



EFFECTIVENESS OF FUNCTIONAL STABILISATION TRAINING WITH MOIST HEAT THERAPY TO IMPROVE DYNAMIC BALANCE AND REDUCE PAIN IN KNEE OSTEOARTHRITIS

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Abstract

Background: Programmes for therapeutic training have been built on functional stabilisation exercises and moist heat therapy techniques to lessen pain in patients with knee osteoarthritis. whereas its contribution is limited to the clinical outcome of improving dynamic balance and reducing pain. The objective of this experimental investigation is to assess and synthesise the available data on the effectiveness of moist heat therapy and functional stabilisation exercises for knee osteoarthritis patients.

Method: A total of 15 osteoarthritic knee participants were randomised into a single group. Functional stabilisation exercise and moist heat therapy are part of the 12-week treatment plan. To determine the level of discomfort and balance, the BBS and WOMAC tools are employed.

Result: The group performed better in terms of dynamic balance and pain. In patients with knee osteoarthritis, all treatments improved knee mobility, function, and dynamic balance.

Conclusion: Exercises for functional stabilisation and moist heat therapy enhance dynamic balance and lessen pain. Additionally, it delivered clinically important improvement.

Keywords: Knee Osteoarthritis, Stabilization training, anterior knee pain.

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INTRODUCTION

One of the most prevalent musculoskeletal ailments, osteoarthritis (OA) of the knee is a chronic degenerative joint condition that causes pain and suffering.^{1, 2} Radiographic signs of osteoarthritis are evident in over 85% of people who are getting close to 60 years old^{3,4}. It has been characterised as a "wear and tear" condition that causes cartilage loss.⁵ However, this painful and incapacitating joint condition affects the entire joint, including the articular cartilage, meniscus, ligament, and peri-articular muscle, and is thought to be caused by a variety of patho-physiological mechanisms.

Knee osteoarthritis (6% of all adults) was the most prevalent form. As people age, osteoarthritis is more likely to occur. According to studies, men aged 60 to 64 are more likely to have knee osteoarthritis in the right knee (23%) than the left knee (16.3%), although women appear to have a more evenly distributed distribution (right knee, 24.2%; left knee, 24.7%).^{6,7} For people aged 70 to 74, the prevalence of osteoarthritis of the knee might reach 40%. Adult prevalence, when the diagnosis is made only on the basis of clinical signs and symptoms, is 10%⁸ Only 15% of patients with radiologically proven knee osteoarthritis report knee pain, despite the fact that these patients exhibit the typical radiological signs of the condition⁹. According to estimates, 1% of those over 70 have the disorder each year. It is associated to friction or crackling crepitus and is made worse by stair climbing and descending, hill climbing, standing up from a seated position, kneeling, or squatting.

Osteoarthritis of the knee can be treated with functional stabilisation training, which primarily focuses on strengthening the knee muscles and controlling how the lower limbs and trunk move, which impacts the trunk's kinematics, muscular endurance, knee function, and eccentric hip and knee strength¹⁰. Numerous studies have looked into how the proximal musculature, which includes the hip girdle and lumbo-pelvic region, affects the knee. The gluteal muscles' primary job is to externally rotate and extend the hip¹¹. Additionally, because of their insertion into the iliotibial tract, they aid in knee extension¹². The patellar tracking can also be impacted by these muscles' weakness. According to research, functional stabilisation training significantly reduces anterior knee discomfort in patients with osteoarthritis of the knee and improves dynamic balance¹³.

In the physiotherapy department, moist heat is a type of superficial heat therapy that is most frequently used to relieve pain and muscle spasms before stretching and mobilising stiff joints. A wet hot pack is a 'conductive' way to give the patient moist heat. It was submerged in water that was between 158 and 170 degrees Fahrenheit or 70 and 76.7 degrees Celsius¹⁵. The heat-retention capacity of the pack is about 30 minutes. Moist hot packs, which are typically applied to the big and flat parts of the body, provide surface heat up to 1 to 2 cm in depth¹⁶.

In light of this, the primary goal of the current study is to determine the efficacy of functional stabilisation training combined with moist heat therapy to enhance dynamic balance and lessen pain in knee osteoarthritis.

