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CONSERVATIVE MANAGEMENT FOR PAIN AND STABILITY IN MEDIAL OSTEOARTHRITIS KNEE USING LATERAL RAISE FOOTWEAR- A COMPARATIVE STUDY

Manish Bhawatkar*[1] and Amitabh Dwivedi[2]

[1]MOT (Musculoskeletal Sciences) Occupational Therapy Department, Government Medical College, Nagpur 440003, India.

[2]PhD (OT) Professor & Dean, Jaipur Occupational Therapy College, Maharaj Vinayak Global University, Dhand, Amer, Jaipur, Rajasthan-302038, India.

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***Corresponding Author**
Manish Bhawatkar
MOT (Musculoskeletal Sciences) Occupational Therapy Department, Government Medical College, Nagpur 440003, India.

ABSTRACT

In this piece of research a sample of 30 subjects were divided into two equal groups to find the effectiveness of laterally raised footwear in relieving the pain symptoms of medial OA knee. The groups are divided into 1) Control Group which received exercise strengthening program and, 2) Experimental group which receive lateral raise footwear and exercise strengthening program. The two groups were evaluated on the Lysholms Knee Scoring Scale, pain component, weigh bearing on affected extremity and muscle strength. Readings of Lysholms scale, weight bearing on affected extremity and muscle strength were taken at the initial and final evaluation. Readings for pain component was taken at initial, mid and final follow-up and data were compared. The study revealed that lateral raise footwear with exercise strengthening program both in combination brings better relief in pain and functional stability to the subjects of mild to moderate medial OA knee of the experimental groups. The lateral wedge shifts the centre of pressure (COP) and the line of the ground reaction force (GRF) more laterally to the knee joint by altering the angle of the calcaneus into a valgus position. This result in a reduced load on the knee joint in individuals.

KEYWORDS: Quadriceps strengthening, cartilage degeneration, Osteoarthritis, Lateral raise, diminished joint space, altered weight bearing.

INTRODUCTION

Primary knee osteoarthritis (OA) is a degenerative articular joint disease which leads to erosion and degradation of the articular cartilage within the knee joint. Subjects with OA experience pain and stiffness due to alteration in the cartilage structure and a narrowing of the joint space.

The presence of osteophytes is commonly seen, and muscle weakness can also occur.

Secondary arthritis can also occur due to a previous causative agent or event such as trauma and obesity is a risk factor along with a varus knee alignment.[1] In affection of the medial or lateral compartment of the knee joint (hermiarthrosis), the progressive breakdown of the Corresponding articular surfaces is accompanied by development of varus or valgus deformity respectively. The medial compartment is most often affected, especially in women of advanced age. As the varus deformity increases it aggravates the loading pressures acting on the medial articular surface. Hence a vicious cycle is set which encourages rapid progression of deformity, pain and instability.[2]

General management program for the patient with osteoarthritis may include alleviation of pain and improvement of functional status. Optimally patient should receive a combination of non-pharmacologic such as patient education, drugs, exercise and unloading in certain joints and pharmacological treatment include (surgical) such as high tibial osteotomy and total knee replacement have produced favourable result but conservative treatment is the mainstay for majority of the patient. X-ray finding are useful to demonstrate degenertaitive changes of knee.[3]

Quadriceps femoris is one such important structure in knee joint. Quadriceps femoris angle know as Q Angle which is decreased in genu varum, the normal angle is 11-13 degree and in females is 18 degree. Pain is the presenting symptoms in osteoarthritis and is because of compressive stresses or pain excessive activity of the involved joint and is relaxed with rest.[4]

Research studies have introduced in lateral raise footwear as conservative management for medial compartment of osteoarthritis. However there is not much literature available to say how or why lateral raise work wonders. So we have made an attempt to compare the effects of lateral raise insole in medial OA knee with varus deformity.

AIM

The aim of the study is to compare the effectiveness of lateral raise in pain and stability in medial osteoarthritis knee.

Biomechanics of Knee

The knee is comprised of tibiofemoral and patellofemeral joint and is a modified hinge joint. The anatomical axis of knee is a line drawn along with shaft of femur and shaft of tibia from angle of 170-175 degree when the angle is less than 165 degree and abnormal condition called genu valgum. When the angle is more than 180 degree then abnormal condition is called genu varum. The medial aspect if knee lead to compression loading thereby cartilage degeneration of compartment occurs. Q angle is drawn two lines from Antero-posterior iliac spine to the midpoint of patella from tibial tubercle to the midpoint of patella.

