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Effect of retrowalking and forward walking in ramp for gait and balance training in knee osteoarthritis subjects

Varadharaju B[1], Srinivasan V[2], Kotteeswaran K[*3], Harini B[3]

[1]Department of Physiology, Saveetha Medical College, SIMATS, Chennai, Tamil Nadu, India
[2]Department of Pharmacology, Saveetha Medical College, SIMATS, Chennai, Tamil Nadu, India
[3]Saveetha College of Physiotherapy, SIMATS, Chennai, Tamil Nadu, India

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ABSTRACT

The study aims to investigate the effect of forward walking versus retro walking on gait and balance training among OA patients. The study setting is Saveetha College of Physiotherapy, SIMATS Chennai, and the sample technique used is simple random sampling. The sample size for this study is 30 participants. The study design is a quasi-experimental study, meaning that the participants are not randomly assigned to the experimental and control groups. Instead, the participants are assigned based on some characteristic or criteria that may affect the outcome. Based on inclusion and exclusion criteria, convenient samples of 30 knee osteoarthritis patients' subjects were collected for this investigation. Patients were allocated into two groups namely group A and group B. In Group A, 15 participants received the traditional physical treatment, IFT, and forward walking in a ramp; in Group B, 15 subjects received traditional physical therapy, IFT, and retro walking in a ramp. Pretest value as timed up and go test was made before and after commencing the therapy for both the group A and B. The mean scores for the Timed up and go pretest and posttest for group A are 17.13 and 15.93, respectively, while the mean scores for group B are 17.60 and 15.27. respectively. Statistical analysis of posttest for time up and go test revealed that there was a statistically significant difference noted between Groups A and B respectively. Our study shows that retro walking in ramp has highly significant improvement in improvement in gait and balance among osteoarthritis patients.

*Corresponding Author

Name: Kotteeswaran K
Phone:
Email: kotteeswaran.scpt@saveetha.com

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INTRODUCTION

Osteoarthritis (OA) is the most common cause of walking-related disability among older adults in the United States, and the prevalence and incidence of OA are increasing rapidly. Systemic and local risk factors for knee OA have been identified, and obesity and joint injury appear to be the strongest risk factors that are both modifiable and have the potential for substantial impact on a population level. Osteoarthritis of the knee is a common multifactorial joint disease that progresses over time and is marked by functional impairment and chronic discomfort. About 4/5 of all OA cases worldwide are knee OA, which gets worse with age and fat [1]. A chronic degenerative joint condition known as

osteoarthritis (OA), which affects 15–40% of persons over the age of 40, is one of the primary causes of disability. 60 to 70 percent of the population is over 60. Its complex etiology is marked by articular cartilage loss, end bone enlargement, and several biochemical and morphological changes to the synovium and joint capsule. With a prevalence of 22–39%, it is the most prevalent form of joint illness in India [2]. Uncertainty surrounds the cause of this age-related rise in osteoarthritis. Age-related alterations to cartilage (shorter proteoglycan chains, less water content) certainly occur, but these changes do not match those in patients with early OA. OA may be more likely to result from fatigue fractures in ageing cartilage. Increasing OA may be caused by increased subchondral stiffness brought on by trabecular microfractures, although it is yet unknown what causes this increased bony stiffness. Furthermore, aging-related neuromuscular alterations may make the joint more susceptible to OA. OA has a multifactorial etiology, and may be taken into consideration the fabricated from interaction among systemic and nearby elements. For example, someone may also have an inherited predisposition to broaden OA however may also best broaden it if an insult to the joint has occurred. The relative significance of danger elements may also range for distinct joints, for distinct degrees of the disease, for the improvement in place of the development of disease, and for radiographic as opposed to symptomatic disease.

There is also some evidence that suggests dangerous materials could behave in ways that are compatible with a person's radiographic traits, such as osteophytes and joint area narrowing [3]. Repeated joint motion when painting is linked to an increased risk of OA. According to studies, hip OA is more common than normal among farmers. While spinal OA wasn't any more common among cotton mill workers than it was among controls, Heberden's node incidence was much higher among cotton mill workers. Workers whose jobs required repeated pincer grip had greater OA at distal interphalangeal joints than did employees whose task required energy grip. The danger of improvement of knee OA changed into greater than instances more for guys whose jobs required each sporting and kneeling or squatting in mid-lifestyles had greater than for the ones whose jobs did now no longer require those bodily activities. And the dangers of knee OA related to kneeling and squatting have been a great deal better amongst topics who have been obese or whose task additionally worried with lifting [4].

