Innovations

Efficacy of Kinesio Taping with Physiotherapy Interventional Protocol in Patients with Knee Osteoarthritis

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Abstract

Objective*: This study evaluated the effects of exercise plus Kinesio taping on knee osteoarthritis patients' pain, stiffness, and physical function.* ***Design****: 30 patients were selected to chitchat to a home-based exercise followed by Kinesio taping and home-based exercise alone. The assessment was performed at baseline, after 10 days of starting the treatment, and the third after 21 days. The physical function status of the Patient was evaluated using the WOMAC (Western Ontario and McMaster Universities Osteoarthritis Scale) and the pain was measured using the visual Analog scale, respectively.* ***Result****: The patient receiving the home-based exercise followed by Kinesio taping a large decrease in VAS and Physical function scores compared with exercise alone from the initial to after the 21-day assessment. The data indicate that group A treated home based exercise with Kinesio taping showed better pain relief and physical function.* ***Conclusion****: This study shows that home-based exercise with Kinesio taping has a better effect on pain and Physical function, than home-based exercise alone with knee osteoarthritis.*

Keywords*: Kinesio taping, Home-based exercise, Knee arthritis, and Patient.*

Introduction:

Osteoarthritis (OA) is a chronic degenerative disease that lasts a long time and causes stiffness, discomfort, and limited mobility in the joints due to the breakdown of cartilage[1]. The World Health Organization (WHO) reports that osteoarthritis (OA) is one of the most incapacitating musculoskeletal ailments and that, by 2020, it will rank as the fourth leading cause of disability [2,3].Particularly affecting the knee, osteoarthritis (OA) is a major source of pain, disability, and early retirement from employment in Australia. Due to arthritis, there is a considerable chance of sliding into poverty, a decrease in tax revenue, and a huge loss of income, which increases government reliance [4-7]. Previous research has shown that decreased muscular strength, poor proprioception, and poorer self-reported knee status have been linked to discomfort and substantial physical functional limits, which have been predicted to aggravate knee instability over time [8-11]. It affects numerous daily activities like walking, stair climbing, and other daily functions. Reducing disability and managing pain are the goals of OA management. Numerous techniques are employed, such as knee braces, manual therapy programs, exercise therapy, and taping [12-14].

An alternative taping method called Kinesio tape (KT) is an elastic therapeutic tape that is used to treat or prevent a variety of clinical disorders, including Achilles tendinopathy, shoulder impingement syndrome, patellofemoral discomfort, and sports injuries [15].KT has been more popular among physical therapists in recent years. Taping is frequently used to relieve inflammation, increase range of motion, inhibit or facilitate muscle, decrease pain, alter gait patterns, and improve patients' functional outcomes [16,17].One non-surgical technique for reducing pain and enhancing movement is taping. For taping interventions, there are two types of tape: elastic tape and non-elastic tape. Non-elastic tape is used to repair joints. Kinesio tapes, also known as elastic tapes, are well renowned for their ability to increase muscle and movement via discomfort[18].The efficacy of Kinesio Taping for patients with knee osteoarthritis has garnered increased scientific attention in recent times, and a growing number of researchers have examined its benefits in terms of pain reduction and functional enhancement. However, the study findings have been inconsistent [19-23].According to recent reviews and meta-analyses, this approach may be useful in the treatment of osteoarthritis in the knee; however, the majority of trials that are currently available have small sample sizes, inadequate blinding, no follow-up, and other methodological flaws. Therefore, further randomized double-blind trials are required to confirm the usefulness of Kinesio Taping for knee osteoarthritis symptom management and function improvement. Currently, the evidence is unclear [24,25].

Our newly published study discovered that a specific Kinesio Taping technique was more successful in relieving knee pain than generic elastic knee taping. This study focused on the effectiveness of Kinesio Taping for pain management in patients with osteoarthritis of the knee [26]. This study aimed to determine if the Kinesio-taping technique was beneficial for individuals with osteoarthritis in their knees based on the evaluated secondary outcomes.knee range of motion (ROM), gait, and mobility improvements following a month-long course of taping, in addition to reductions in pain sensations and functioning. We also investigated knee-taping tolerance and subjective patient experiences.

Methods

The study was a pre- andpost-experimental study. 30 subjects were assigned randomly into 2 groups A and B. It was carried out atNIMS University Rajasthan, Jaipur. All participants have given their written informed consent.

The inclusion criteria were subjects between age group 40- to 65-year-old; having primary OA with pain at least in one knee (>4 weeks); radiological evidence of grade II and III of Kellgren and Lawrence criteria for knee OA; no ligament or soft tissue damage; pain intensity level 6 to 8 point on visual analog scale (VAS); participants can walk independently without any assistive device and ascend and descend at least a flight of stair; given willingness of participation. The exclusion criteria were any acute inflammation, contracture, or surgery; cognitive problem; any unstable medical condition withinthe last 6 months; a patient who received NSAIDs, steroid injection, or physiotherapy intervention within the last 3 months; BMI >30; secondary OA; skin allergy; local skin lesion. The goal of the study and the methods that would be used were explained in writing and verbally to every patient who chose to take part in it. Informed consent forms were signed by patients who gave their approval to participate.

