



EFFICIENCY OF DYNAMIC EXERCISES WITH THERABAND AND STRENGTHENING EXERCISES WITH WEIGHT CUFF FOR QUADRICEPS MUSCLES IN PATIENTS OF OA KNEE JOINT..

ABSTRACT

Arthritis is one of the most common medical problems in the world that leads to disability and pain. Next to traumatic conditions, arthritis is the oldest and most widespread pathological condition reported in pathology (the study of disease and trauma in extinct societies). There are more than 100 forms of arthritis. Osteoarthritis is becoming increasingly recognized in both developed and developing countries as a major cause of pain and disability, with 44% - 70% of people over the age of 55 years having radiological evidence, and this figure rises to 85% above the 75 years of age group. Osteoarthritis is the most frequent joint disease encountered in the clinical practice with a prevalence rate of 22% to 39% in India and is the most common cause of locomotor disability in the elderly. Background: Osteoarthritis of the knee is very common, affecting 12.4 million (33.6 %) adults over the age of 65 interestingly; women are more affected and burdened by osteoarthritis of the knee than men. Knee OA is the greatest contributor to impairment of functional ability of OA patients. The disability can be extensive, including mobility limitation, difficulty with activities of daily living, and social isolation. The principal contributors to disability are believed to include pain, reduced range of joint movement, and muscle weakness.

PURPOSE: This study was aimed at comparing the effects of dynamic exercise with theraband and strengthening exercises for Quadriceps muscles in patients of OA knee joint.

METHOD: An absolute number of 40 patients were chosen for the review initially. Thirty young adults (19 females, 11 males) participated in this pretest-posttest experimental study. Participants were randomly assigned to one of the two groups: 10 of them were rejected as they couldn't finish the meetings for different reasons. Just 30 subjects who fully filled the incorporation standards were appointed in the study. VAS, WOMAC was used as outcome measure. Pre- and Post-intervention readings were taken.

RESULT: The paired t-test was applied to find out the significance difference between pre and post values of VAS and WOMAC in group A (HIP + KNEE STRENGTHENING EXERCISES) and group B (KNEE

STRENGTHENING EXERCISES) respectively which shows a significant difference in both the groups and unpaired t-test was applied to find out the significance difference between the two groups but the results shown that there was no significant difference when the two groups were compared.

CONCLUSION: In the current review we presumed that the Hip and knee strengthening is compelling and better than knee strengthening alone for decreasing pain and improving activity in people with osteoarthritis of knee. Walking worked on after the addition of hip strengthening in knee strengthening in individuals with knee Osteoarthritis. Dynamic or isometric resistance training improves functional ability and reduces knee joint pain of patients with knee OA

INTRODUCTION

Knee osteoarthritis (OA) is characterized by pain, articular cartilage deterioration, and joint space narrowing and reduced muscle strength. Knee pain during movement due to OA is a strong predictor of an increased need for functional assistance,² and is the important leading cause of disability .³ Approximately 10–30% of people diagnosed with OA have pain severe enough to limit function and cause disability, and this percentage is increasing.⁴ Loss of leg muscular strength is associated with increased pain and disability, as well as a more rapid progression of knee OA.

Few studies indicates that abnormal motion at the knee often precedes degenerative changes⁷ with decreased tibiofemoral rotation as a mechanism contributing to the development of cartilage degradation. Chronic kinematic alterations can cause degenerative changes in the cartilage, particularly in older adults whose cartilage may no longer have the ability to adapt to load bearing. This is a serious issue for the individual with knee OA, as activities such as squatting, stair climbing and kneeling may load the tibial-femoral cartilage surfaces in areas that cannot tolerate the load. Pain, perceived instability, and functional limitations are common downstream effects of this degenerative process. Muscle strengthening through resistance exercise (RX) increases physical function, decreases pain due to OA, and reduces self-reported disability.^{5, 9, 10} Resistance exercises, defined here as the use of machines (i.e. machines using a weight stack or added weights allowing selection of a given resistance load) or free weights as the external load, may combat the multi-faceted etiology of OA. This article will synopsise the highest quality evidence of the effects of Resistance exercises on OA, and provide clinical guidelines for the prescription and expected adaptations to Resistance exercises in the knee OA population. Initiation of a resistance training program requires assessment of strength, total knee range of motion, knee pain throughout the range of motion, and the patient's access to exercise equipment.