METHODS

This study was carried out at M.M. Hospital in Namakkal with the patient's consent and under the direction of the appropriate hospital official. 15 patients with knee OA between the ages of 45 and 60 were included in this study based on the inclusion criteria. Three months were spent conducting the investigation, which used a quasi-experimental study design. The Western Ontario McMaster Universities Osteoarthritis Index (WOMAC) and Berg Balance Scale (BBS) were used to collect the pretest scores for pain and dynamic balance from all 15 subjects. Functional stabilisation training and moist heat therapy were administered to all 15 individuals. All 15 patients' post-test pain and dynamic balance results were collected after three months for statistical analysis.

PROCEDURE:

According to the selection criteria, about 15 subjects were included. The 15 participants are divided into one group (n=15). The group got Moist Heat Therapy as well as Functional Stabilisation Training. The written informed consent form was requested from them. Three months were spent on treatment in all. Treatment for moist heat therapy lasted 15 minutes, with 5 sessions each week. Treatment for functional stabilisation training lasted 45 minutes, with 5 sessions per week for a period of 12 weeks.

The Western Ontario McMaster Universities Osteoarthritis (WOMAC) and Berg Balance Scale (BBS) are used to compare the pre- and post-test values of dynamic balance and pain.

TECHNIQUE:

Moist Heat Therapy and Functional Stabilisation Training were administered to 15 subjects.

MOIST HEAT THERAPY:

Also referred to as superficial heat. A physical therapy technique called temperature 158F-170F is used to reduce pain, quicken healing, relax muscles, and improve range of motion. In a moist heat therapy, a hot pack is applied to the sore or uncomfortable area. For perhaps 15 to 20 minutes. Put the moist heat therapy to use. Fill the bowl with water that is warm to the touch but not scorching. Wring out the excess water after soaking the towel in the hot water. Apply the towel, folded into a square, to the painful area. Wrap the injured knee with a soft towel and apply moist heat for 15 minutes using a hydro collator pack. Before stretching and mobilising a stiff joint, pain and spasm relief is necessary.

FUNCTIONAL STABILIZATION TRAINING:

Physical treatment and performance-enhancing training based on functional anatomy and biomechanics are combined through functional stabilisation training¹⁷. standing with isometric hip abduction and lateral rotation

- Lateral bridge
- Ventral bridge
- Swiss ball exercise for the transverse abdominis and multifidus muscles
- Side lying hip abduction/lateral rotation with minimal knee and hip flexion

RESULTS

Comparative mean, standard deviation, and T value for dynamic balance and pain between pre- and post-tests

TABLE - 1 MEAN VALUES OF PRE & POST TEST F O R WESTERN ONTARIO AND McMASTER UNIVERSITIES OSTEOARTHRITIS INDEX :

Test	Mean	SD	T Value	P Value
Pre test	52.66	6.4	15	<0.05
Post test	27.8			

The research established a statistically significant difference between values on Day 1 and Week 12. WOMAC had a pre-test value of 62 and a post-test value of 36.

GRAPH –

1 GRAPHICAL REPRESENTATION:

Graphical representation of pre test and post test values of pain in WOMAC.