This study evaluated pain by VAS Scale and pain, stiffness, and physical function by WOMAC Scale under two groups A & B. Group A (Experimental Group) was givenhome-basedexercisesfollowed by Kinesio taping,and Group B (Control group) was given home-basedexercisesalone.The trial comprised a three-week intervention period. Participants were assessed beforetreatment (baseline day 0) for pain on the VAS Scale and Pain, Stiffness, and Physical function on the WOMAC Scale, after 10 days from starting the treatment (2nd assessment), and finally after day 21 of treatment (Fig. 1).

The experimental Group received home-based exercise followed by Kinesio taping treatments. Each application was spaced out by three to four days, and the intervention period in this study lasted between sixteen to twenty-one days overall. In both groups A & B, the physical therapist applied home-based exercise; the group A patients were unfamiliar with Kinesio taping from prior experience. Moreover, the

participants were not allowed to take nonsteroidal anti-inflammatory drugs or analgesics to prevent the analgesic effects of these medications.

Home-based exercise and Kinesio taping application:

Home-based exercise was used in both groups and Kinesio tape was used in Group A only (Fig 2,3). As recommended by Kase et al., group A's hamstring and quadriceps femoris muscles were taped[27].A home-based exercise program was devised. Five exercises were included:

1. Isometric quadriceps contraction in full extension held for five seconds (subject sits on the floor with back supported and legsextended, with rolled up towel under one knee and contracts quadricepsby pushing into the floor againsttowel).
2. Isotonic quadriceps contraction held in mid flexion for five seconds (subject sits in a chair, lifts a lower leg to the partiallyextended position, andholds).
3. Isotonic hamstring contraction (subjects lie on front or side and bend knee bringing foot towardsbody).
4. Isotonic quadriceps contraction with a resistance band held for five seconds (as for exercise2).
5. Dynamic stepping exercise (walking up and down one step/stair)

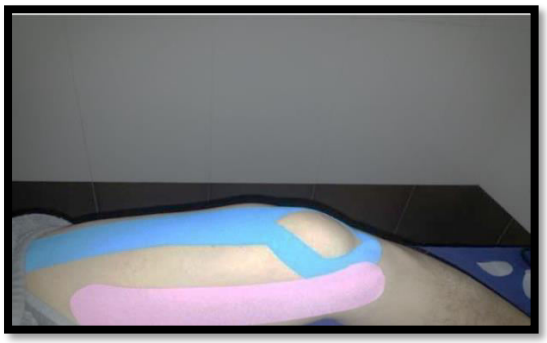


Fig 2. Kinesio taping rectus femoris and vastus Rectus femoris & Vastusmedialis (Kneeflexion)

Fig 3. Kinesio taping for vastusmedialis (knee extension)

Outcome measures:

The outcome measure includes pain by the VAS and Physical function by The WOMAC scale. A popularly utilized, credible, and responsive metric of outcome for individuals with osteoarthritis (OA) of the knee is the WOMAC index. The twenty-four items on the WOMAC scale are broken down into three dimensions: physical function (17 items), stiffness (2 items), and pain (5 items). Each item was scored using the Likert (LK) scale, which is a verbal scale with five points: none, 0; minor, 1; moderate, 2; severe, 3; extreme, 4.The LK scale has a maximum value of 68 points for physical function, 8 points for stiffness, and 20 points for pain. The subscale values were normalized using the following correction factors, where S is the sum of

raw scores for items in the dimension: pain normalization = S × 0.50; stiffness normalization = S × 1.25; and physical function normalization = S × 0.147.Subscale data were standardized before they were added up to produce the WOMAC total score.

High self-perceptions (more severity) in all three dimensions are reflected in high WOMAC scores [28,29].The Visual Analogue Scale (VAS) was used to measure each patient's reported pain during rest, activity, and sleep (a 0–1 numerical pain rating scale with zero equivalent to no pain and 10 corresponding to excruciating pain) [30].