Stability of the knee joint during locomotion is mainly supported by the lower limb muscles. The quadriceps muscle may easily get fatigued due to weakness, resulting in poor neuromuscular control causing pathological movement at the knee joint. Additionally, weakness may also decrease the shock absorption capacity, resulting in increased loading on the knee joint. Consequently, quadriceps dysfunction may contribute to early degenerative changes [1]

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Resistance or strength training of the quadriceps has been used to reduce pain and improve knee function in people with knee OA [10]. There is a correlation between knee pain and muscle weakness as knee pain may cause atrophy and weakness of surrounding muscles [11]. It is also suggested that a reduced quadriceps sensory and motor function may result in the progression of knee OA [12]. Another study found weakness of quadriceps muscles in the absence of knee pain or muscle atrophy, which indicates that the quadriceps weakness may be due to muscle dysfunction [13]. Therefore, it was suggested that the weakness of the quadriceps muscle was possibly a primary risk factor for increased knee pain, reduced function, and progressive joint damage in people with knee OA [14].

MATERIALS & METHODOLOGY

SOURCE OF DATA COLLECTION

Data was collected from Anandit Hospital Meerut U.P.

STUDY DESIGN:-

Study design experimental.

SAMPLING METHOD:

Random Sampling

SAMPLE SIZE:-

The sample size for this research study was 40.

Inclusion Criteria:-

1. Participates with clinical diagnosis of Primary unilateral knee osteoarthritis (OA).
2. Chronic knee pain.
3. Both Male and female participants between the age of 40-55 years.
4. Numeric pain rating scale score 3.
5. WOMAC score 25.
6. MMT Score 3.0

Exclusion Criteria:-

1. Metallic implant around knee joint.
2. Secondary OA of knee
3. Subjects with any other pathology
4. Postoperative knee .
5. Recent Knee injury
6. Other arthritic conditions
7. Any cardiovascular disease.

Tools used in the study:

