# EFFECTIVENESS OF STRENGTH TRAINING EXERCISES AND PASSIVE MANUAL MOBILIZATION IN OSTEOARTHRITIS OF KNEE SUBJECTS

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***Abstract*:**
**BACKGROUND AND AIM:**
**To evaluate the effectiveness of strength training exercises and passive manual mobilization in OA knee subjects.**
**Knee osteoarthritis (OA), also known as degenerative joint disease, is typically the result of wear and tear and progressive loss of articular cartilage. It is most common in elderly people and can be divided into two types, primary and secondary. Primary osteoarthritis is articular degeneration without any apparent underlying cause. Secondary osteoarthritis is the consequence of either an abnormal concentration of force across the joint as with post-traumatic causes or abnormal articular cartilage, such as rheumatoid arthritis (RA). Osteoarthritis is a painful, chronic joint disorder that primarily affects not only the knees but also hands, hips and spine.**
**OBJECTIVE:**
**To determine the effectiveness of strength training exercises and passive manual mobilization in OA knee subjects.**
**METHODS: Study type: Experimental study, sampling technique: convenient sampling technique,**
**Sample size: 30**
**RESULTS:**
**Statistical analysis was done for all the collected data using paired t- test. The test shows significant effects ($p<0.0001$) in both groups. The test shows that the strength training exercises and passive manual mobilization have improved reduction in pain and increased mobility in subjects with OA Knee.**
**CONCLUSION:**
**The results and the data obtained from this research was statically classified and can be concluded that there was a definite and positive effect of strength training exercises and passive manual mobilization in subjects with osteoarthritis of knee.**
***Keywords*: osteoarthritis, strength training exercises, passive manual mobilization, handheld dynamometer**

## INTRODUCTION

OA(Osteoarthritis) knee is the most common condition of aged people and one of the primary causes of disability. Knee OA is becoming more common as the population average age rises. Knee OA is caused by a combination of variables including age, weight, and joint damage from repetitive activities such as squatting and kneeling. Knee OA is caused by a variety of variables such as cytokines, leptin, and mechanical stresses. Attributing pain to knee OA should be approached with caution in patients with knee pain. Knee osteoarthritis is divided into two types: primary (idiopathic) and secondary. Secondary knee osteoarthritis etiologies are Post-traumatic,
Congenital/malformation,Postoperation,Metabolic,Hemochromatosis,Chondrocalcinosis,Endocrineproblems,Acromegaly,Hyperparathyroidism,Hyperuricemia,Osteonecrosis. The hyaline joint cartilage is the main target of the harmful influences that cause osteoarthritis and the structure in which the disease begins among the various structures that form the knee joint. Extracellular matrix creates 95% of hyaline cartilage Due to the low sensitivity of radiographic imaging, identification of knee OA in many individuals is not achievable. Symptomatic knee OA affects approximately13% of women and 10% of males aged 60 and up. Because of population ageing and the prevalence of obesity and overweight in the general population, the number of patients with symptomatic knee OA is expected to rise. Over the course of a year, 25% of persons over the age of 55 may experience a chronic knee discomfort. Around 10% of adults over the age of 55 have painful, chronic knee OA, with one-quarter being severely disabled. Men have a lower prevalence of knee OA than women do. This occurred between males and females, with males aged 55 years having a lower incidence of knee OA than females [1]. The three compartments of the knee joint—the medial, lateral, and patella femoral joint—are all affected by knee OA, which typically progresses slowly over a period of 10 to 15 years and causes discomfort in daily activities. In the past, it was thought that articular cartilage damage was primarily caused by the "wear and tear" of ageing and had nothing to do with inflammation. Knee OA is influenced by a variety of factors, including family history, age, obesity, diabetes, synovitis, systemic inflammatory mediators, innate immunity, lower limb alignment (genuvalgum and genuvarum), joint shape and dysplasia, trauma, and inflammation by metabolic syndromes, whereas both inflammatory and biomechanical whole-organ disease processes play an important role [11]. Obesity and overweight, comorbidity, occupational factors, physical activity, biomechanical factors, and dietary exposures are the six main categories of modifiable risk factors. A holistic therapeutic approach to the patient with KOA may include femoral muscle-strengthening physical activities along with a healthy diet, weight loss, vocational rehabilitation, management of comorbidities (especially diabetes and depression), and biomechanical support. A

personalized risk factor modification plan should be developed based on the patient's preferences, work habits, medical history, and general state of health [14].