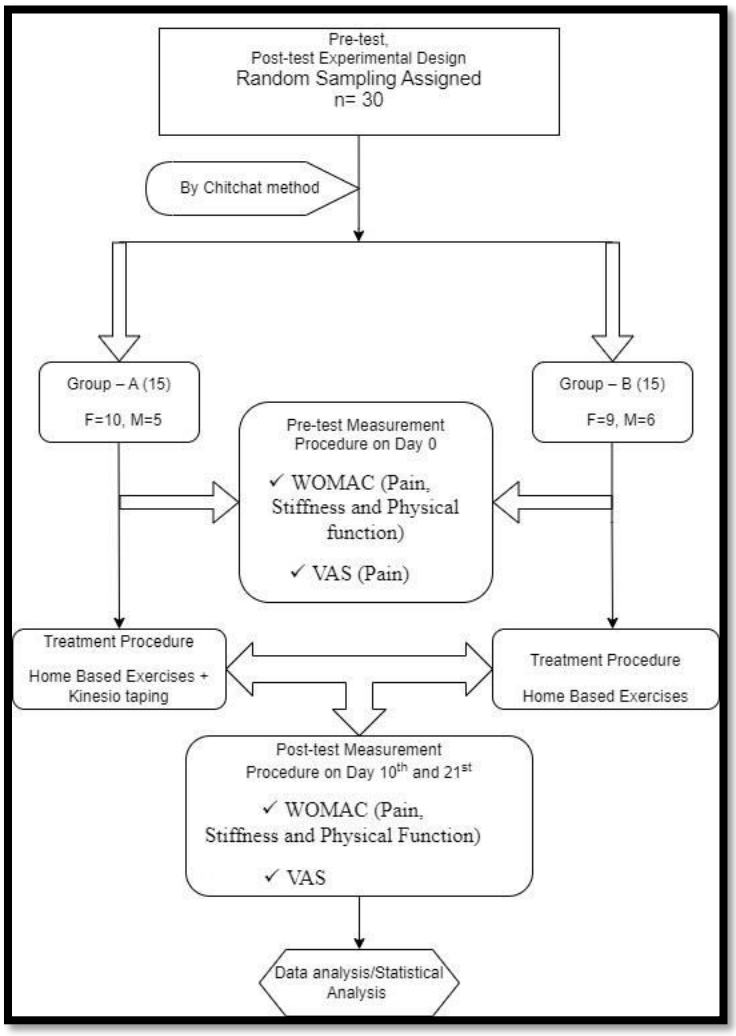


Figure 1. Design of the study

Results:

30 subjects were selected for the study, 15 enrolled in a trial with combined therapy in Group A (Home-based Exercises + Kinesio taping) and 15 inGroup B (Home-based Exercises alone).

Table 1 Change in pain score over the observation period of 21 days

VAS Pan Score	Mean+ SD	Mean+ SD	
	Group A	Group B	P-value
At base	8±0.845	7.93±0.799	0.802
After 11 days	4.67±0.724	5.07±0.704	0.415
After 21 days	1.93±0.884	2.47±0.516	0.033

Table-1 indicates that at base line the pain score in Group A was 8±0.845 and in Group B it was slightly lower at 7.93±0.799 with insignificant p-value at 0.802. After 11 days the pain has been reduced with pain score in Group A with 4.67 and in Group B with 7.93 with insignificant p=0.415. Analyzing after 21 days the average pain score for Group A has reduced at 1.93±0.884 and group B is at 2.47±0.516 and the effect from Group A to Group b is significant with p-value 0.033.

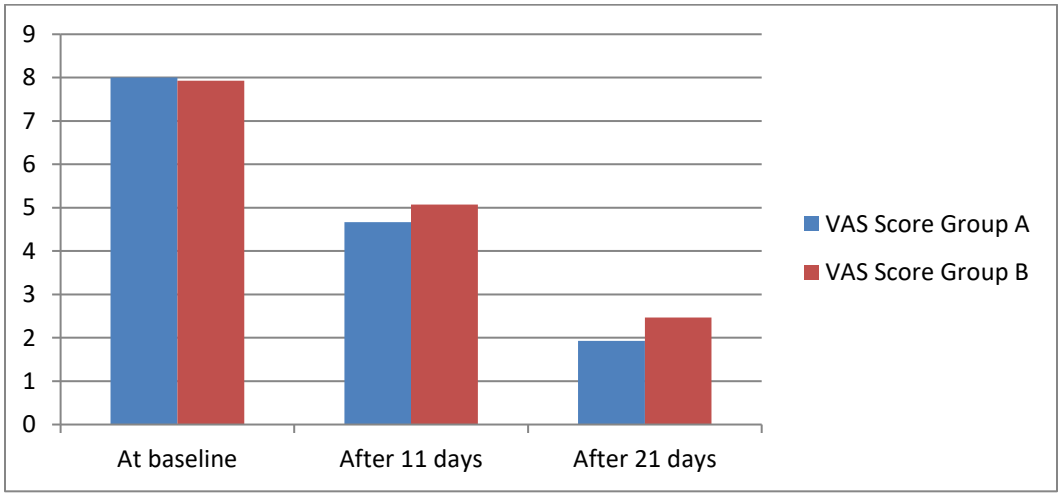


Table-2 Effect on VAS scores over the observation period of 21 days

Source	Sum of Squares	Degree of freedom	Mean Square	F-Value	Sig.
VAS	499.756	2	251.296	402.616	0.000
VAS * Group	1.489	2	0.749	1.199	0.309
Error(VAS)	34.756	56	0.624		

The analysis of variance for the pain score suggests that change in pain score over the time period is significant. But when the analysis of pain score is taken into account in accordance to the groups, it has been observed that pain score is insignificant in the groups.

