significant |
| WOMAC at 4 Week | 35.65 ± 3.80 | | | |
| WOMAC at 1 Week | 43.42 ± 2.95 | 17.56 | 0.001 | Significant |
| WOMAC at 2 Week | 40.67 ± 2.88 | | | |
| WOMAC at 1 Week | 43.42 ± 2.95 | 32.13 | 0.001 | Significant |
| WOMAC at 3 Week | 38.32 ± 2.78 | | | |
| WOMAC at 1 Week | 43.42 ± 2.95 | 33.72 | 0.001 | Significant |
| WOMAC at 4 Week | 35.65 ± 3.80 | | | |
| WOMAC at 2 Week | 40.67 ± 2.88 | 27.48 | 0.001 | Significant |
| WOMAC at 3 Week | 38.32 ± 2.78 | | | |
| WOMAC at 2 Week | 40.67 ± 2.88 | 29.45 | 0.001 | Significant |
| WOMAC at 4 Week | 35.65 ± 3.80 | | | |
| WOMAC at 3 Week | 38.32 ± 2.78 | 15.36 | 0.001 | Significant |
| WOMAC at 4 Week | 35.65 ± 3.80 | | | |



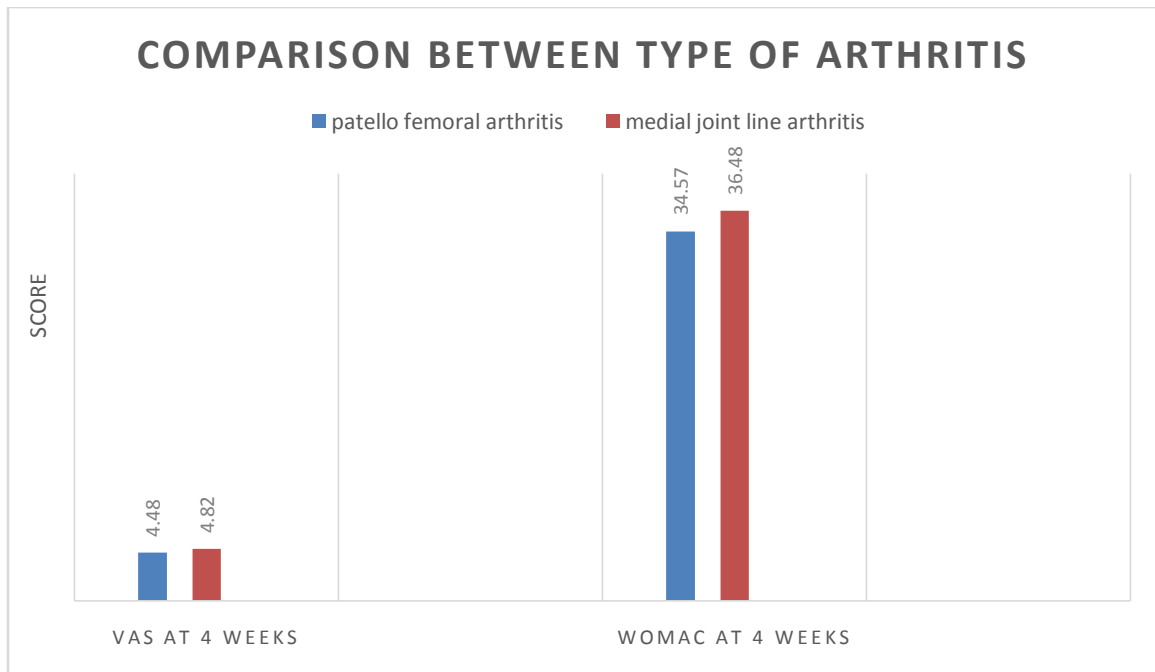
Graph 2:- Showing Decrease Inwomac Score Over Subsequent Weeks.

The mean WOMAC score at the time of presentation 46.18 ± 3.36 , this gradually decreased to 43.43 ± 2.95 at 1 week, followed by 40.68 ± 2.28 at 2 weeks , followed by 38.33 ± 2.78 at 3 weeks and the mean WOMAC at the last follow up (at 4 weeks) 35.65 ± 3.80 . (GRAPH 2)

The p-value for the change from first to last follow-up was 0.001, which was significant. (TABLE 2)

| Score | Type of Arthritis | | | t value | p value |
|--------------------------|---------------------------|---------|-----------------------------|---------|---------|
| | Patello femoral arthritis | femoral | Medial joint line arthritis | | |
| VAS Score at Fourth Week | 4.48 ± 0.74 | | 4.82 ± 0.74 | 2 | 0.049 |
| WOMAC at Fourth Week | 34.57 ± 3.38 | | 36.48 ± 3.93 | 2.29 | 0.024 |

Table 3:- Showing More Decreasing Trend In Patello Femoral Arthritis Than Medial Joint Line Arthritis.