1. Theraband
2. Weight cuff
3. High sitting chair
4. Moist heat packs.

OUTCOME MEASURES:-

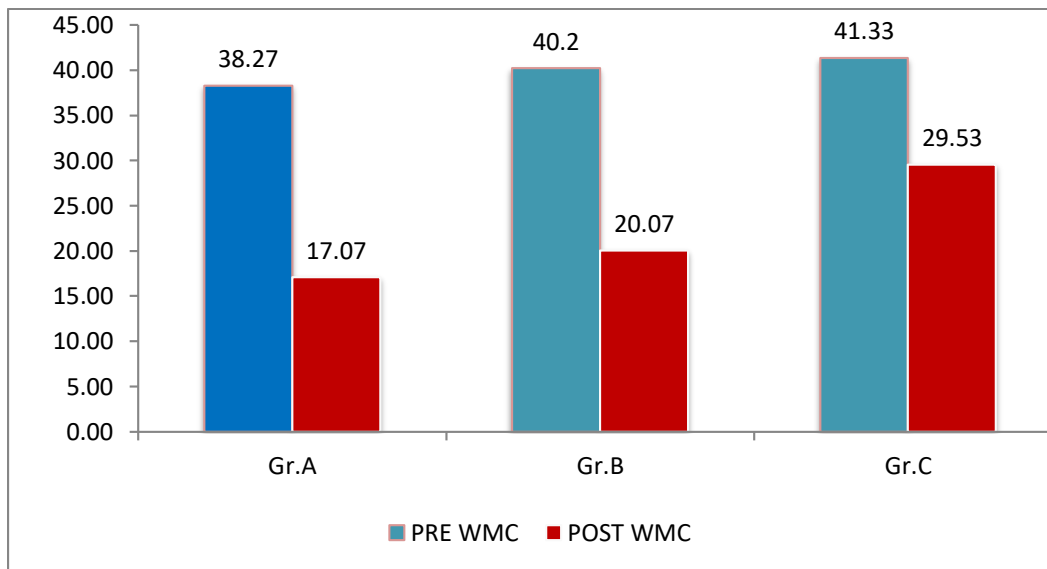
1. **Numeric pain rating scale:** - A horizontal visual analogue scale was used. A 10 cm line was drawn on a paper and participants were asked to mark a point on the line best defined the present pain level, where 0 indicated no pain and 10 indicated severe pain. It should be minimum 3.
2. **Manual Muscle Testing:-** Manual muscle testing is used in rehabilitation and recovery to evaluate contractile units, including muscles and tendons, and their ability to generate forces. Muscle testing is an important evaluative tool to assess impairments and deficits in muscle performance, including strength, power, or endurance. The quadriceps femoris are tested together as a functional group. Any given head cannot be separated from any other by manual muscle testing. straight -leg rising (SLR) range indicates the optimal position for the knee extension test in the sitting position. Grade of the participants taken should be minimum 3.
3. **WOMAC:-** Physical function outcome measured by western Ontario and Mc Master University Osteoarthritis Index Function scale (WOMAC), a well validated, self-report, self-complete questionnaire designed for hip and knee osteoarthritis contains 24 items which measures the severity of pain (5 item)

stiffness (2 item) and physical functioning (17 item). Each item is scored 0-4 with the higher score corresponding to greater disability.

