

Original Research Article

Effect of Therapeutic Exercise Vs Retro Walking In Individuals with Knee Osteoarthritis

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ABSTRACT

Background: Osteoarthritis (OA) is a degenerative joint disease and one of the major health problems that cause functional impairment and reduced quality of life. There is osteophyte formation remodeling of subarticular bone, ligamentous laxity, and synovial inflammation weakening of periarticular muscles. These changes may occur as a result of an imbalance in the equilibrium between the break down and repair of joint tissue. Hamstring tightness and quadriceps weakness are the major problems in osteoarthritis individuals. Tightness of hamstring muscle and quadriceps weakness can cause pain in patients with osteoarthritis. Stretching of hamstring and strengthening of quadriceps muscle can improve the pain and strength of the muscles around the knee joint. Retro walking can help in strengthening of the quadriceps muscles.

Methods: It was a Quasi experimental study with comparison between 2 groups consisting 30 participants (males and females) 15 in each group, with osteoarthritis. Group A received Hamstring stretch and quadriceps strengthening exercises and Group B received Retro walking, for 9 sessions, 3 days/week for a period of 3 weeks. Outcome measure was WOMAC and NRS measured before and after intervention.

Results: The results suggest that participants in Group B had significant improvement in NRS and WOMAC than Group A.

Conclusions: Both group A and group B showed significant results and displayed efficient improvement in decreasing pain and functional disability in patients with knee osteoarthritis.

Key words: Retro walking, Knee Osteoarthritis, Exercises, Pain and disability.

INTRODUCTION

Osteoarthritis (OA) is a non-inflammatory progressive disorder of movable joints, particularly weight bearing joints. Exact cause of OA is not known. However it is strongly believed that it occurs due to aging or wear and tear or degenerative changes in the joints. ^[1] Risk factors for OA knee includes age, gender, obesity, occupation, sports, osteoporosis, previous trauma, irregularity in joint surfaces, internal derangement, heredity, leisure and diseases leaving articular

cartilage damage. ^[2] There is increased risk of development or progression of disease due to greater or uncontrolled loading on the joint; therefore, quadriceps strength needs to be considered in the study of knee OA. A reduced quadriceps strength has been shown to be associated with the presence of OA in the knee. ^[3]

The major symptoms present in osteoarthritis are pain and functional disability. ^[4] The knee is most common site for osteoarthritis with characteristic sign like pain, stiffness, tenderness, swelling,

crepitus, and loss of movement, valgus or varus deformity, locking of the knee, on auscultation of joint- scratching, crepitus and later on loud crackling sound. In addition, they have a lot of functional limitation when sitting and standing or going up and down stairs. [5,6]

There is osteophyte formation remodeling of subarticular bone, ligamentous laxity, synovial inflammation and weakening of periarticular muscles. These changes may occur as a result of an imbalance in the equilibrium between the break down and repair of joint tissue.

According to Framingham study, among the individuals aged above 45 years the prevalence of radiographic knee OA was 19.2%, and in those above 80 years, it is 43.7%. [7] In rural India the incidence is 5.78% which is about 30% of all rheumatological problems. In India there is increased knee arthritis than western population. [8]

Management of knee arthritis is mainly concentrated on reducing pain, increasing joint ROM and improving extensor muscle strength, neglecting ligamentous and muscular tightening which affects lower limbs function and gait. The initial conservative management includes - Risk factor education of obesity, avoidance of ground level activities, Non steroidal anti inflammatory drugs, Intraarticular injections of sodium hyaluronate. The most surgical management done is total knee replacement in most advanced cases. [9]

Physiotherapy as the main choice of conservative management; which includes various strategies such as manual therapy, exercises, patellar taping and electrical modalities with or without thermal modalities as measures for pain reduction. [11] Recently, closed kinematic chain exercises have drawn much attention in the management of knee arthritis. [12] Studies suggest that these exercises are more effective and functional than the traditionally employed open kinematic chain exercises. [13] Closed kinematic chain exercises for knee joint can be incorporated

in many ways; one of them is Retro-walking. [12] Retro-walking is walking backwards. [11] Since there is propulsion in backward direction and reversal of leg movement in Retro-walking, different muscle activation patterns from those in forward walking are required. [14] Retrowalking significantly lowers peak patellofemoral joint compressive force and a significantly slower rate of loading has been found during backward walking. Consequently, trauma to the articular cartilage is reduced during retrowalking. [1] Retrowalking could be utilized as a mode of training during knee rehabilitation since excessive loading of the joint and overstretching of the ligaments are prevented whilst quadriceps strength. [15]