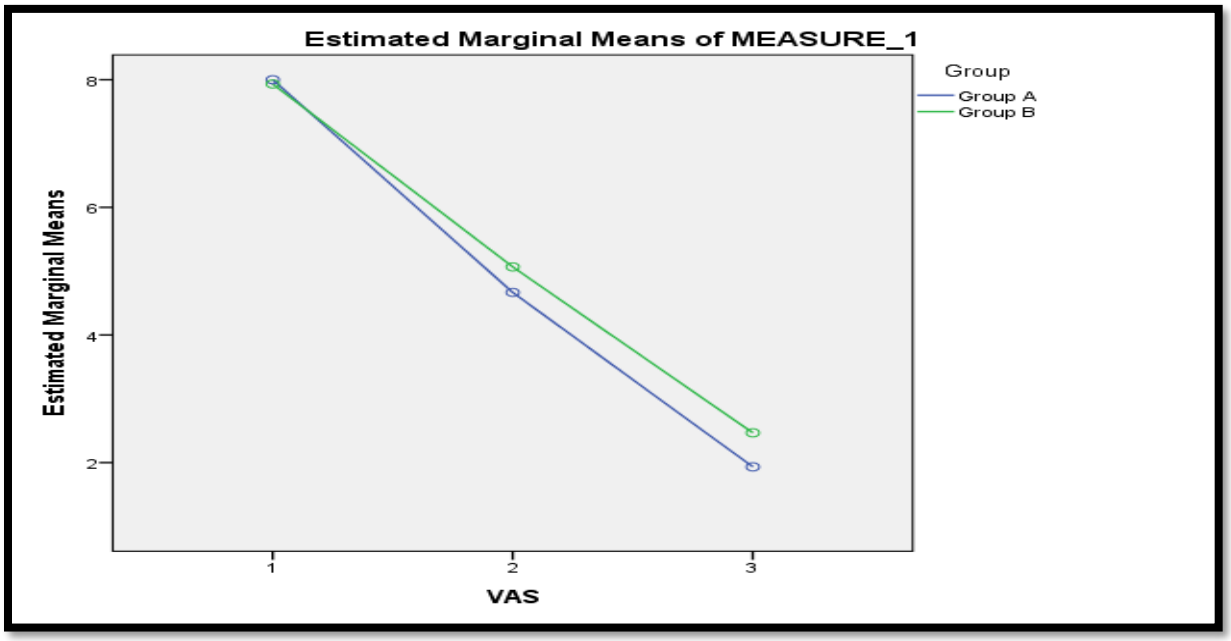


Table-3 Change in Women pain over the observation period of 21 days

	Mean+ SD	**Mean+ SD**	
Womac Pain	**Group A**	**Group B**	**P-value**
At baseline	3.49±0.212	3.45±0.159	0.200
After 11 days	2.32±0.224	2.81±0.256	0.669
After 21 days	1.57±0.271	1.87±0.209	0.385

Table-3 indicates that at base line the womac pain in Group A was 3.49±0.212 and in Group B it was slightly lower at 3.45±0.159 with insignificant p-value at 0.200. After 11 days the womac pain has been reduced with in Group A with 2.32 and in Group B with 2.81 with insignificant p=0.669. Analyzing after 21 days the average pain score for Group A has reduced at 1.57 and group B is at 1.87 and the effect from Group A to Group b is insignificant with p-value 0.385.