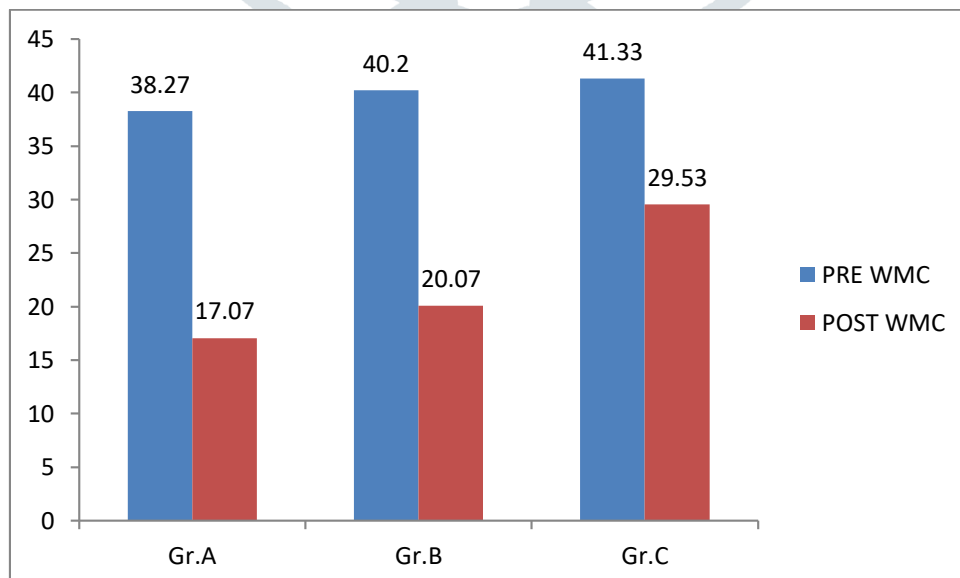
RESULTS

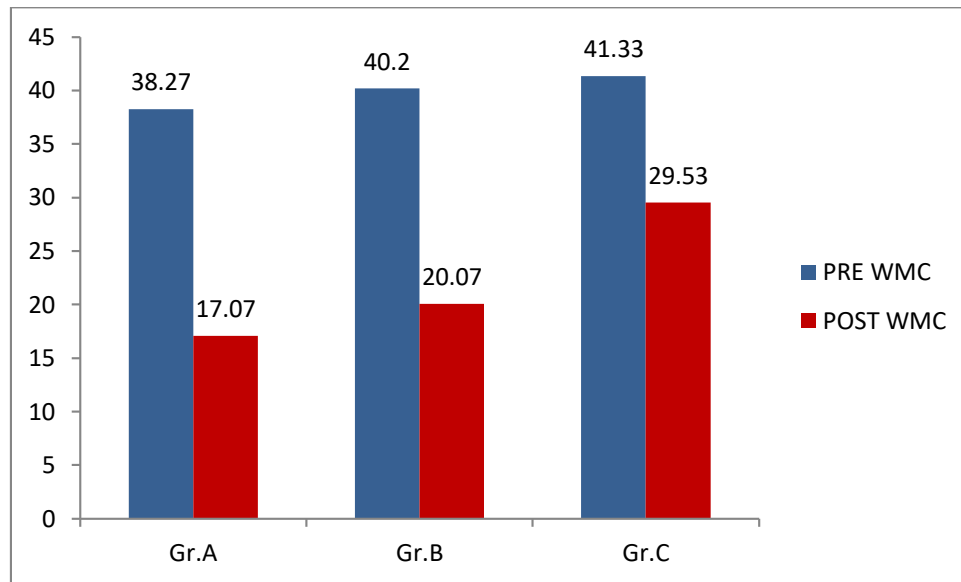
Results were analyzed using student test (paired and unpaired) by using SPSS version 20.0 All the three groups A, B & C completed the treatment of 15 sessions which were assess on the basis of the dependent variables VAS, MMT & WOMAC on the 1st day of treatment and the last day of the treatment

Bar Chart 1. The Bar Chart of Mean of Pre & Post VAS Scores in Three Groups



Bar Chart 2. The Bar Chart of Average PRE & POST MMT Scores⁰ in three groups



Bar Chart 3. The Bar Chart of Average Pre & Post WOMC Scores in Three Groups

DISCUSSION

The purpose of this study is to find out the comparison between the thera band and weight cuff exercises for the strengthening of quadriceps muscles in patients with osteoarthritis of knee. This study includes three groups, Group A received there band exercises, Group B received weight cuff exercises and Group C followed ergonomic advices for five weeks.

Only female participants were taken because according to Hirsh R, who in his study showed that women are more likely to suffer from OA of knee because of their wider pelvis. Patients between the age of 40 to 55 years were taken in this study because according to Robert B.Salter incidence of OA increases with the progressing age. The results of the present study supported the null hypothesis which stated that these will be beneficial effects to the participants treated with thera band and weight cuff.

A combination of pain assessment by VAS, muscular strength by MMT and functional disability by WOMAC, outcome measures were used to assess the comparative effectiveness of thera band and weight cuff exercises in subjects with knee OA. Pain relief in the exercises group is in accordance with randomized control trial with exercise for OA of hip and knee and find mild to moderate pain relief as recommended by Bischoff HA, Ross EM.

According to Simoneau et al 2010, when elastic bands were stretched to 100% of their initial length for 50 cycles, there was a decrease in tension of approximately 9-12% between the first and last cycle. They also found that the most fatigue will occur within the first 50 stretch cycles. They concluded that the tension in the material decreases slowly within repeated stretching and would continue to decrease with an increased number of stretches.

WOMAC is numerical rating scale to knee function. It is based on three sections with scores ranging from one (none) to five (extreme). The present study showed reduction in both groups, the objective of this study was to analyze the effects of strengthening exercises on functional disabilities.

A study by Corinna C Winter et al (2010), stated that patients with degenerative musculoskeletal disorders suffers limitations in their walking ability.

