



EFFECT OF KINESIOTAPING AND PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION ON PAIN AND FUNCTION IN PATIENTS WITH OSTEOARTHRITIS KNEE

Physiotherapy

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ABSTRACT

Background – Osteoarthritis is a leading cause of pain and disability in elderly people worldwide and accounts for a large proportion of visits to doctors each year. Apart from conventional therapy for knee osteoarthritis, KinesioTaping is effective on proprioception and reduction of pain. And the literature suggested that Proprioceptive Neuromuscular Facilitation are effective for improving strength, dynamic stability, ROM and Proprioception. Hence this study will find combined effects of Taping and Proprioceptive Neuromuscular Facilitation versus Taping and Conventional Therapeutic Exercises in knee OA.

Material & Method- 30 patients were selected according to Inclusion criteria and divided into 2 groups. Group A was given Conventional treatment and KinesioTaping. Group B was given Proprioceptive Neuromuscular Facilitation and Kinesio Taping. Pre and Post treatment pain and function of knee were evaluated by VAS and WOMAC scale.

Result- Statistical analysis using Paired t test was done. Paired t test showed that there were significant effects in both the groups. In between the groups unpaired t test showed significant difference. ($p < 0.05$).

Conclusion- Combined effect of Kinesiotaping and PNF was more effective on pain and function in patients with osteoarthritis knee

KEYWORDS

INTRODUCTION

Osteoarthritis (OA) is a progressive joint disorder. It is caused by gradual loss of cartilage that results in a clinical syndrome with predominant symptoms like inflammation, pain, stiffness, limited movement, periarticular muscle weakness and possible deformity of the joint. On the basis of radiological findings OA refers to a partial or full thickness loss of articular cartilage, articular bone sclerosis, and appearance of osteophytes and thickening of the joint capsule. Although radiological changes of OA continuously occurs with advancing age. Osteoarthritis is a leading cause of pain and disability in elderly people worldwide and accounts for a large proportion of visits to doctors each year. It has been found to be major cause of pain and disability in older people.¹ The prevalence of osteoarthritis knee was high among elderly population and increased with age (41.1%).² The quadriceps muscle strength in osteoarthritis has seen to be lower due to disuse atrophy secondary to pain, quadriceps inhibition, delayed activation of quadriceps onset and muscle impaired proprioceptive activity.³ Conventional therapeutic Exercise Interventions have proven to be very effective in decreasing pain and improving level of function in patients with knee osteoarthritis.

Researches have proven that Proprioceptive Neuromuscular Facilitation can be used in Neuromusculoskeletal conditions.³ Proprioception is the process by which the body can vary muscle contraction in immediate response to incoming information regarding external force.⁴ PNF is known to stimulate proprioceptive receptors within muscles and tendons, thereby improving function and increasing muscle strength, flexibility, and balance. PNF movement patterns briefly stretches muscles before contraction, exciting neuromuscular ending which produce higher levels of force. The movements are executed in diagonal pattern, which reproduces physiological movements. It was also proposed that higher balance between agonist and antagonist muscles activation is achieved after PNF exercises.⁴

Kinesio taping (KT) uses elastic adhesive tape with an elasticity rate that is similar to that of the skin to treat all kinds of musculoskeletal pain and functional abnormalities. KT may either inhibit or promote muscular tension according to the application method to the relevant muscles. Herrington (2001) concluded in study "The effect of taping in patellofemoral joint disorders in athletes and adult subjects" that taping resulted in vastus medialis oblique (VMO) and quadriceps activation, patella alignment, and reduced pain. Knee taping is purported to relieve pain by aligning the patellofemoral joint and unloading inflamed soft tissues (Hinman 2004).⁵

By ultimately adjusting muscle tension when it is mixed with strong

voluntary movement, balance between the agonists, synergists, and antagonists is maintained, and physical balance is recovered.⁶ As taping is very effective pain-relieving strategy and improves proprioception,⁷ the combined effect of Taping and Proprioceptive Neuromuscular Facilitation versus Conventional therapy on knee pain and function has to be found.

