

# Effect of Clinical Based Supervised Physiotherapy Vs Home Exercise Program on Osteoarthritis of Knee Joint: A Comparative Study

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## Abstract

**Background:** Knee osteoarthritis (OA), also known as degenerative joint disease of the knee, is a common condition where the cartilage in the knee joint breaks down, leading to pain, stiffness, and reduced mobility. OA is the most common disease of the joints worldwide, with the knee being the most commonly affected joint in the body. It mainly affects people over the age of 45. OA can lead to pain and loss of function, but not everyone with radiographic findings of knee OA will be symptomatic: in one study only 15% of patients with radiographic findings of knee OA were symptomatic.

**Aims:** The aim of study is to investigate the effectiveness of physiotherapy treatment in osteoarthritis of knee and compare the clinical based supervised physiotherapy and home exercise programme.

**Setting:** The comparative study was conducted on patients of age group 45-75 years in a private clinical setup.

**Design:** The study was conducted on 40 patients both male and female. The patients were randomly selected. The evaluation of pain and disability was assessed by using WOMAC scale and 6minute walk test. Statistical analysis was done on the basis of data obtained during intervention and results were obtained.

**Conclusion:** The study highlights that the clinical based supervised physiotherapy is an effective conservative treatment protocol to cope with severity of osteoarthritis of the knee.

**Keywords:** OA ,WOMAC SCALE ,pain,stiffness, endurance. Abbreviations: OA-osteoarthritis ,WOMAC- The Western Ontario and McMaster Universities Osteoarthritis Index

## INTRODUCTION

Osteoarthritis is primarily a degenerative, non-inflammatory disorder of movable joints characterized by an imbalance between the synthesis and degradation of particular cartilage leading to the classic pathologic changes of wearing away and destruction of cartilages Joint diseases affect millions of people throughout the world, causing pain and disability with great impact on individuals and on society as a whole.<sup>1</sup> Osteoarthritis is the most common joint disease in the near future and is projected to rank second for women and fourth for men in the developed countries in terms of years lived with disability<sup>2</sup>. Osteoarthritis is the most common form of arthritis affecting about 237 million (3.3%) of the population .<sup>3</sup> Among those

over 60 years old, about 10% of males and 18% of females are affected. It is the cause of about 2% of years lived with disability.<sup>4</sup>

The most common symptoms are joint pain and stiffness. Initially, symptoms may occur only following exercise, but over time may become constant. Other symptoms may include joint swelling, decreased range of motion, and when the back is affected weakness or numbness of the arms and legs.<sup>5</sup> The main symptom is pain, causing loss of ability and often stiffness.<sup>6</sup> Local risk factors are obesity, previous knee injury and occupational activities. Obesity has been shown to be associated with an increased risk of incident knee OA in several studies.<sup>7</sup> Management of osteoarthritis includes Lifestyle modification (such as weight loss and exercise) and analgesics are the mainstays of treatment.<sup>8</sup> Acetaminophen (also known as paracetamol) is recommended first line with NSAIDs being used as add on therapy only if pain relief is not sufficient. This is due to the relative greater safety of acetaminophen. In physiotherapy many therapeutic modalities are used in the treatment of osteoarthritis of knee.<sup>10</sup> Different physiotherapy methods are used to relieve the pain and maintain or improve patient's functional ability. Both land-based therapy and hydrotherapy are relieving the symptoms of knee OA. Physical treatments, like TENS and ultrasound can be used, but therapeutical training and guiding the patient towards active regular exercise are the most important parts of the conservative treatment.<sup>11</sup> Manual mobilization techniques and muscle stretching are used to maintain and improve the joints range of motion. Aids for moving and being able to perform the ADL-tasks are used, if needed. The aim of study is to investigate the effectiveness of physiotherapy treatment in osteoarthritis of knee and compare the clinical based supervised physiotherapy and home exercise programme. The key objective is to give the insight of physiotherapy treatment and highlight the use of clinical based physiotherapy in maintaining osteoarthritis knee.<sup>12</sup>

## **SUBJECT AND METHOD**

### **Participants**

The study was conducted on 40 patients aged 45-75 years both male and female. The patients were randomly selected and randomly divided into 2 groups. Group A (experimental group)-20 patients group B (experimental group)-20 patients. The patients with deformities of knee, acute osteoarthritis and extreme knee pain are excluded.

### **Study design and research method**

The vague of study is comparison between clinically supervised physiotherapy and home exercise program. It is conducted in a private clinical setup.

### **Procedure and outcome measures**

Total of 40 patients aged between 45-75 yrs both male and female who fulfilled inclusion and exclusion criteria were randomly selected and divided into two groups A and B. Patients were asked to sign the consent form and were informed about the procedure to be performed. The patients were screened using formal evaluation form. GROUP A (experimental group) n =20 received clinical based physiotherapy therapy including strengthening exercises, stretching of hamstrings, calf, quadriceps and range of motion exercises and therapeutics modalities.