Strength of the quadriceps musculature is one of the intrinsic factors that have been shown to affect the knee joint functions. It is evident that lower extremity strength has a major role in knee joint shock attenuation during weight bearing activities. [10]

MATERIALS AND METHODS

The research design used for the study was Quasi experimental study with comparison between 2 groups. Participants received 9 sessions, 3 days per week for a period of 3 weeks. Each treatment session lasted for 30 minutes. Both male and female participants with a clinical diagnosis of unilateral or bilateral osteoarthritis of knee referred to department of PMR, from the department of orthopaedics, PSG Hospitals. The sample size was 30. Sample design was Convenience sampling. Selection Criteria used for this study was as follows- The inclusion criteria for the study:- Male and female participants, clinically diagnosed with osteoarthritis of knee by orthopaedician, Age more than 40 years, Participants having Pre test NRS score more than 5 score, Participants with unilateral or bilateral involvement of knee, Willingness to participate in the study. The exclusion criteria for the study were Participants with History of lower limb or spinal surgeries,

Neurological disorder (motor and sensory loss), Pathologies related to hip, knee and spine, Cardio vascular problems with increased heart rate, Other musculoskeletal disorders associated with knee joint, IT band, adductor muscle and sartorius muscle tightness.

The participants were screened from outpatient department of PMR department, after finding their suitability according to the inclusion and exclusion criteria, they were requested to participate in the study. The participants were briefed about the nature of study, the duration of intervention and the intervention being used in the language best understood by the participants. They were encouraged to clarify queries regarding the study, if any. An informed written consent form, previously approved by the Institutional Ethical Committee was then obtained from the participants. The demographic data was obtained and a detailed assessment of 30 participants was done on the basis of name, age, gender, height, weight, BMI, present chief complaints, past history, pain history, and medical history. Participants were subsequently allocated in a group according to the selection criteria. The outcome measures NRS and WOMAC were assessed before the intervention as given below;

- Pain was assessed with the help of Numerical Rating Scale, an 11-point numeric scale with 0 representing one pain extreme (e.g. “no pain”) and 10 representing the other pain extreme (e.g. “pain as bad as you can imagine” and “worst pain imaginable”). [16]
- Physical function was assessed with the help of Western Ontario and McMaster Universities Osteoarthritis Index, is a widely used, proprietary set of standardized questionnaire used by health professionals to evaluate the condition of patients with osteoarthritis of the knee and hip, including pain, stiffness, and physical functioning of the joints. [17]

The two groups were as follows: Group A (Conventional Group) and Group

B (Experimental Group). In group A Hamstring stretch and quadriceps strengthening with 5 seconds hold and a rest interval of 2 seconds for 10 repetitions for each exercise for a period of 3 weeks, 3 days per week was given. In group B retro walking with a rest (if need) for a period of 3 weeks, 3 days per week was given.

Procedure:

In Group A

Conventional Physiotherapy treatment for this group was given static quadriceps exercise, dynamic quadriceps exercise, straight leg raise, prone knee bending, and simple hamstring stretches, for 10 repetitions with 5 seconds hold followed by 2 seconds rest for each exercise for a period of 3 days per week for duration of 3 weeks. Home program for 2nd and 3rd week: same exercises.

In Group B

Procedure for retro walking: The participants initially were made to walk 4 steps retrowalk and were observed for any discomfort. If no discomfort then, participant was made to retrowalk for 10 minutes per session. The participants will be first familiarized with the retrowalking on flat surface (distance 20 meters) such that during retrowalking, the toes strike the ground first instead of the heel. Practice session was made for retrowalking with support of wall. The participants received retrowalking on flat surface (distance 20 meters) at their maximum pace with support of the wall for 10 minutes per session. The session included 4 minutes of retrowalking following 2 minutes of rest time and then again 4 minutes of retrowalking. The therapist was walking besides the participant. The protocol followed was retrowalking for 10 minutes, 3 days/ week for duration of 3 weeks. Home program for 2nd and 3rd week: same walking pattern.

Ethical clearance

The study followed the ethical standards of institutional human ethics committee, PSG

IMS&R. [(Ref. no. PSG/IHEC/2018/ Appr/Exp/165) (project no.18/073)].