Apart from conventional therapy for knee osteoarthritis, Taping is effective on proprioception and reduction of pain. And the literature suggested that Proprioceptive Neuromuscular Facilitation are effective for improving strength, dynamic stability, ROM and Proprioception. Hence this study will find combined effects of Taping and Proprioceptive Neuromuscular Facilitation versus Taping and Conventional Therapeutic Exercises in knee OA.

AIMS AND OBJECTIVES

AIM :

- To compare the effects of KinesioTaping and Proprioceptive Neuromuscular Facilitation versus KinesioTaping and Conventional Treatment in knee osteoarthritis.

OBJECTIVE :

- To find out the effect of KinesioTaping and Proprioceptive Neuromuscular Facilitation on pain and function in knee osteoarthritis.
- To find out effects of KinesioTaping and Conventional Treatment on pain and function in knee osteoarthritis.
- To compare the effect of KinesioTaping and Proprioceptive Neuromuscular Facilitation versus Taping and Conventional Treatment in knee osteoarthritis.

METHODOLOGY AND MATERIALS

STUDY DESIGN-EXPERIMENTAL STUDY

STUDY POPULATION-KNEE OSTEOARTHRITIS PATIENTS

SAMPLE SIZE -30

SAMPLING METHOD-RANDOMSAMPLING METHOD

Inclusion Criteria

Patient diagnosed as a case of unilateral knee osteoarthritis. Radiographic evidence of Grade II or III of Kellgren and Lawrence criteria for knee osteoarthritis.

Exclusion Criteria

Patients with inflammatory or other locomotor disease. Any significant peripheral and C.N.S disease. Any other joint involvement. Uncontrolled hypertension or cardiac problems. Trauma during last 3 months.

Materials Used:

PEN
PAPER
KINESIO TAPE

Outcome Measure:

VAS AND WOMAC SCALE

PROCEDURE:

Ethical committee clearance was taken .
Procedure and the nature of study was explained to the subjects and consent was taken from them.
Subjects were selected according to Inclusion criteria .
Using Random Sampling Method the subjects were divided into 2 groups .
Group A was given Conventional treatment and Kinesio Taping.
Group B was given Proprioceptive Neuromuscular Facilitation , Conventional treatment and Kinesio Taping .
15 subjects each were selected randomly for both the groups .

ASSESSMENT OF KNEE PAIN was done by taking intensity of pain on Visual Analogue Scale. The readings were noted before and after end of treatment.

ASSESSMENT OF FUNCTION by Western Ontario and McMaster universities Osteoarthritis Index. WOMAC scores was taken by asking the questionnaire to patient about pain, stiffness, functional independence before and after end of treatment.

Kinesio Taping : The application of kinesio tape was done . The patient were asked to perform symptom provoking activity like step down before applying the tape to see the reduction in level of pain . The tape was applied in sitting on the edge of bed.

GROUP A	GROUP B
Step1-Pre-treatment- Visual Analogue Scale , WOMAC Scale	Step1-Pre-treatment-Visual Analogue Scale , WOMAC Scale
Step 2-Kinesio Taping.	Step 2-Kinesio Taping.
Step 3-Conventional treatment	Step 3-Conventional treatment
Step4-Post-treatment-Visual Analogue Scale , WOMAC Scale	Step4-PNF technique
	Step5-Post-treatment-Visual Analogue Scale , WOMAC Scale

Conventional Treatment:

- Isometric Quadriceps(10 reps.× 3 sets)
- Isometric Hamstrings (10 reps.× 3 sets)
- Dynamic Quadriceps (10 reps.× 3 sets)
- Dynamic hamstrings (10 reps×3 sets)
- Lower limb muscles stretching(30 seconds × 3 sets)
- Hot fomentation 10 mins.

Proprioceptive Neuromuscular Facilitation

PNF D1 D2 patterns for lower limb with facilitation technique and principles of PNF.

- They were given PNF patterns 8-10 times in a session.
- The protocol was of 2 weeks with sessions thrice weekly for each group.
- At the end of treatment the VAS and WOMAC score was taken and compared with pre treatment VAS and WOMAC.