GROUP B (experimental group) n=20 received home exercise programme

Outcome measures were assessed on the first and last day of treatment using WOMAC scale and 6minute walk test and pre-post data was noted.

## STATISTICAL ANALYSIS

The student's paired t-test was used to evaluate the significance of mean differences of total distance covered in six minute test and scores measured on WOMAC between pre (baseline) and post intervention among osteoarthritis of knee patients of group A and group B.

## USED FORMULAE:

$$\text{Mean} = \frac{\sum_{i=1}^n x_i}{n}, \quad \text{S. D.} = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{X})^2}{n-1}} \quad (\text{If } n < 30)$$

$$\text{and S. D.} = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{X})^2}{n}} \quad (\text{If } n > 30)$$

where  $\sum_{i=1}^n x_i$  = Sum of all observations and

$n$  = Number of subjects included for study according to inclusion criteria.

$\sum_{i=1}^n (x_i - \bar{X})^2$  = Sum of squares of the deviations from the mean

The probability value, t-value for paired t-test had calculated by the given formula

$$t = \frac{\bar{X}}{\text{S. E. } (\bar{X})} \quad (\text{Degree of freedom} = n-1).$$

Wherever, the standard error of difference between means of paired samples calculated by-

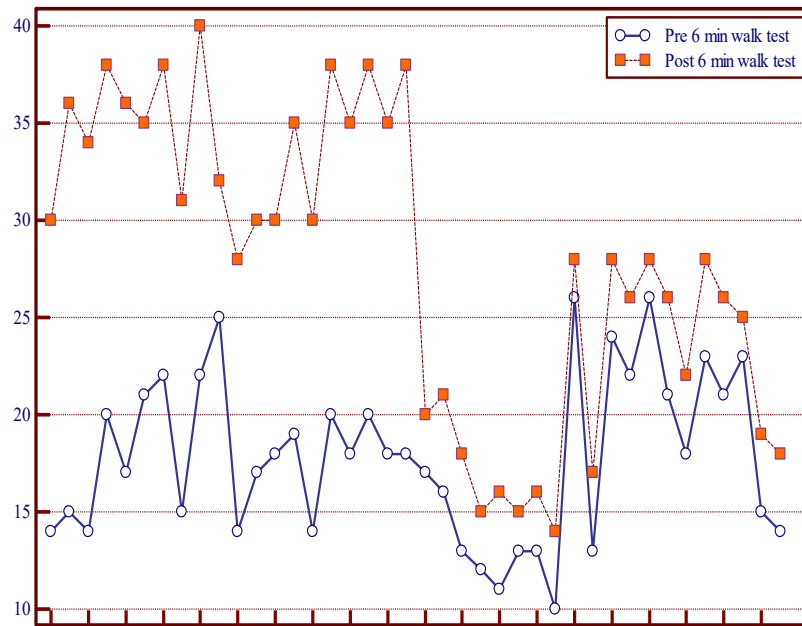
$$\text{S. E. } (\bar{X}) = \frac{\text{S. D.}}{\sqrt{n}};$$

The standard error of difference between two means calculated by

$$\text{S. E. } (\bar{X}_1 - \bar{X}_2) = \hat{S}\hat{D} \sqrt{\frac{1}{n_1} + \frac{1}{n_2}} \quad \text{where } \hat{S}\hat{D} = \sqrt{\frac{\sum (X_1 - \bar{X}_1)^2 + \sum (X_2 - \bar{X}_2)^2}{n_1 + n_2 - 2}}$$

The probability value, t-value, for unpaired t-test had calculated by the given formula

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\text{S. E. } (\bar{X}_1 - \bar{X}_2)} \quad (\text{Degree of freedom} = n_1 + n_2 - 2)$$