It necessitates a multimodal approach, with physiotherapy serving as the primary conservative treatment. This entails a variety of pain-relieving techniques, including as guidance therapy, physical activity, patellar taping, and electric modalities with or without heat modalities. Research indicates that closed kinematic chain exercises are more effective and beneficial than open kinematic chain exercises, which are now gaining popularity in the treatment of knee OA. Walking backwards, or retro-walking, is one technique to implement closed kinematic chain exercises for the knee joint. Due to propulsion in the reverse direction and reversal of leg action, this demands different muscle activation patterns from forward walking. Backward running and walking have been shown to increase strength and reduce joint stress in numerous studies [5]. Compared to walking forward, walking backward has the advantage of increasing cadence and shortening stride length, which has additional advantages. Although there is evidence that exercise can help individuals with knee OA experience less pain and have better joint function, there are no specific recommendations for the best types and amounts of exercise. Established. The efficacy of retro walking as a supplement to traditional gait and balance training therapy in individuals with knee OA is now being investigated. Backward walking differs from forward walking in that it has a higher cadence, a shorter stride, and distinct joint kinematics [6].

And hence previous studies shows that there are some benefits over forward walking alone. As retro walking is a part of Closed kinematic chain exercise, we have very less evidences regarding the functional rehabilitation of patients with osteoarthritis knee. Considering the advantageous effect of retro-walking with respect to forward walking in decreasing the compressive load on knee and improvising the muscular strength, the current study aimed at finding out the effectiveness of retro walking in comparison with forward walking exercise in patients with knee osteoarthritis.

MATERIALS AND METHODS

The purpose of the study is to determine whether retro walking and forward walking in a ramp are useful for improving gait and balance in knee osteoarthritis patients. The objective of this study is to determine the effect of retro walking and forward walking in ramp in improving the gait and balance among knee osteoarthritis patients.

Methodology

The study design is Quasi experimental technique with convenient sampling approach with sample size of 30. The Study setting involved the Saveetha College of Physiotherapy, SIMATS, Thandalam, Chennai, India and students participants was

selected for the study based on inclusion and exclusion criteria.

Inclusion Criteria:

- Age 40-60 years
- Gender both male and females
- Subjects with unilateral or bilateral OA knee patients
- Subjects having symptoms for at least 1 month and pain level less than 8 on Visual Analogue Scale (VAS)

Exclusion Criteria:

- Recent Knee surgeries
- Patients with congenital knee deformity
- Uncooperative Patients
- Central or peripheral pain
- Bone Tumor

Procedure

A sample of 30 people with knee osteoarthritis was chosen for this study based on a set of inclusion and exclusion criteria. The patients were given a thorough explanation of the study's methodology before providing their written informed permission or that of a representative. In addition to taking baseline measurements for study variables including age and gender, all pertinent information was documented. Thereafter, the patients were separated into Group A and Group B. There were 15 participants in Group A who received standard physiotherapy.

IFT and forward walking in ramp, Group B will have 15 subjects given with conventional physiotherapy, IFT and retro walking in ramp. Pretest value as timed up and go test is made before and after starting the treatment for both the group A and B.

Group A Intervention

Group A were given with Interferential therapy of carrier frequency 4 kHz; beat frequency 100Hz; sweep frequency 150 Hz for a duration of 15 minutes every session and vastus medialis oblique (VMO) muscle contraction in sitting position (squeezing a rolled-up towel between the knees) and 10 Isometric contraction of quadriceps by placing a towel underneath your knee of affected leg and squeeze is thought and the subject is made to do forward walking in ramp for 15 minutes. The course of treatment lasts for 4 weeks straight, three days a week.

Group B Intervention

Group B were given with Interferential therapy of carrier frequency 4 kHz; beat frequency 100Hz; sweep frequency 150 Hz for a duration of 15 minutes every session and Vastus Medialis Oblique (VMO) muscle contraction in sitting position (squeezing a rolled-up towel between the knees) and 10 Isometric contraction of quadriceps by placing a towel underneath your knee of affected leg and squeeze is thought and the subject is made to do retro walking in ramp for 15 minutes. The course of treatment is given three days a week for a total of four weeks.

Outcome measure

Timed up and go test was employed as the outcome measure. The timed up and go test is an easy way to evaluate someone's mobility because it considers both static and dynamic balance. It gauges how long it takes someone to get up from a chair, move three metres, do a 180-degree turn, go back to the chair, and then sit down.