Quadriceps muscle weakness is the main reason for the disability in knee joint in OA, while maintaining quadriceps strength is imperative for limiting disability, many activities of daily living (i.e. rising from sitting, ascending stairs) as shown in a study by B.A.Luc-Harkey.

LIMITATIONS

- Sample size was small
- Duration of symptoms was variable.
- Single investigations conducted the study.
- The subjects could not be followed up after the study.
- The long term effect of the exercise was not taken into account due to study duration.

FUTURE SCOPE/RECOMMENDATIONS

- Conduct the study a larger sample size.
- Studies with larger duration are recommended with larger follow up period to assess long term benefits.
- Conduct the study using different radiological grades of knee osteoarthritis
- Future research may focus on determining which factors influence the responsiveness of subjects with knee osteoarthritis this will allow the development of targeted physiotherapy programmes.

CONCLUSION

This study compared the efficacy of weight cuff and Thera-band resistance exercises to increase strength of quadriceps muscles are patients with knee OA. The results revealed a significant difference in p- value of pre & post reading of VAS for groups A, B, & C (0.001, 0.000 & 0.000) respectively, MMT for group A, B & C (0.000, 0.001 & 0.000) respectively in all groups. But there is no significant difference found in p- value of post VAS (0.431), MMT (0.616) & WMC (0.269) between group A & group B. So this study concluded that both methods are equally effective in reducing pain and functional disability and strength in comparison with the control group. Compared to evaluate the effectiveness of two physiotherapy intervention in the present study.

REFERENCE

1. M. Sattler, T. Dannhauer, M. Hudelmaier et al., “Side differences of thigh muscle cross-sectional areas and maximal isometric muscle force in bilateral knees with the same radiographic disease stage, but unilateral frequent pain - data from the osteoarthritis initiative,” *Osteoarthritis and cartilage*, vol. 20, no. 6, pp. 532–540, 2012. View at: [Publisher Site](#) | [Google Scholar](#)
2. R. Topp, S. Woolley, J. Hornyak, S. Khuder, and B. Kahaleh, “The effect of dynamic versus isometric resistance training on pain and functioning among adults with osteoarthritis of the knee,” *Archives of Physical Medicine and Rehabilitation*, vol. 83, no. 9, pp. 1187–1195, 2002. View at: [Publisher Site](#) | [Google Scholar](#)
3. C. Slemenda, K. D. Brandt, D. K. Heilman et al., “Quadriceps weakness and osteoarthritis of the knee,” *Annals of internal medicine*, vol. 127, no. 2, pp. 97–104, 1997. View at: [Publisher Site](#) | [Google Scholar](#)
4. N. A. Segal, N. A. Glass, J. Torner et al., “Quadriceps weakness predicts risk for knee joint space narrowing in women in the MOST cohort,” *Osteoarthritis and Cartilage*, vol. 18, no. 6, pp. 769–775, 2010. View at: [Publisher Site](#) | [Google Scholar](#)
5. N. A. Segal and N. A. Glass, “Is quadriceps muscle weakness a risk factor for incident or progressive knee osteoarthritis?” *The Physician and sports medicine*, vol. 39, no. 4, pp. 44–50, 2011.
6. Lars L. Andersen Christoffer H. Andersen. Muscle activation and perceived loading during rehabilitation exercise: comparison of Dumbbells and elastic resistance. *Physical therapy*, volume 90, Issue 4, 1st April 2010, pages 538- 549.
7. Jorge RT, Souza MC. Progressive resistance exercise in women with osteoarthritis of the knee : a randomized controlled trial. 2015 Mar., 29 (3) : 234-43
8. Emmanuel gomes ciolac. Effects of resistance training in older women with osteoarthritis and TKR. 2015 Jan; 70 (1) 7-13.
9. Hurly MV . The role of muscle weakness in the pathogenesis of O.A 1999 May ; 25 (2) : 283 – 98
10. Slemenda C, Brandt KD. Quadriceps weakness and osteoarthritis of the knee 1997 Jul.15;(2) : 97-104