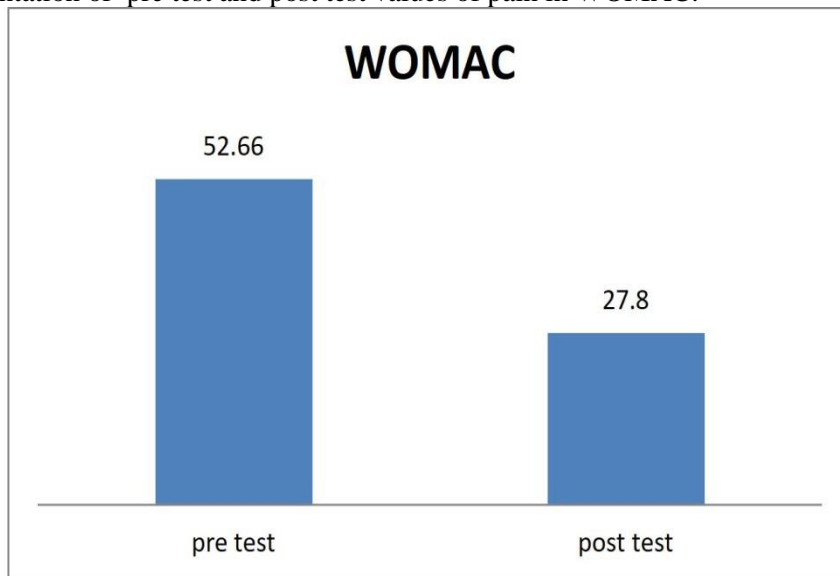


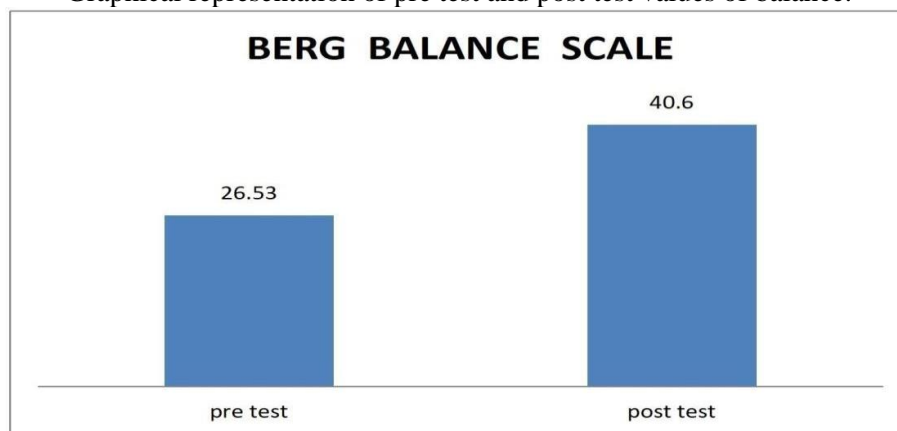
TABLE – 2 MEAN VALUES OF PRE & POST TEST F O R BERG BALANCE SCALE

Test	Mean	SD	T Value	P Value
Pre test	26.53	2.76	19.63	<0.05
Post test	40.6			

The research established a statistically significant difference between values on Day 1 and Week 12. The Berg balancing scale had a pre-test value of 33 and a post-test value of 49.

GRAPH – 2 GRAPHICAL REPRESENTATION:

Graphical representation of pre test and post test values of balance.



This study has shown that moist heat therapy and functional stabilisation training have a substantial impact on pain relief and dynamic balance in knee osteoarthritis.

DISCUSSION

The goal of the study is to determine whether moist heat therapy combined with functional stabilisation training can enhance dynamic balance and lessen discomfort associated with knee osteoarthritis. The trial lasted three months in total. The course of treatment lasted 12 weeks. At the beginning and the end of the 12-week period, the dynamic balance was assessed using the Berg Balance Scale, and the pain was assessed using western Ontario and McMaster universities osteoarthritis index. In a randomised clinical trial, participants who received both mobilisation with movement and usual treatment improved much more than those who received only usual care in terms of self-reported function, pain, and patient satisfaction. This effect was noticeable right away following the intervention and persisted until six months later. However, functional mobility, as assessed by the timed up and go test and the 12 step test right after the intervention¹⁸, did not differ significantly between groups. At three and six months' follow-up, there were significant differences in these variables favouring the experimental group. These findings are in line with earlier research on the effectiveness of mobilisation combined with movement for the treatment of symptomatic knee osteoarthritis.

With ThermoCare moist heat, the rise in skin and muscle temperature was even more rapid. Air that is moist promotes conductive heat exchange and can carry more heat than air that is dry¹⁹. Therefore, these wraps significantly speed up the transfer of

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heat into deep tissue. In this investigation, it manifested as a quicker rise in deep tissue blood flows. This would explain why DOMS sufferers who use moist heat wraps have higher pain relief and quicker healing. Heat packs made with a hydrocollator are frequently used in therapy. Five layers of towels are normally used to keep the heat pack away from the skin because it is so hot. The skin receives less heat as a result. The modality typically lasts for 15 minutes because these packs cannot maintain heat for very long. As a result, the skin heats up quickly and the blood flow increases as well, but the enhanced heat gradient is too shallow to reach deep tissue. There was not much of a change in deep tissue temperature or blood flow in the participants investigated here.