RESULTS AND DISCUSSION

Results

Both descriptive and inferential statistics were used to organise and analyse the data collected. For each parameter, the mean and standard deviation were computed. The significant differences between pre-test and post-test values for the timed up and go test were determined using a paired t-test. A total of 30 knee osteoarthritis patients were taken as a sample in which 14 were male and 16 were female

Paired T Test (Group A)

The mean value of Timed up and go pretest and posttest is 17.13 and 15.93 correspondingly. Similar to this, the timed up and go pre and post standard deviation values are 1.30 and 1.22, respectively. The pre and post standard errors of the mean are 0.34 and 0.32, respectively. The confidence interval for this difference ranges from 0.97 to 1.43, the two-tailed p value is equal to 0.0001, the t value is equal to 11.2250, the degree of freedom is equal to 14, and the standard error of the difference is equal to 0.107. Table 1Figure 1.

Paired T Test (Group B)

The mean value of Timed up and go pretest and posttest is 17.60 and 15.27 respectively. The timed up and go test pre-test and post-test measurements had standard deviations of 1.76 and 1.83, respectively. Pre-test and post-test measures had standard

Table 1: Group-A pre test and post test values of timedup and go test

Timed up and go test	Mean	Standard Deviation	T value	P value
Pre test	17.13	1.30	11.2	0.0001
Post test	15.13	1.22		

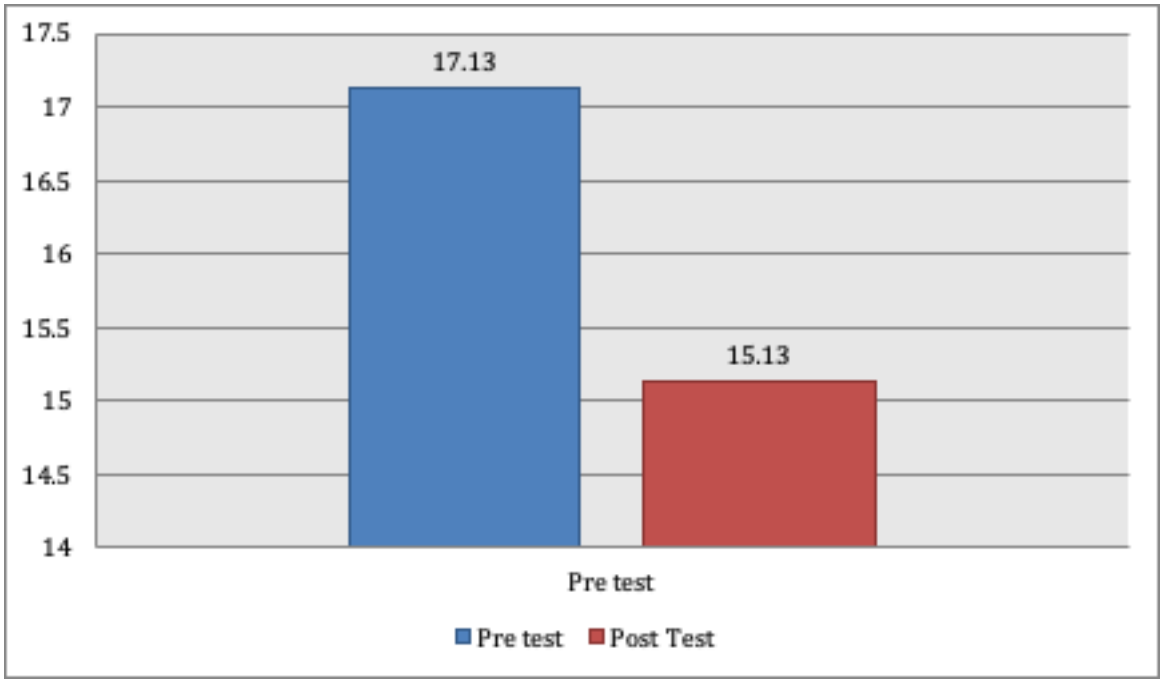

Figure 1: Showingcomparison of Timed Up and Go for Pre and Post Test of Group A

errors of the mean of 0.46 and 0.47, respectively. The confidence interval for the difference was from 1.99 to 2.68, the two-tailed p-value was 0.0001, the t-value was 14.6416, the degrees of freedom were equal to 14, and the standard error of the difference was equal to 0.159. Table 2Figure 2.

The mean value for group A of Timed up and go pretest and posttest is 17.13 and 15.93 respectively, whereas the mean value of group B of Timed up and go pretest and posttest is 17.60 and 15.27 respectively. Statistical analysis of posttest for time up and go test revealed that the statistical significance difference seen between Groups A and B respectively is significant. Thus, there is high statistical difference in B than A. Table 3Figure 3.