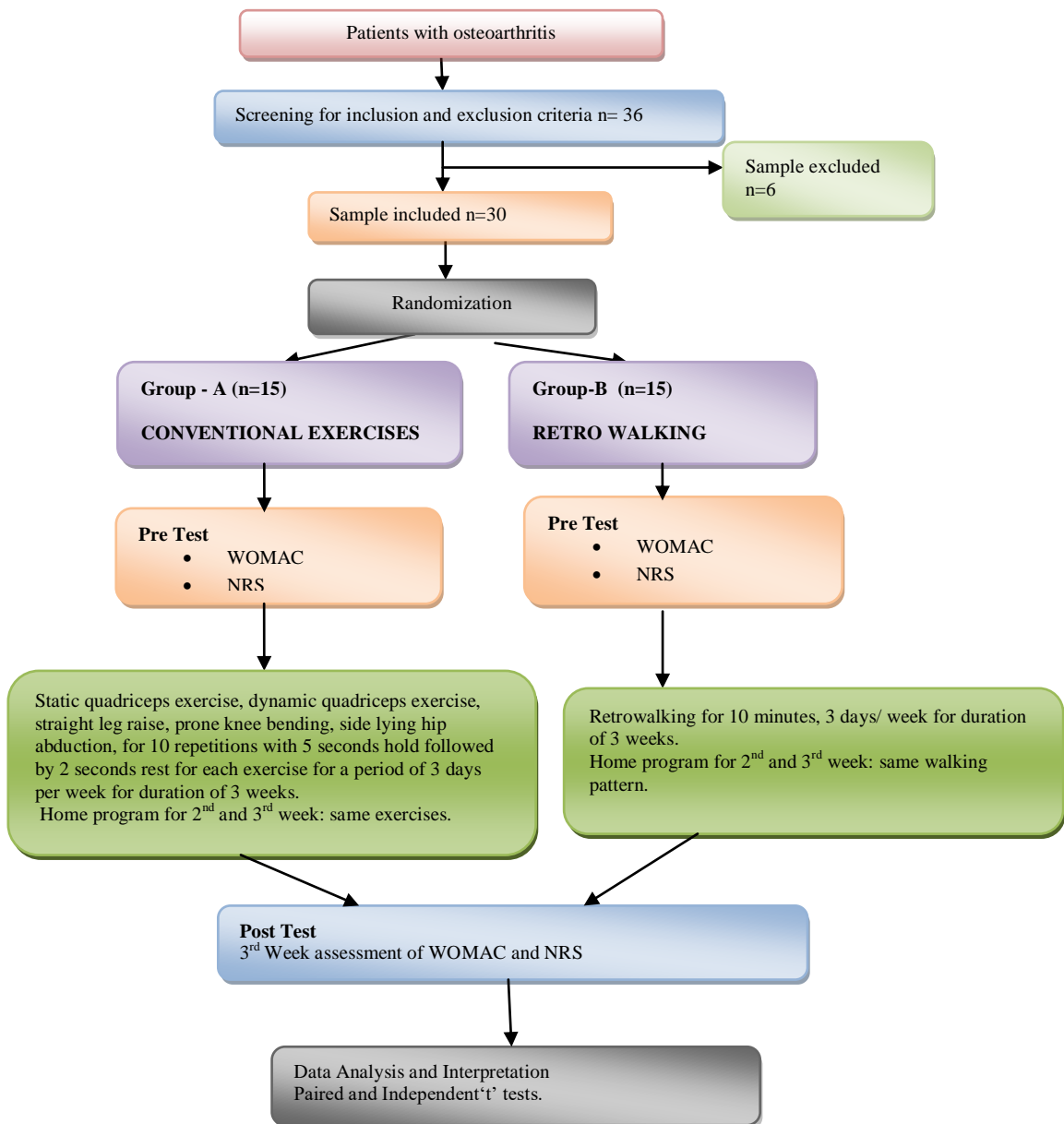


Fig.1 Flow chart representing the procedure of selection of participants

RESULTS

Study variables were done before starting physiotherapy sessions on both groups and at the end of the study, study variables include NRS and WOMAC.