1: Clinical based supervised conventional therapy and 2: Home exercise program

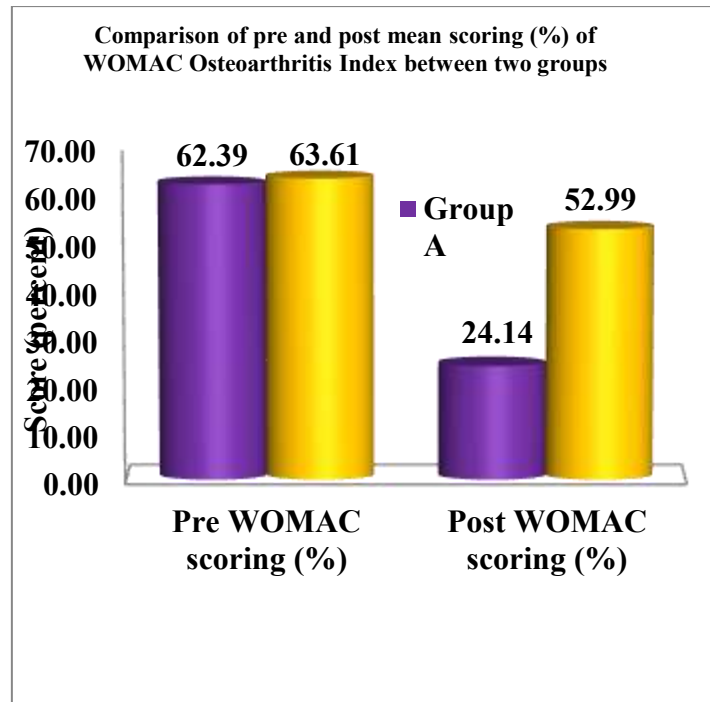
Line diagram shows the distribution and comparison of total distance covered in six minute walk test at pre and post intervention among knee osteoarthritis patients of group A and group B.

## COMPARISON OF SCORES BETWEEN GROUP A AND GROUP B NOTED ON WOMAC OSTEOARTHRITIS INDEX AT PRE (BASELINE) AND POST INTERVENTIONS

Group and Sampling Stage	Score on WOMAC (%)	Mean Diff	t-statistic	LOS
	Mean ± SD			
Baseline				
Group A	62.39±4.63	1.22 percent	0.72	p=0.473 <sup>⊗</sup>
Group B	63.61±5.90			
Post-Intervention				
Group A	24.14±5.26	28.85 percent	16.71	p=0.000 <sup>#</sup>
Group B	52.99±5.66			

<sup>®</sup> The mean difference is not significant (insignificant) at the 0.05 level of significance. <sup>#</sup> The mean differences are highly significant at the 0.000 level of significance. [Mean Diff-Mean Difference; LOS-Level of Significance]

The patients with osteoarthritis of the knee of group A had experienced significantly differed and improved pain, stiffness, and physical functioning of the joints of knee after administration of clinical based supervised conventional therapy at post intervention stage as compared to patients with osteoarthritis of the knee patients of group B intervened with home exercise programme.

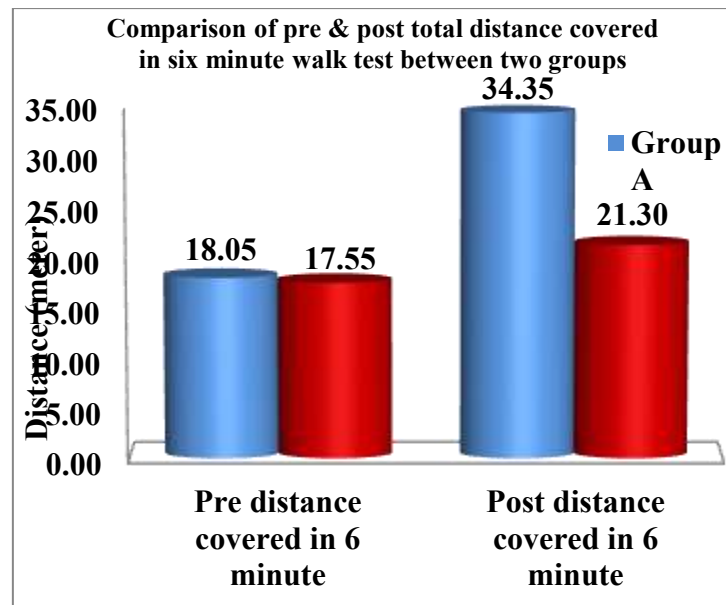


Bar diagram shows the distribution and comparison of scoring (%) of WOMAC Osteoarthritis Index at pre and post intervention among knee osteoarthritis patients of group A and group B.

## ASSESSMENT OF CHANGE IN WALKING ENDURANCE STATUS BETWEEN GROUP A AND GROUP B AT PRE AND POST INTERVENTIONS

Group and Sampling Stage	Distance in 6 min. walk test	Mean Diff	t-statistic	LOS
	Mean ± SD			
Baseline				
Group A	18.05±3.14	0.50 meter	0.37	p=0.717 <sup>⊗</sup>
Group B	17.55±5.25			
Post- intervention				
Group A	34.35±3.54	13.05 meter	9.39	p=0.000 <sup>#</sup>
Group B	21.30±5.11			

<sup>®</sup> The mean difference is not significant (insignificant) at the 0.05 level of significance. <sup>#</sup> The mean differences are highly significant at the 0.000 level of significance. [Mean Diff-Mean Difference; LOS- Level of Significance]



Overall, the above all statements and inferences from all the tables indicated the rejection of null hypothesis. Therefore, the alternative hypothesis is accepted which stated as **“There is a significant effect of clinical based supervised manual therapy as compared to home exercise programme”** that impacted the achievement of the entire selected objectives followed with fulfillment of the aim of the proposed research titled.