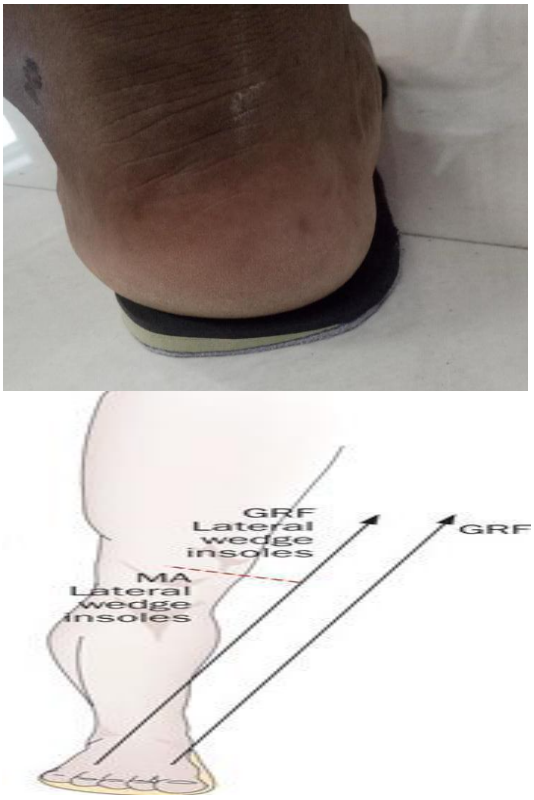


Figure 1: Effect of Lateral Raise Footwear on GRF line & moment arm.

MATERIALS AND METHODOLOGY

30 patients, 15 each in both experimental and control groups within the age group 50-70 years with bilateral OA knee pain with genu varum were selected for the studies. Pain was the presenting symptom in all the patients and was aggravated on weight bearing activities and subsided with rest.

The experimental Group (15 patients) was given

- 1/4th Raise on the lateral aspect of the foot outside the footwear and Exercise strengthening program.
- While the control group (15 patients) was put only on the exercise strengthening program.

Both Groups of patents were followed up after every 15 days for a period of 30 days. In the study, we have tried to find out which group shows significant relief from pain.

Criteria for Patient selection: - All the patients were symptomatically and radiologically diagnosed confirmed cases of medial compartment OA with genu varum.

Patients with pain in any other joints of the lower limb, limb length discrepancy or any neuromuscular disorder of the lower limbs were excluded from the study. Patients were not put on any other kind of drug therapy pertaining to Osteoarthritis during the study.

Total subject population was divided into two groups each consisting of 15 subjects:-

A) Control Group: Which received Exercise strengthening program.

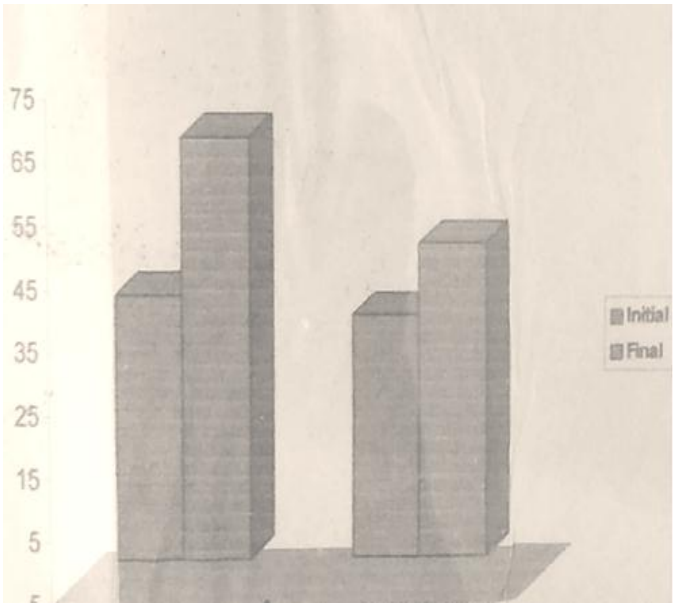
B) Experimental Group: Which received Exercise strengthening program and a lateral raise in the footwear.