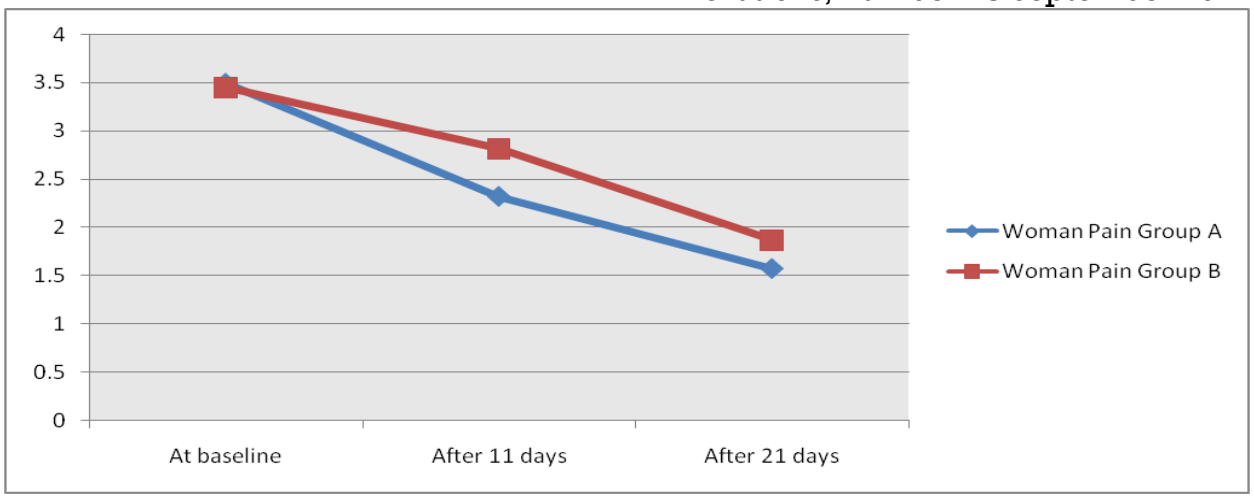
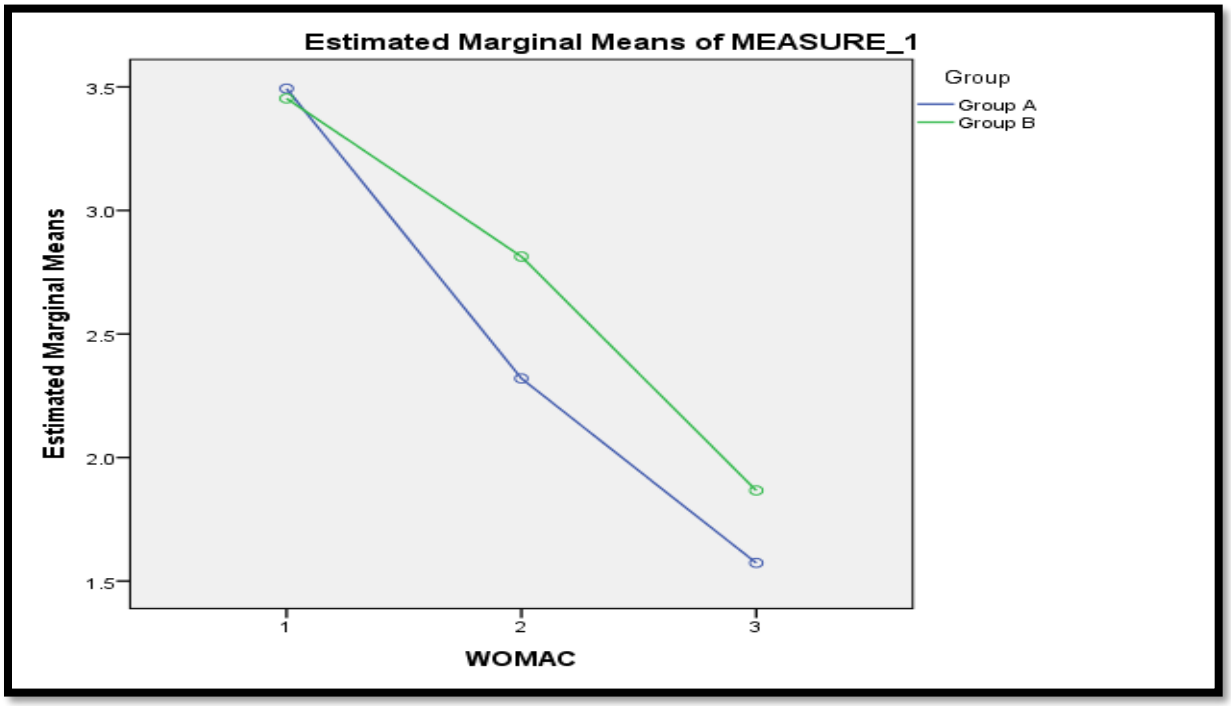


Table-4 Effect on Womac pain over the observation period of 21 days

Source	Sum of Squares	Degree of freedom	Mean Square	F	Sig.
WOMAC pain	46.131	2	27.831	366.209	0.000
WOMAC pain* Group	1.089	2	0.657	8.644	0.001
Error(pain)	3.527	46.411	0.076		

The analysis of variance for the pain score suggests that change in womac pain over the time period is significant. But when the analysis of womac pain score is taken into account in accordance to the groups, it has been observed that pain score is also signifi



cant in the groups too.