## DISCUSSION AND CONCLUSION

The mean age (Mean  $\pm$  Standard Deviation) of patients with osteoarthritis of knee of group A ( $n_1=20$ ) was  $59.75 \pm 7.61$  years with a range from 48 to 74 years found to be little greater as compared to age of osteoarthritis of knee patients of group B was  $58.40 \pm 9.42$  years noted within age ranged from 45 to 73 years.

Patients with osteoarthritis of the knee of group A had experienced better pain, stiffness, and physical functioning of the joints of knee and was significantly differed and improved after administration of clinical based supervised conventional therapy at post-intervention stage as compared to pre-intervention stage. This reflected the effectiveness of clinical based supervised conventional therapy in osteoarthritis of the knee.

The patients with osteoarthritis of the knee of group B had also experienced improvement in pain, stiffness, and physical functioning of the joints of knee at post intervention stages as compared to pre-intervention stage since the home exercise program was administered but the improvement found to be less as compared to knee osteoarthritis patients of group A.

However, the comparison between modalities outcomes indicated the effectiveness of both, clinical based supervised exercise therapy and home exercise programme among patients with osteoarthritis of the knee found with a potential to cope with stiffness, and physical functioning of the joints of knee.

The patients of group B also experienced improvement in pain, stiffness, and physical functioning of the joints of knee but less than patients of group A was recorded at post treatment stage. In group B, score of WOMAC Osteoarthritis Index ( $52.99 \pm 5.66$  %) after administration of home exercise programme was significantly reduced and improved at post-intervention stage as compared to WOMAC Osteoarthritis Index scoring ( $63.61 \pm 5.90$  %) at pre-intervention stage. The difference in mean score between pre and post intervention (10.62 %) among patients of group A was statistically highly significant ( $p=0.000$ ).

Moreover, the statistical agreement indicated that the patients used for experimentation intervened with clinical based supervised exercise therapy had significantly improved and better pain, stiffness, and physical functioning of the joints of knee than patients intervened with home exercise programme. The performances of pain, stiffness, and physical functioning of the joints of knee was judged by using WOMAC score between the patients with osteoarthritis of the knee of the two groups (A and B) can be seen.

## RESULT

The clinical based supervised physiotherapy therapy may be consider as more preferred tool to combat the severity of pain, stiffness, and physical functioning of the joints of knee in knee osteoarthritis than home exercise programme. **However physiotherapy plays a very important role in treating OA knee.**

## LIMITATIONS OF STUDY.

1. No of patients was too small to generalize the result.
2. Long duration of treatment protocol.
3. Long term effect of the technique was not included in the study.
4. Duration of the study was short.

## REFERENCES

1. Dottie Roberts: Textbook of Orthopedics and Rheumatology.ed 2nd London. W.B.Saunders Company(2005).
2. Global Burden of Disease Report . Osteoarthritis as a major Public health problem, Retrieved on May, 12<sup>th</sup>, 2006.
3. National Center for Health Statistics . Prevalence of osteoarthritis, Retrieved on May 12<sup>th</sup> 2006.
4. All India Institute of Medical Science Report . Chronic illness in India, Retrieved on September, 4<sup>th</sup>, 2007.
5. Lawrence, Kellegran.: Textbook of orthopedics.: Baltimore. William and Wilkins Co. 11<sup>th</sup> edition.:(2003)
6. Osteoarthritis Research Society International (2003). Quality of life in osteoarthritis clients, Retrieved on May, 12<sup>th</sup> 2007.
7. Bone and Joint decade (2005). Treatment options for osteoarthritis, Retrieved on May, 4<sup>th</sup>, 2007.
8. Sue. C Delaune :. Thermotherapy in the management of osteoarthritis. Journal of Clinical Nursing. Vol.XI:No.1.Pp.153 – 162(2003).
9. American Academy of Orthopedic Surgeons (2005). OsteoarthritisPrevalence and Complications, Retrieved on September, 4<sup>th</sup>, 2007.
10. National Centre for Health Statistics (2004). Prevalence of osteoarthritis, Retrieved on May 12<sup>th</sup> 2006.
11. Voharanio . Intervention for osteoarthritis. Journal of Orthopedics. Pp. 120 – 125(2000).
12. Potter and Perry :Nursing intervention and clinical skill. St.Louis. Mosby Company. 4<sup>th</sup> edition(2001).