**METHODOLOGY:**

In this study, 30 samples have been selected under inclusion and exclusion criteria by the convenient sampling technique. Informed consent was obtained from the subjects and detailed procedure were explained. The study was conducted in government and private hospitals around Chennai& Tiruvallur, the samples were observed in a time period of 2 months. Their sociodemographic details like name, age, height, weight also been asked and filled by the researcher.

**INCLUSION CRITERIA:**

Above 45-65 years both genders diagnosed unilateral OA knee grade 2 and 3 according ARC grading.

**EXCLUSION CRITERIA:**

-Hip, knee, ankle surgery in affected leg
-Any malignancy /tumor in involved leg
- Any neurological/ balance impairment in involved leg

**STATISTICAL ANALYSIS:**

The collected data was tabulated and analyzed. Mean and standard deviation (SD) was used for finding out the parameters. The Paired t-test was used to analyze the significant changes between pre-test and post-test measurements. Unpaired t test used to calculate the difference between the post-test values of Experimental group and Control group.

**RESULTS**

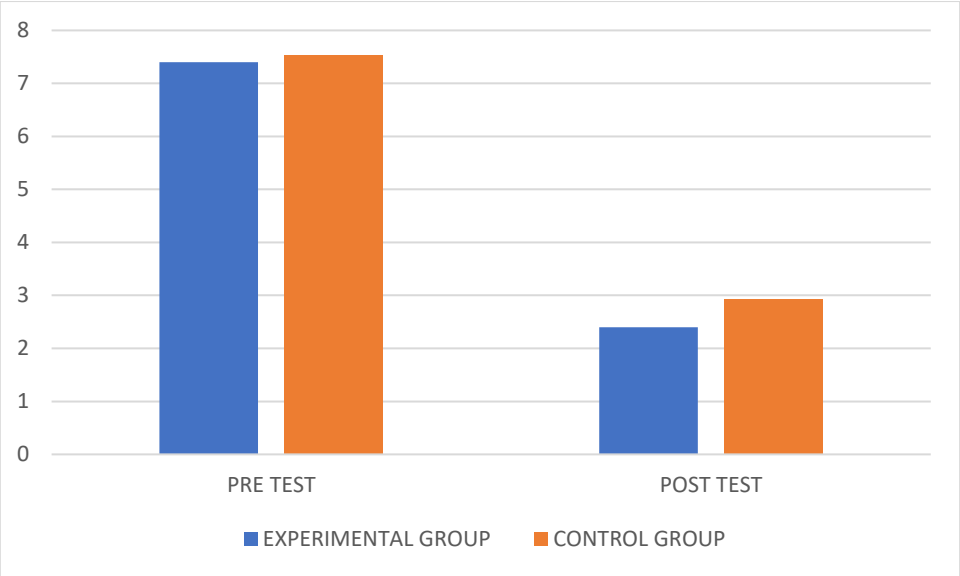
From the statistical analysis made with the quantitative data obtained from hand-held dynamometer revealed statistically significant differences between the experimental group and control group also within the group. The post-test mean value of the hand-held dynamometer in the experimental group was 40.27 and the control group was 39.67.

From the statistical analysis made with the quantitative data obtained from NPRS revealed statistically significant differences between the experimental group and control group and also within the group. The post-test mean value of NPRS in the experimental group was 2.47 and the control group was 2.93.