Table-5 Effect on Womac Stiffness over the observation period of 21 days

	Mean+ SD	**Mean+ SD**	
Womac Stiffness	Group A	Group B	P-value
At baseline	3.43±0.320	3.47±0.352	0.831
After 11 days	2.53±0.352	2.83±0.244	0.686
After 21 days	1.43±0.372	1.77±0.372	0.718

Table-3 indicates that at base line the womac Stiffness in Group A was 3.43 and in Group B it was slightly higher at 3.47 with insignificant p-value at 0.831. After 11 days the womac stiffness has been reduced with stiffness in Group A with 2.53 and in Group B with 2.83 with insignificant p=0.686. Analyzing after 21 days the average has been reduced to 1.43±0.372 for Group A and for group B is at 1.77±0.372 along with effect from Group A to Group b is insignificant with p-value 0.718.

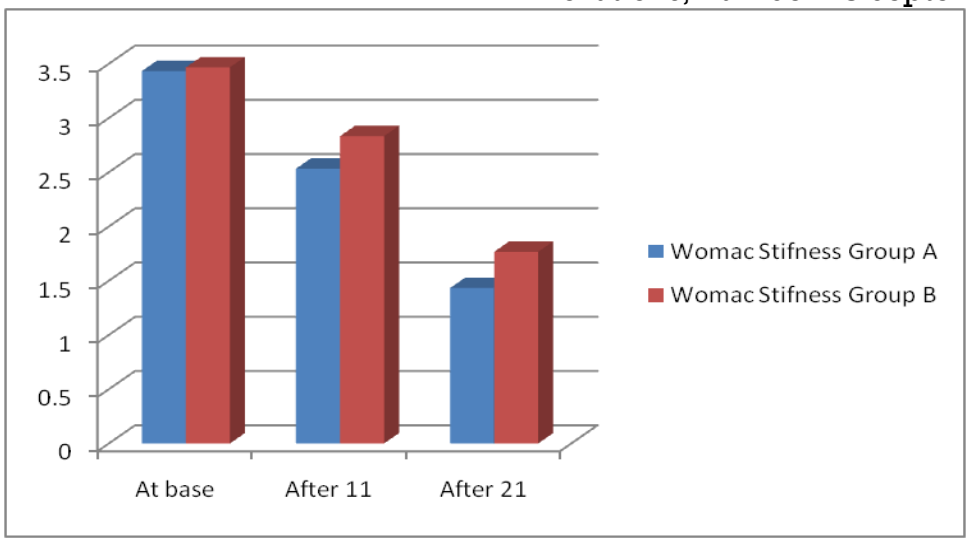


Table-6 Effect on Womac pain over the observation period of 21 days

Source	Sum of Squares	df	Mean Square	F	Sig.
WOMAC Stiffness	51.839	1.757	29.505	175.82	0.000
WOMAC Stiffness* Group	0.406	1.757	0.231	1.376	0.261
Error(Stiffness)	8.256	49.194	0.168		

The analysis for womac stiffness suggests that change in womac stiffness the time period of 21 days is significant among the patients. But when the analysis of womac stiffness has been tested over the group wise conditions, it is resulted that effect of group on womac stiffness is insignificant.