Two groups were evaluated at initial, first and second follow-ups, each after 15 days. Both experimental and control group were educated about energy conservation and work simplification techniques and were given progressive muscular strengthening rehabilitation program which included.

- Static quadriceps
- Straight leg raising
- Dynamic quadriceps exercise
- Hamstrings setting exercise
- Hamstrings strengthening in prone
- To facilitate co-contraction of quadriceps and hamstrings
- Cycling in supine position
- Bicycle fret saw

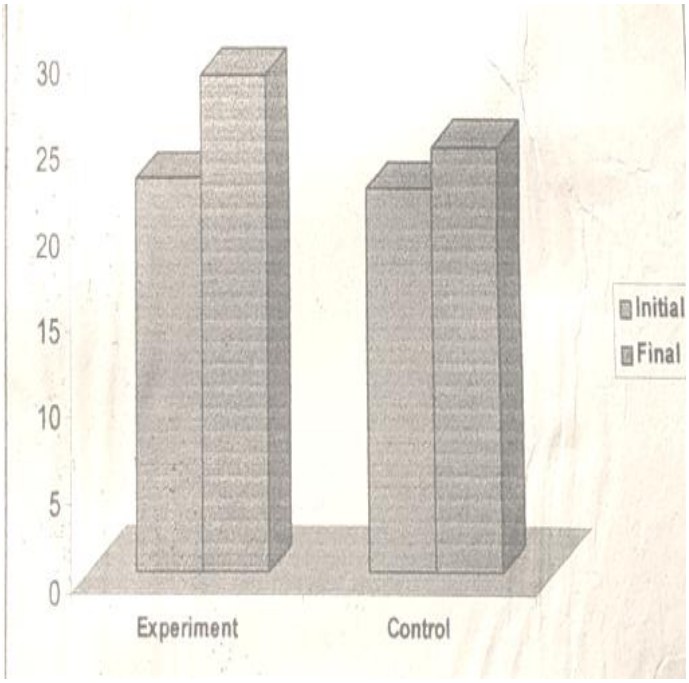
RESULTS

The pre and post readings were evaluated on the Lysholms Knee Scoring Scale, weight bearing on affected extremity, muscle strength. Readings for pain component was taken at initial, mid and final follow-up and data were compared.

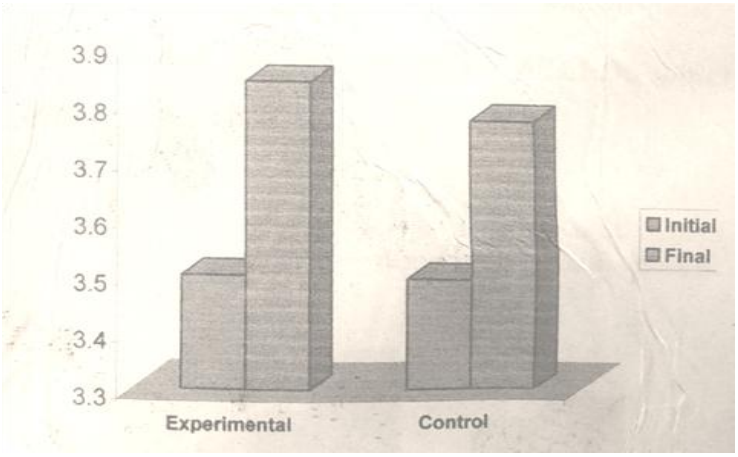


Experimental Group Control group

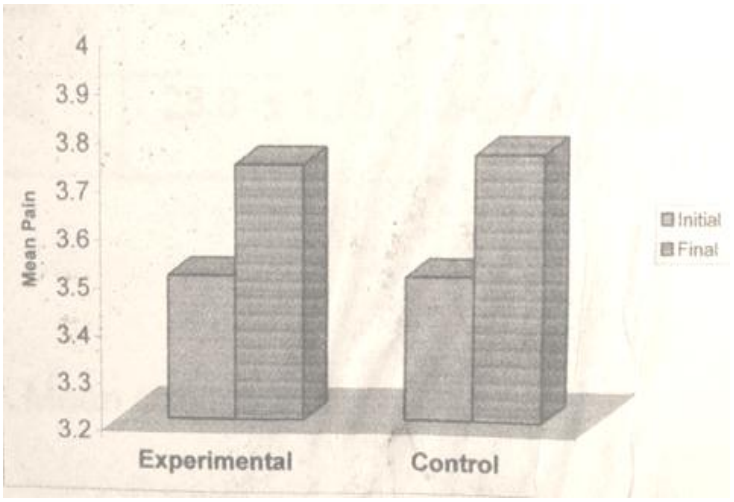
Graph I: Mean score of Lysholm scale in experimental and control group.