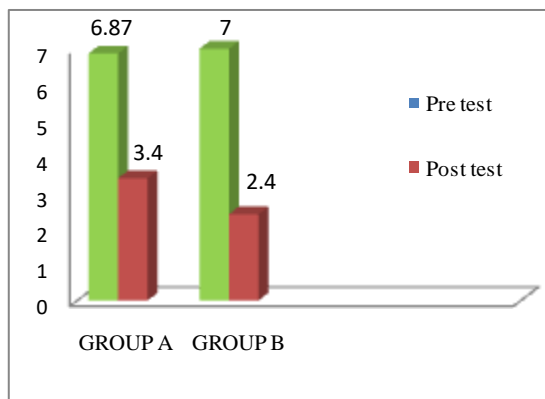
Data analysis: Statistical analysis was performed on the data obtained from 30 patients. Data was analyzed using Statistical Package for Social Sciences [SPSS] software [version 16.0]. Descriptive statistics for all outcome measures were expressed as mean, standard deviations and test of significance such as paired 't' test

used for comparing data within each group and independent 't' test for comparing between the groups. Data was considered statistically significant with $p < 0.05$ and highly significant with $p < 0.01$.

Pre and post mean difference of pain (NRS) shows 3.47 ± 0.74 in group A and 4.60 ± 0.83 in group B. As $p < 0.05$ there is significant difference between two groups. Pre and post mean difference values of WOMAC shows 15.01 ± 4.51 in group A and 20.15 ± 5.29 in group B which shows a significant difference between two groups.

Table 1: Paired “t” test values for OA knee (NRS)

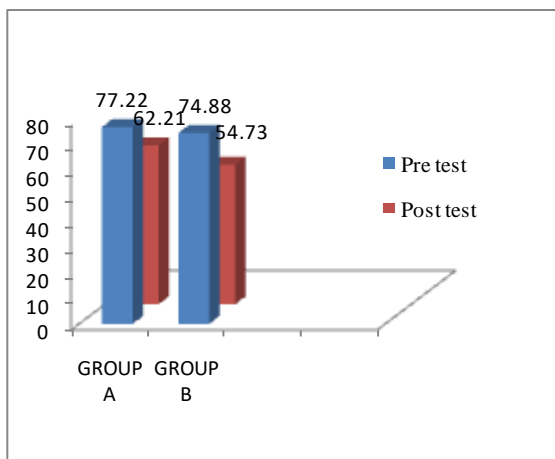
Group	Mean	Mean Difference	Standard Deviation	“t” Value	“p” Value
Group A Pre Test Post Test	6.87 3.40	3.47	0.74	18.07	P<0.05
Group B Pre Test Post Test	7.00 2.40	4.60	0.83	21.51	P<0.05



Graph 1: Mean values of NRS

Table 2: Paired “t” Test values for OA Knee (WOMAC)

Groups	Mean	Mean Difference	Standard Deviation	“t” Value	“p” Value
Group A Pre Test Post Test	77.22 62.21	15.01	4.51	12.90	P<0.05
GROUP B PRE TEST POST TEST	74.88 54.73	20.15	5.29	14.76	P<0.05



Graph 2: Mean values of WOMAC

Table 3: Independent “t” test for OA knee

Outcome Measures	Mean Difference	“t” Value	“p” Value
NPRS	1.00	4.33	P<0.05
WOMAC	7.49	4.53	P<0.05

DISCUSSION

The purpose of the study was to determine the effects of retro walking over conventional physiotherapy treatment in

osteoarthritis of knee joint. According to many studies the backward walking increases the hamstring activation which generates reduced patello femoral and lower tibiofemoral compression load stress and ACL strain, and therefore backward walking reverses the shear forces in knee joint. [18] Results of the present study showed that retrowalking is more effective in reducing pain and disabilities as compared to conventional physiotherapy treatment.

Reduction of pain and disability was seen in both the groups. But a much better improvement was seen in group B. Despite the fact that patients in the group A performed conventional exercises to reduce pain and to improve physical function, changes were identified. The result of this study also suggests that retro walking positively influences pain and disability in the group B.

The outcome measures used for assessment were the Numerical pain Rating Scale (NRS) and the Western Ontario and McMaster Arthritis Index (WOMAC). In the group B, the mean value for NRS was reduced at the end of 3rd week, showing a significant reduction in pain. The mean value for WOMAC was also reduced at the end of 3rd week, showing a significant reduction in pain, stiffness and disability.

CONCLUSION

Participants who underwent retrowalking showed significant reduction in pain, stiffness and disability at the end of the treatment period when compared to participants with conventional physiotherapy. Therefore, retrowalking can be considered beneficial reduction in pain, stiffness and disability in knee osteoarthritis individuals. The result of this study also suggests that retro walking positively influences pain and disability in group B.

Suggestions

- The study can be extended to large sample size.
- The duration of the study can be increased.
- Activities of daily living and recreational activities of patients were not taken into account. There were few dropouts that can be strategically improved in future.

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