RESULTS:

- Patients in Group A showed improvement in VAS from a mean pre intervention VAS score of 7 with S.D. ± 1 to a mean post intervention VAS of 5 with S.D. ± 1. Also there was improvement in WOMAC score from mean pre intervention value of 72 with S.D. ± 10 to mean post intervention value of 48 with S.D. ± 8.
- Patients in Group B showed improvement in VAS from a mean pre intervention VAS score 8 with S.D.± 1 to a mean post intervention VAS score 3 with S.D.± 1 with p value of $p < 0.05$ i.e.0.000 using paired t-test. Thus showing that PNF and Taping is highly effective in reducing pain among people with knee OA.
- The effects of PNF and Taping treatment on WOMAC scale showed a significant difference between pre and post intervention assessment. The p value is 0.000 ($p < 0.05$) that is the mean WOMAC score has reduced from a baseline score of 74.3 ± 8 to 48 ± 9 . Thus PNF techniques and Taping are helpful in improving level of activity upto 50% measured on WOMAC index.
- Using unpaired T-test post VAS of Group A and Group B , the p

value was < 0.001 which is highly significant.

- Also the post WOMAC p value was < 0.001 which is again highly significant.
- The improvement in group B was more significant than in group A

DISCUSSION

The purpose of the study was to evaluate the effectiveness of Proprioceptive Neuromuscular Facilitation and kinesiotaping with Conventional therapeutic exercises in knee OA. In the present study, both treatment groups obtained successful outcomes that is improvement in pain and functional activity level, as measured by significant reductions in WOMAC scores and Visual Analogue Scale.

But Group B produced significant improvement in pain and function for knee OA compared to group A because kinesio taping is very effective pain-relieving strategy and improves proprioception and PNF exercises are effective in gaining muscle strength , muscle flexibility, joint stability ,proprioception and function.it was also found that activities like squatting , climbing stairs , walking were relieved faster with PNF exercises.

Studies conducted by **Yong-Kyu Choi** in 2013 -The Effects of Taping Prior to PNF Treatment on Lower Extremity Proprioception of Hemiplegic Patients proved that the combination of PNF patterns and KT has effect on gait ability, aiming to provide a more effective treatment method for the clinical treatment of stroke patients. There were significant improvements in the BBS and 10-m walking tests of the experimental group after treatment ($p < 0.05$).

Hence this study concluded that combined effect of PNF and Taping are effective along with conventional treatment in knee OA.

PNF facilitation techniques used were Combination of Isotonic, Stabilising Reversal, Rhythmic stabilisation, Hold Relax, Contract Relax and Dynamic Reversal. These techniques works on principle of autogenic inhibition, reciprocal inhibition, stress relaxation and the gate control theory. The studies by Kayla B. Hindle ,Tyler J. Whitcomb suggested that a combination of these mechanisms enhance movement and performance which is required in knee OA .

Kinesio taping was developed in 1973 by Kenzo Kase in Japan. It provides cutaneous stimulation, reduction in oedema and correction of joint positioning and pain reduction by neural pathways. Applying pressure and stretching the skin stimulates cutaneous mechanoreceptors which sends signal information of joint movement (Grigg, 1994).Dietz noted that simultaneous application of different patterns exerted more force, and therefore had a greater influence on muscle strength and stability.Hence the effects on pain ad knee function in OA knee was more due to PNF effects overlapping with Kinesio taping effects on muscle function in knee OA, enhanced joint stability of knee joint and joint proprioception .Hence this combination can be used as an adjunct to Conventional Treatment.

CONCLUSION

PNF and taping along with conventional treatment had significant effect on joint pain,stiffness and function.Literature suggests that knee OA does not involve only joint degeneration and muscular imbalance but also it affects the proprioception and neuromuscular control of the joint. Apart from Conventional exercises , PNF and Taping is an effective therapeutic intervention in enhancing dynamic control and proprioception. Therefore PNF and Taping can be used in the management of knee OA in order to enhance strength, power and proprioception. It can be used as an adjunct to Conventional exercises. Similar studies can be conducted in other Musculoskeletal conditions like Frozen shoulder. Rotator cuff Injury , Arthritis.

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