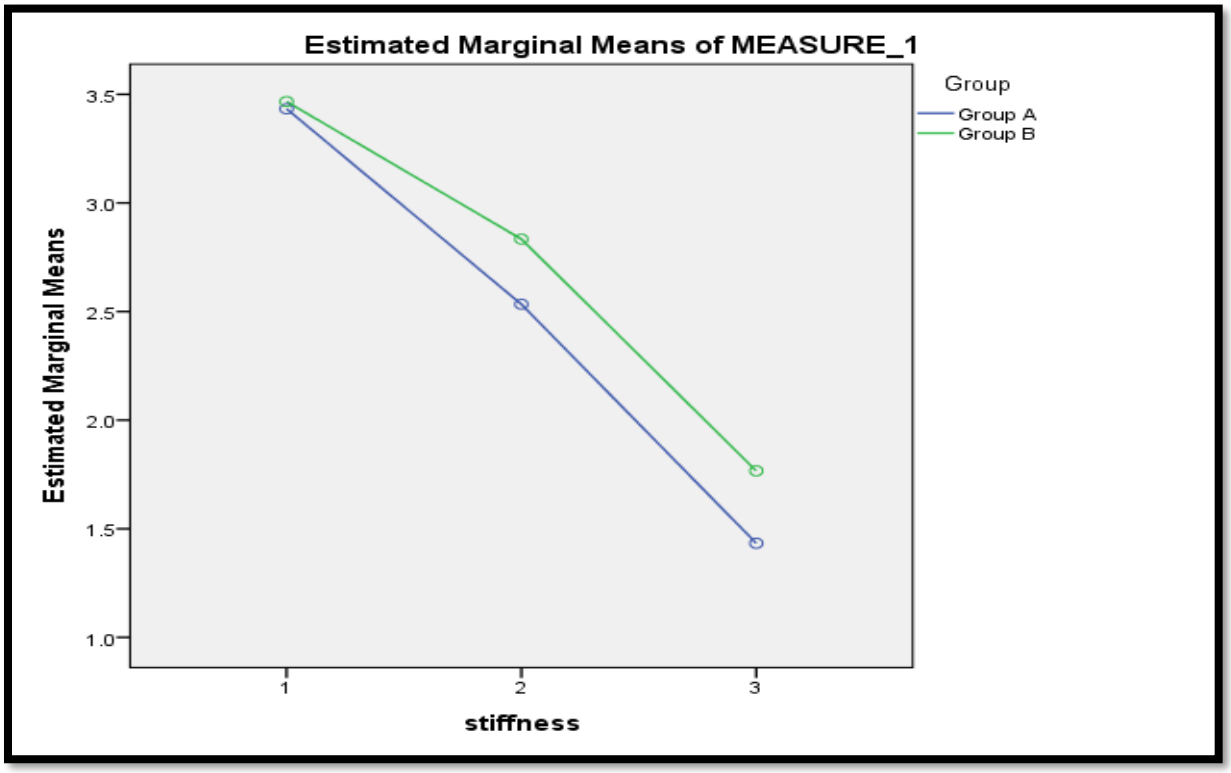


Table-7 Effect on Womac Physical function over the observation period of 21 days

	Mean+ SD	**Mean+ SD**	
Womac Physical function	Group A	Group B	P-value
At baseline	3.33±0.121	3.33±0.188	0.277
After 11 days	2.57±0.119	2.80±0.180	0.121
After 21 days	1.54±0.095	2.02±0.135	0.361

Table-7 indicates that at base line the womac Physical function in Group A was 3.33±0.121 and in Group B it was slightly higher at 3.33±0.188 with insignificant p-value at 0.277. After 11 days the womac Physical function has been reduced in Group A with 2.57±0.119 and in Group B with 2.80±0.180 with insignificant p=0.121. Analyzing after 21 days the average has been reduced to 1.54±0.095 for Group A and for group B is at 2.02±0.135 along with effect from Group A to Group b is insignificant with p-value 0.361.