From the statistical analysis made with the quantitative data obtained from KOOS questionnaire revealed statistically significant differences between the experimental group and control group also within the group. The post-test mean value of the KOOS questionnaire in the experimental group was 88.93 and the control group was 86.33.

**Table-1:** Comparison of pre-test and post-test values of NPRS SCORES for Experimental Group & Control Group

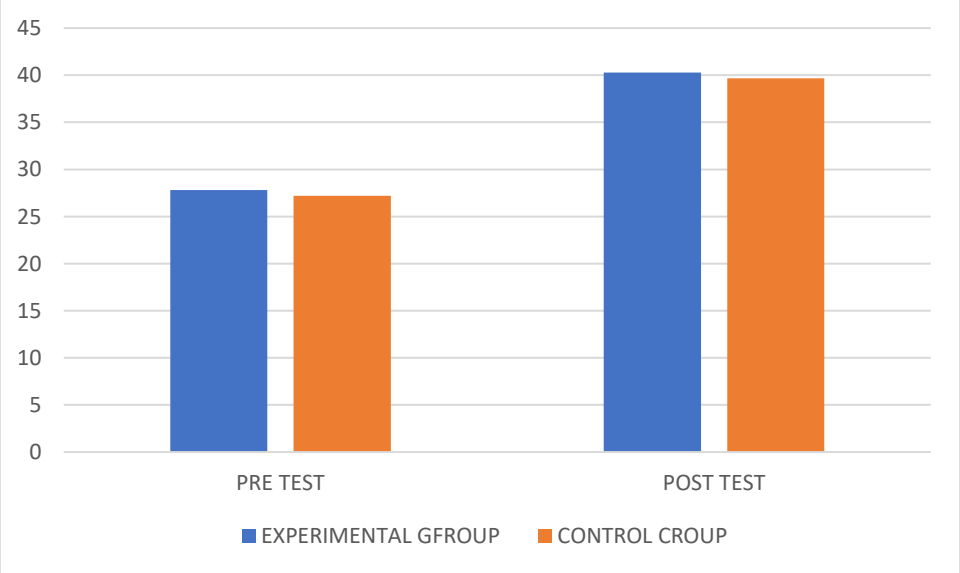
| **NPRS SCORE** | | Mean | Standard deviation | t value | p value |
|---|---|---|---|---|---|
| **Experimental Group** | Pre test | 7.40 | 1.88 | 7.6718 | < 0.0001 |
| | Post test | 2.40 | 1.68 | | |
| **Control Group** | Pre test | 7.53 | 1.55 | 7.3317 | < 0.0001 |
| | Post test | 2.93 | 1.87 | | |