Discussion

This randomised controlled experiment aimed to examine how well forward and retro-walking programmes helped people with knee OA balance. The muscles in the area of the knee and ankle function in the opposite direction while retro-walking. The quadriceps and hamstrings work together to provide the majority of the force, with the ankle plantar flexors serving as shock absorbers. When walking backward, the shear stress at the knee joint is directed anteriorly, whereas when walking forward, it is directed posteriorly [7].

When compared to forward walking, retro-walking has been proven to dramatically lessen the patellar compressive force. In addition to regular physiotherapy, a recent study found that knee OA patients who participated in retro-walking for three weeks experienced significant improvements in function. A combination of walking and weight training has been shown to lessen pain and impairment, and long-term aerobic walking and weight training have been shown to enhance postural stability in people with knee OA. On the other hand, a three-month randomised controlled trial examining the efficacy of a forward walking programme and home exercise in people with knee OA discovered significant improvements of 51-55% on the WOMAC pain subscale and 57% on the WOMAC physical function subscale in comparison to controls [8].

In the current investigation, one group received standard treatment while going forward, whereas the other group received standard treatment while walking backward. Retro-walking maintains isometric and circular quadriceps activity while decreasing eccentric quadriceps activity, according to past studies. This is a well-known benefit of

Table 2: Group-B pretest and posttest values of timed upand go test

Timed up and go test	Mean	Standard Deviation	T value	P value
Pre test	17.60	1.76	14.64	0.0001
Post test	15.20	1.82		

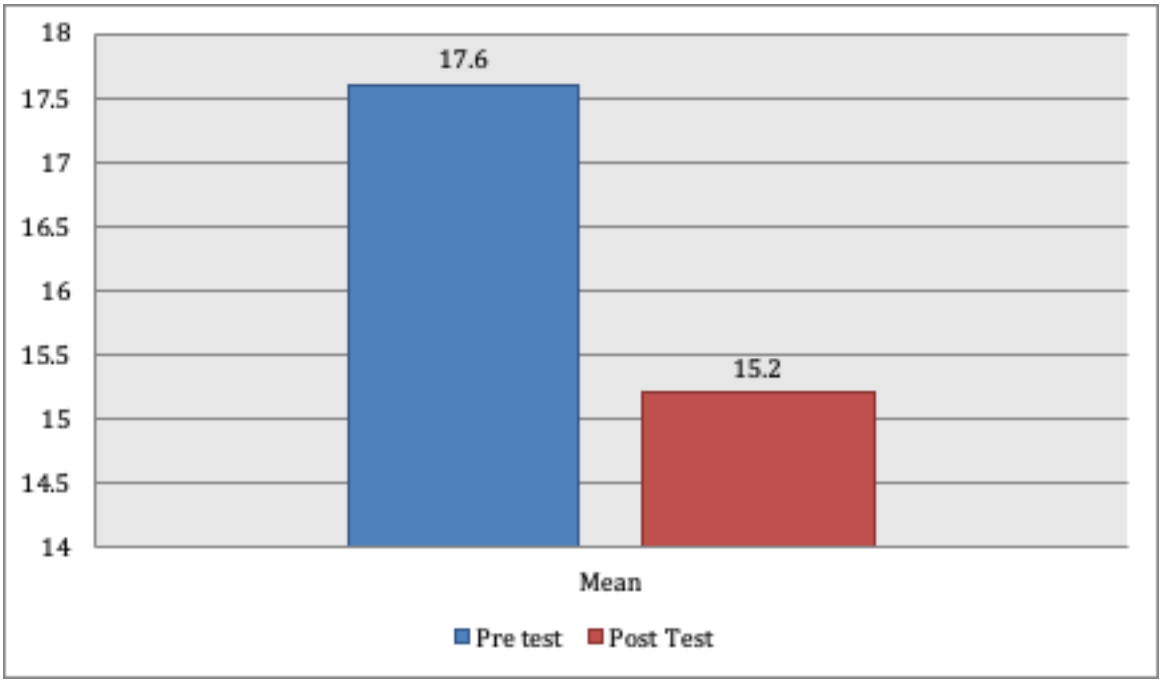

Figure 2: Showingcomparison of Timed Up and Go for Pre and Post Test of Group B

Table 3: Comparison of Group-A and Group-B of timed upand go test

Timed up and go test	Mean	Standard Deviation	T value	P value
Group-A	15.20	1.23	13.2	0.0001
Group-B	12.390	0.813		

retro-walking over forward walking because less eccentric quadriceps activity means less compressive force at the knee joint, which lessens pain and improves balance. According to recent studies, specialised gait training for persons with OA symptoms in their knees immediately reduced pain and mobility-related constraints. Yet these gains were not still there at the six- and twelve-month checkups. A walking programme and exercise have also been shown to improve the health-related quality of life for those with knee OA [9].