Graph 3:- Showing More Decreasing Trend In Patello Femoral Arthritis Than Medial Joint Line Arthritis.

This chart shows lower mean VAS and WOMAC score at the end of 4 weeks (final follow up) in patello femoral arthritis suggesting that kinesio taping is more effective in patello femoral arthritis than medial joint line arthritis. (GRAPH 3)

Both the p values are less than 0.05 showing the study to be significant. (TABLE 3)

Discussion:-

Treatment options for knee OA are divided into three categories: drug therapy, surgery, and rehabilitation. Drug therapy in the form of anti-inflammatory drugs are commonly used by patients, but these may be associated with complications. Surgical options include gel injections and joint replacements; however, these are very costly and are associated with complications⁴ (Chang et al., 1993).

Therefore, rehabilitation techniques, which are relatively low cost, are a popular treatment option in order to improve quality of life, improve range of motion, and reduce pain in patients with knee OA.

Clinical practice (therapy), acupuncture, aqua therapy, laser therapy and kinesiotaping (KT) are all routinely used to treat patients with knee OA⁵ (McAlindon et al., 2014).

Kinesio Taping was developed by **Kase et al**⁶. and it is an elastic cotton strip with an acrylic adhesive that is used with the intent of treating pain and disability from athletic injuries and a variety of other physical disorders.

Huang et al⁷. reported that Kinesio Taping could improve pain during functional activities as well as the performance.

KT increases muscle flexibility and muscle strength, whilst improving the proprioception in patients with various musculoskeletal disorders (Akbaş et al., 2011⁸; Williams et al., 2012⁹); tapes are divided into two categories: elastic and nonelastic. The elastic group includes KT which has a thickness and elasticity similar to that of the skin; it is analgesic, made of linen, and known by different names.

Taping principles were first introduced in Japan and Korea in 1970. Since then, various methods have been proposed and developed. Various mechanisms for the effective use of KT have been proposed including '**lifting**' which is associated with the adhesive and elastic properties of KT as the amount of inter-tissue space increases improving

blood and lymph circulation (Campolo et al., 2013¹⁰). ‘**Gate-control of pain**’: The pain intensity reduces due to the stimulation of mechanical receptors of the skin. Finally, ‘**neurofacilitation**’ is the stimulation of skin mechanoreceptors causing positive changes to the nervous system.

Outcome Assessment of Present Study:

The mean VAS score at the time of presentation was 7.12 ± 1.25 , this gradually decreased to 6.66 ± 0.93 at 1 week, followed by 6.29 ± 0.98 at 2 weeks, followed by 5.41 ± 0.88 and the mean VAS at the last follow up (at 4 weeks) 4.68 ± 0.76 . The mean VAS score at the end of 1 month in patellofemoral arthritis was 4.48 ± 0.74 while for medial joint arthritis was 4.82 ± 0.74 .

The p-value for the change from first to last follow-up was 0.001, which was significant. Our study showed both objectively and subjectively shows decrease in pain in patients with early grade osteoarthritis

Womac Score

The mean WOMAC score at the time of presentation was 46.18 ± 3.36 , this gradually decreased to 43.43 ± 2.95 at 1 week, followed by 40.68 ± 2.28 at 2 weeks, followed by 38.33 ± 2.78 at 3 weeks and the mean WOMAC at the last follow up (at 4 weeks) 35.65 ± 3.80 . The mean WOMAC score at the end of 1 month in patellofemoral arthritis was 34.57 ± 3.38 while for medial joint arthritis was 36.48 ± 3.93 .

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 Kinesio taping in musculoskeletal pain due to arthritis. Our study relied on Y shaped kinesio 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 of early-stage osteoarthritis who have been treated with Kinesio tape. **The efficacy of Kinesio tape in patello femoral arthritis was more significant as compared to Grade I and II medial joint arthritis as seen in graph 3 and table 3.**

No major side effects were noted throughout the course. We can thus safely conclude that Kinesio taping is a low-cost, non-prescription treatment that effective in non traumatic chronic knee pain. As a result, kinesio 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 due to arthritis.

Kinesio taping has been proven to be efficient in the management of osteoarthritis 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

Source of Support

Nil.

Conflicts of Interest

None declared.

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