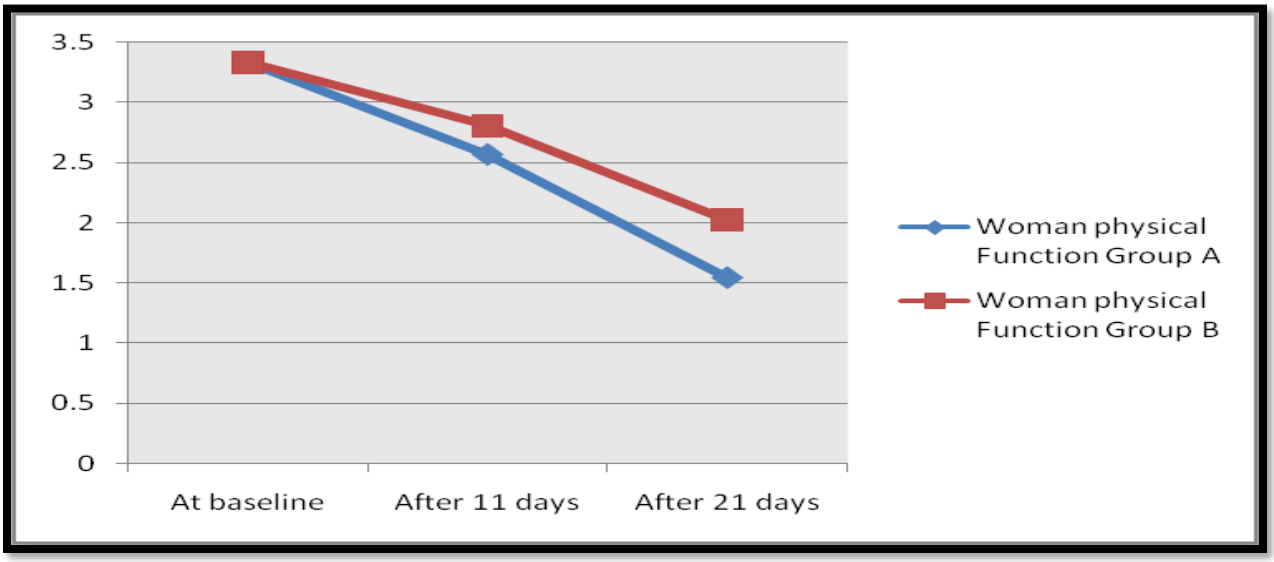
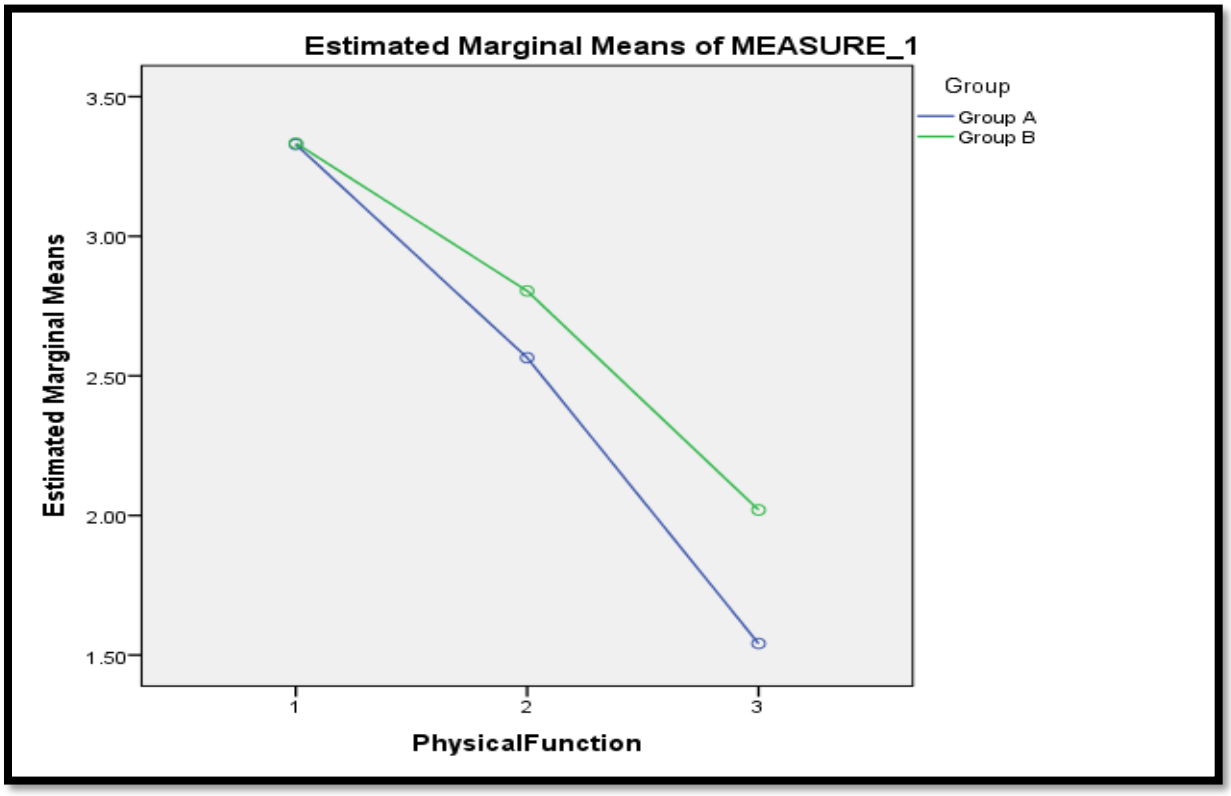


Table-8 Effect on Womac Physical function over the observation period of 21 days

Source	Sum of Squares	df	Mean Square	F	Sig.
WOMAC Physical function	36.413	1.789	20.359	665.701	0
WOMAC physical function* Group	0.844	1.789	0.472	15.437	0
Error(Physical function)	1.532	55.181	0.028		

The analysis for womac physical function suggests that change in physical function the time period of 21 days is significant among the patients. But when the analysis of womac physical function has been tested over the group wise conditions, it is resulted that effect of group on womac physical function is also significant.



Conclusion:

According to this study, Knee osteoarthritis patients report less pain when their knee joint is taped. Compared to the control group, the experimental group's level of discomfort decreased more quickly. After the session, knee joint taping also improves physical function impairment.

According to the Womac and visual analog scale, individuals with osteoarthritis of the knee who have their Home-basedexercise with Kinesio taping had better pain and functional status.

Limitations

Fewer people are participating in this study, which is its main restriction. Our study's brief length constituted its second primary shortcoming. Patients who engage in potentially aggravating activities benefit most from taping. However, as patellofemoral osteoarthritis is a chronic condition, research on the long-term consequences of knee taping is also necessary. We are unable to determine if benefits continue after therapy ends since follow-up is not assessed.

Ethical Considerations:

Compliance with Ethical Guidelines: This study was approved by the ethical committee of NIMS University (Code: NIMS/PT/OT/May/2024/69, dated 20.5.2024

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5. *Change in other OA symptoms of the knee at 6 and 12 months will be measured using the Symptoms subscale of the KOOS.*
6. *Change in QoL at 6 and 12 months will be measured using the Quality of Life subscale of the KOOS.*
7. *Change in function of the study knee during sport and recreational activities at 6 and 12 months will be measured using the Function (sports and recreational activities) subscale of the KOOS.*
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