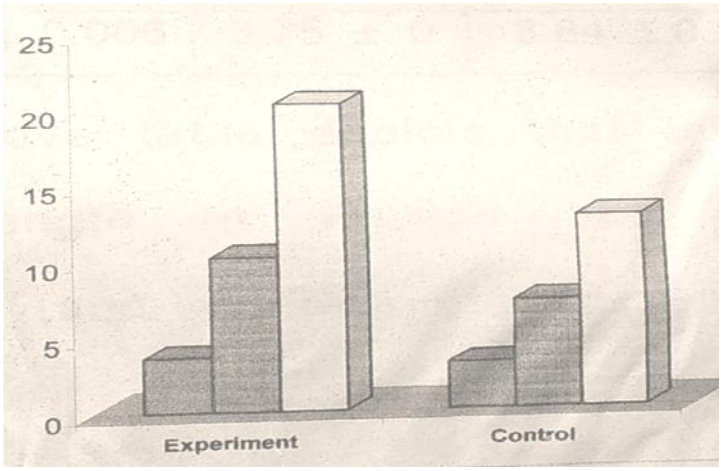
Graph II: Mean weight bearing in experimental and Control group.



Graph III: Muscle strength in experimental and control group for extension.



Graph IV: Muscle strength in experimental and control group for Flexion.



Initial readings

Mid readings (15 days)

Final readings (30 days)

Graph V: Pain assessment in experimental and control group.

DISCUSSION

In the management of OA knee according to Andrriachhi (1990) et.al (1998) Total Knee Replacement (TKR) unicompartmental Knee Replacement (UKR) on high tibial osteotomy (HTO) have been of great success to load on the knee joint but before surgery a conservative treatment still continue to be important. In this conservative management pharmacology modalities such as anti-inflammatory drugs to relieve symptoms. However load on the knee joint is still there and tends to increase over the time. This concept was supported by Sumet (1997), analysed the pain reliving pharmacology modalities results in loss of protective mechanism associated with pain & increased load on the knee joint over the disease progression. NSAIDS therefore may not be beneficial in long term.

NICE (2008) recommended to conservative intervention effectiveness in pain relief & improve function. The conservative management includes exercises, education, weight loss if obese, hot & cold packs & orthotics. Surrounding musculature of the knee is strengthened & lateral raise which can correct deformity and alter knee stresses of load bearing.

WOLF (1991), Masoud Rafiaee (2012) and Mohammad Karimi (2012) studied the effects of various kinds of lateral wedges up to $1/8^{th}$ inch, 3 mm and 7mm Lateral raise. In both studies the patients experience a significant decrease in Pain, joint stiffness and functional impairment.

The important scores were discussed on Lysholms knee scoring scale, Pain, weight bearing on affected extremity, muscle strength. The scale comprise of 8 functional activities or specific response of the patient to attempted functional activities that help to determine the status of knee relative to the performance of normal activities of daily life. A score or 85/100 and higher indicates a level of functional normalcy of the knee joint.

CONCLUSION

The strengthening of surrounding knee musculature helps the joint to tolerate the weight bearing forces better. This comparative study between the two groups, one with exercises alone and other with a laterally raised footwear along with exercises, suggests that it is the combination of the two that brings better relief to subjects of early medial osteoarthritis knee. This probably occurs due to lateral wedge shifts the centre of pressure (COP) and the line of the ground reaction force (GRF) more laterally to the knee joint by altering the angle of the calcaneus into a valgus position. This result in a reduced load on the knee joint in individuals.

However, since the effects of lateral raised footwear become notable after the second week of usage, further studies to analyze its efficacies and limitations, if any, in long term usage in the Indian population would be very beneficial.

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