Steen and Cooper and Smeltzer and Bare stated that there will be a dilution of intravascular prostaglandins, bradykinin, and histamine during the administration of local heat. These chemicals are some of the strongest compounds that cause pain. Through the production of enkephalin, local heat, despite being a minor painkiller, may also raise the threshold of cutaneous sensory receptors. As an adjunct non-pharmacological therapy technique for the management of knee OA, local heat application has been widely employed. The results of the current study have shown how effective applying heat is for controlling pain and overcoming handicap in daily physical activities. Local heat treatment may be used for treating patients with knee OA in whom NSAIDs and analgesics are contraindicated because it has been demonstrated to initially reduce pain and increase physical activity. However, there hasn't been much research done on this subject²⁰

Traditional closed kinetic chain exercises often have a VMO:VL ratio that is close to 1. VMO:VL

activation patterns in PFP patients may be different from those in healthy controls. For people with knee osteoarthritis, a 1:1 ratio or anything close to it between the vastus medialis oblique and vastus lateralis is the ideal target ratio. The investigations of the variations in knee, hip, pelvic, and trunk kinematics, hip strength, and gluteal muscle activation across genders in people with PFPS and healthy participants during the performance of a single-leg squat²¹. They came to the conclusion that both men and women with PFPS demonstrated increased knee abduction, hip adduction, contralateral pelvic drop, and ipsilateral trunk lean during a single-leg squat as compared to normal participants. The hip external rotators and abductors strength was decreased, as evaluated eccentrically on an isokinetic dynamometer along with the altered kinematics²². Additionally, compared to men, women with PFPS displayed increased hip internal rotation and decreased gluteus medius activation during the single-leg squat.

Disparities between females with and without knee osteoarthritis in terms of hip and knee strength during stair descent. This study revealed weak hip lateral rotator and abductor muscles in individuals with osteoarthritis of the knee. The posture and strength of the hip are related to knee osteoarthritis, according to a systemic study. Such patients had a common deficit as soon as they became symptomatic. A typical treatment programme for knee osteoarthritis can benefit from hip strengthening and a coordination exercise protocol²³. Compared patellar tracking and tilting during non weight bearing and weight bearing activities in females with lateral patellar subluxation using dynamic magnetic resonance imaging techniques. Patella tracks and tilts laterally on a stable femur in non weight bearing. In weight bearing, the femur rotates internally, which causes patella to track laterally in relation to the femur. Two studied the knee osteoarthritis patients and found that they had double the femoral internal rotation compared to the control group. This indicates the association between knee osteoarthritis and hip strength coordination.

There is proof that the higher therapeutic effects of FST are linked to improvements in the biomechanics of the trunk and lower extremities in both the frontal and sagittal planes. Only those in the FST group had less ipsilateral trunk inclination, contralateral pelvis depression, hip adduction, and knee abduction movement excursions in the frontal plane after the 8-week intervention. They also had

stronger hip abductor eccentric muscles and more endurance in the lateral trunk muscles. Therefore, the improved frontal plane lower-limb movement control and subsequent reduction in patellofemoral stress and pain might have been facilitated by the greater eccentric hip abductor muscle strength and lateral trunk endurance seen in the FST group after intervention. After intervention, only the FST group displayed increased hip flexion excursions, pelvis anteversion, eccentric knee flexor muscle strength, and posterior trunk muscle endurance in the sagittal plane. Powers has suggested that people with PFP may engage in weight-bearing activities with decreased hip flexion and increased pelvis anteversion and trunk extension, causing a posterior shift of the centre of mass and an increased external knee flexor moment. The hip and trunk extensor muscles have been shown to be inhibited by this pattern of motion, whereas the quadriceps are more active.

In this study after 12 weeks of treatment the statistical analysis of this study's post-test results reveals that the berg balance scale scored 49 and Ontario and McMaster universities osteoarthritis index scale scored 38. Analysis of the pre- and post-test results reveals a significant improvement. The results showed that treating knee osteoarthritis with functional stabilisation training combined with moist heat therapy significantly improved dynamic balance and decreased pain.

CONCLUSION:

The study concluded that 12 weeks of interventions of Moist heat therapy followed by Functional stabilization training were shown statistically significant in pre-test and post-test values in reducing pain and improve dynamic balance for patient with knee osteoarthritis.

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