**Graph- 1:** Comparison of pre-test and post-test values of NPRS SCORE for Experimental Group & Control Group

**TABLE 2:** Comparison of hand-held dynamometer for Experimental Group & Control Group

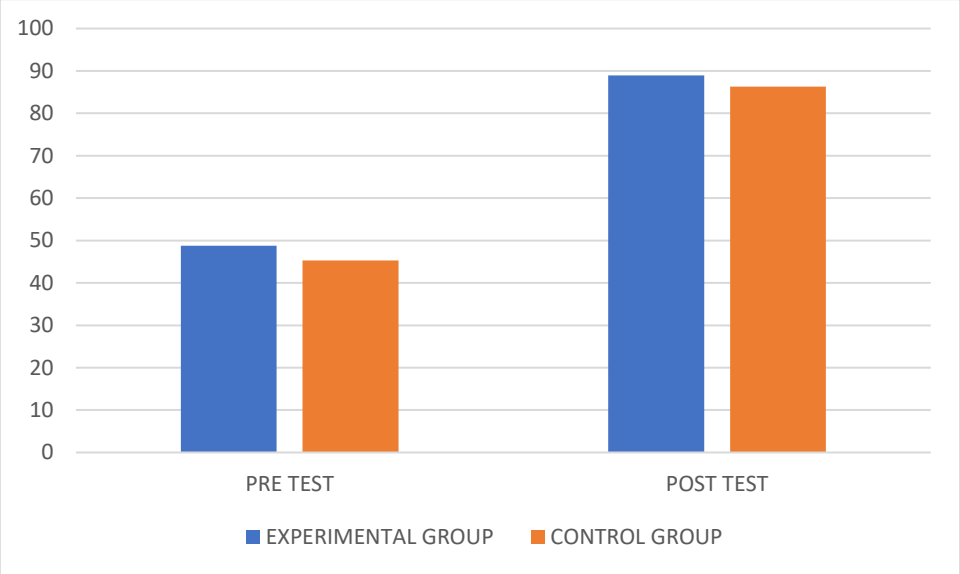
| **NPRS SCORE** | | Mean | Standard deviation | t value | p value |
|---|---|---|---|---|---|
| **Experimental Group** | Pre test | 27.80 | 4.89 | 7.3672 | < 0.0001 |
| | Post test | 40.27 | 4.37 | | |
| **Control Group** | Pre test | 27.20 | 4.21 | 7.6361 | < 0.0001 |
| | Post test | 39.67 | 4.72 | | |




**Graph- 2:** Comparison of post-test values of NPRS SCORE for Experimental Therapy Group & Control Group

**TABLE 3:** Comparison of pre-test and post-test values for Experimental Group & Control Group using KOOS questionnaire

| **KOOS QUESTIONNAIRE** | | Mean | Standard deviation | t value | p value |
|---|---|---|---|---|---|
| **Experimental Group** | Pre test | 48.80 | 16.41 | 8.1079 | < 0.0001 |
| | Post test | 88.93 | 9.91 | | |
| **Control Group** | Pre test | 45.33 | 17.15 | 8.2964 | < 0.0001 |
| | Post test | 86.33 | 8.50 | | |




**Graph- 3:** Comparison of post-test values of KOOS questionnaire for Experimental Therapy Group & Control Group

**DISCUSSION**

The most common condition of aged people is osteoarthritis of knee and one of the primary causes of disability. Knee OA is becoming more common as the population average age rises. It happens when cartilage of knee joint breaks down, causes bones to rub together. The friction makes knees hurt, becomes stiff and swell. Clinical symptoms include joint stiffness, pain, and dysfunction, but pain is the most common complaint among patients. Knee osteoarthritis is divided into two types: primary (idiopathic) and secondary.

People who have knee-osteoarthritis, Strength training, range of motion exercises, and cardiovascular activities are given. Education and home activities are also part of exercise interventions [4]. In general, treatments have been more effective at reducing pain than in reducing disability. Exercise can help with many of the issues that contribute to disability.

Exercise, including both aerobic and strength training, has been studied as a treatment for knee osteoarthritis, with mixed results [5]. Soft tissue mobilization and oscillations are examples of passive manual mobilization, which are used to improve joint mobility and stability while also reducing pain.

According to article proposed in 2011, W.Viechtbauer, AF lenssen concluded that strength training or exercise therapy alone shows more effect in reducing pain ,when compared to exercise therapy plus manual mobilization in patients with osteoarthritis.

According to article proposed in 2018, Jun Iwamoto, concluded that muscle strengthening and aerobic exercises are effective in reducing pain and improving physical function in patients with mild to moderate OA of the knee.

According to article proposed in 2015,Yanan Li , proposed that resistance exercise is beneficial in terms of reducing pain, alleviating stiffness, and improving physical function in patients with knee osteoarthritis.

## CONCLUSION

The results and the data obtained from this research was statically classified and can be concluded that there was a definite and positive effect of strength training exercises and passive manual mobilization in subjects with osteoarthritis of knee.

However, passive mobilization given to the experimental group was proved to be more effective in treating knee osteoarthritis when compared to strength training exercises.

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