Biomechanically, Quadriceps femoris, posterior compartment of the proximal leg, peroneus longus and peroneus brevis muscles reversed their action during retro-walking. In retro-walking, knee gives the primary power producer with simultaneous contraction of multiple muscles such as quadriceps and hamstring and plantar flexors of ankle works as shock absorber. In retro-walking, stress force at Quadriceps femoris directed anteriorly whereas it moves posteriorly in forward walking. Reduced unconventional activity of quadriceps will results decrease squeezing force at knee joint, therefore, pain ferocity at the knee will be reduced [10].

Additionally, retro-walking causes significantly reduced patellar squeezing force than forward walking. It is well-known that physical activity like exercise in the form of walking is cost-effective, approachable, and most effective in reducing coronary disease, overweight, and symptoms of depression. Additionally, walking is the most regular and frequent form of physical activity in health-related quality of life in person.

CONCLUSION

The result of the study reveals that there is significant change in the pretest and post test values of group-A and group-B subjects with knee osteoarthritis. The study concluded that retro walk-

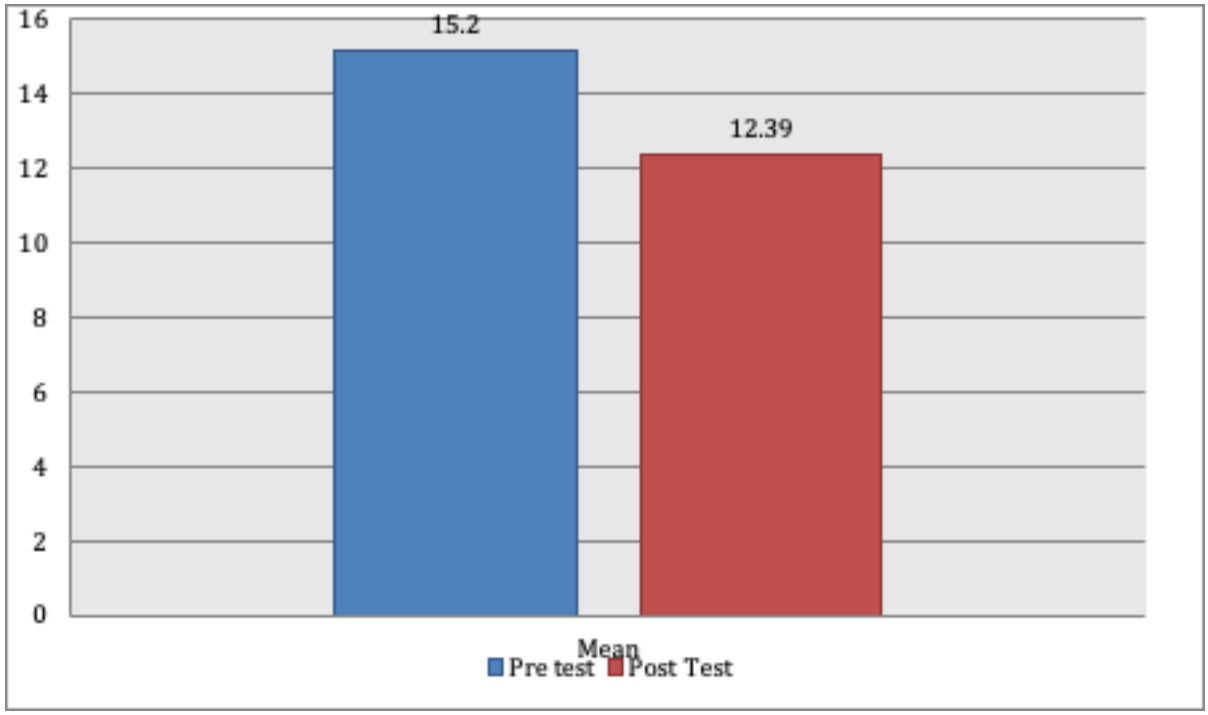

Figure 3: Showingcomparison of Timed Up and go test of group A and B

ing in ramp has highly significant improvement in improving gait and balance among osteoarthritis patients. Substantial and sizable reduction in pain and functional impairment and ameliorate quadriceps muscle power and performance in individuals with knee OA.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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