



Case report

## Impact of a retro walking on degenerative osteoarthritis of knee joint

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### ABSTRACT

Osteoarthritis of knee being of the major causes for disability in older population. Due to sedentary lifestyle this disease is becoming common in younger population as well. About 13% of women and 10% of men aged 60 years and older have symptomatic knee OA. Prevalence of knee OA in men is lower compared with women. As prevalence of the disease still increasing further it is a need of the hour to come up with a highly reliable exercise protocol which will be beneficial for the patients. Retro-walking is new intervention and also easy to practice. It is protected closed chain practice exercise as it decreases the compressive powers at the patellofemoral joint. During Retro-walking quadriceps eccentric capacity is diminished, while the isometric and concentric quadriceps quality is protected. Retro walking programs are known to expand quadriceps quality. Additionally, during retro walking cardiopulmonary interest is higher when contrasted with forward-walking. Henceforth, such advantages make backward walking a protected and viable segment of recovery schedule for patients of knee osteoarthritis. A case of 55 years old male is presented in the report who presented with pain and stiffness in knee which was sudden in onset and was present since he had a twisting injury to his left leg. Assessment, patient's history and therapeutic protocol have been discussed in the case study. This case study found that the provided therapeutic intervention has a substantial impact on the patient's discomfort, range of motion, and activities of daily living (ADL).

**Keywords:** Knee Osteoarthritis, Retro Walking, WOMAC.

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### INTRODUCTION

Both low- and high-income countries are seeing an increase in the incidence of osteoarthritis (OA). Knee OA is the fastest growing major health condition and the second leading cause of disability, according to the Global Burden of Disease studies [1]. About Symptomatic knee OA affects 13% of women and 10% of men aged 60 years and older. Men have a lower prevalence of knee OA than women. Adolescent athletes are predisposed to develop premature osteoarthritis due to sports participation, joint damage, obesity, and genetic susceptibility. In the development of joint OA, factors such as age, female gender, overweight and obesity, knee injury, repeated use of joints, bone density, muscle weakness, and joint laxity all play a role [2]. Osteoarthritis is basically a multifactorial joint disease which describe a group of diseases that share clinical symptoms and morphological and radiological changes. It is wear and tear of joints as one ages. It mainly affects the bones, the cartilage and the synovium of the joints. Joints which bear weight of the body such as the knee and hip are susceptible to degenerative changes that can interfere with physical activities and life quality. In older people, OA of knee is the main cause of pain and disability. Pain, stiffness, joint enlargement,

crepitus, muscle weakness, deformity, impaired proprioception, decreased joint motion, and impairment are all common clinical manifestations of knee OA. The existence of osteophytes, narrowing of the articular space, and bone sclerosis are the key criteria for radiological classification [3].

Retro-walking is one of the new interventions which is beneficial in treating OA knee. Since the compressive forces at the patellofemoral joint are diminished, it is considered a healthy closed kinetic chain exercise. Quadriceps eccentric feature is reduced by retro-walking, but isometric and concentric quadriceps power are maintained. Quadriceps ability has been found to improve with retro-walking training programs [4]. Furthermore, during retro-walking, the cardiopulmonary demand is higher [5]. Therefore, Retro-walking is a safe and efficient part of rehabilitation services for osteoarthritis.

### Patient information

A 55-year-old male patient, tailor by occupation, with right-handed dominance was referred into physiotherapy department. As per the information given by the patient, on 15 of February 2021 in morning hours patient was performing some household chores patient.

During the same he was bending down to lift up the water pipe when his left knee twisted and he started experiencing pain. After the incident he was unable to move. With support of his relatives, he was mobilized and brought to Hospital and orthopedic department was consulted on the same day. Here in orthopedic department detail evaluation and x-ray investigations were done. As there were no measure findings in the x- ray, patient was advised to go for MRI investigation to rule out any other complications. In MRI report degenerative changes and reduced joint space was seen and patient was diagnosed as a case of osteoarthritis of left knee. Patient was prescribed with analgesic medicine and was advised physiotherapy. Since then, patient is undergoing physiotherapy treatment.

On examination, swelling was seen on the left knee (anterior and medial aspect). Patient had pain and rated it 7 on visual analogue scale. On palpation grade 2 tenderness was noted on the medial aspect of the knee. Crepitus was present during flexion of left knee and Clark test was positive. Swelling and deformity of left knee is clearly visible in figure 1. Ranges and muscle strength of the knee joint were found to be reduced. Ranges and MMT before starting the treatment are given in the below tables.

**Table 1.** - showing ranges of knee joint before and after treatment

Knee range of motion	Before treatment	After treatment
FLEXION	00 – 850	00 – 1100
EXTENSION	850 - 00	1100 - 00

**Table 2.** Muscle Strength Before and After Treatment

Knee Muscles	Pre-Treatment MMT	Resistive Isometric Grading	Post Treatment MMT	Resistive Isometric Grading
Flexors	3-	Painful and Weak	4	Painless and Strong
Extensors	3-	Painful and Weak	4	Painless and Strong

**Table 3.** VAS and WOMAC score before and after treatment

	Pre – treatment	Post treatment
VAS score	7	3
WOMAC score	45%	21%

**Figure 1:** showing swelling of left knee



There was no evidence of any neurological involvement. The therapeutic interventions were started from first day after taking written consent from the patient.

In 1<sup>st</sup> week – ultrasound was given on medial aspect of left knee. Probe of 1 MHz was used and treatment was given in continuous

mode. Treatment was given daily for 8 mins during first seven days. Exercises were started from 3<sup>rd</sup> day after the pain subsided. Treatment of retro-walking was given for 7 min including a 5-minute warm-up and a 5-minute cool-down exercises before and after the retro walking program. Patient was advised to walk on a flat surface and at their own pace. Treatment of conventional therapy involve Isometric Quadriceps exercise, SLR, Isometric hip adduction exercises, Terminal knee extension exercise 1 set of 10 Repts two times a day.(one set of exercise was performed in clinic in presence of therapist and second set was performed by the patient in evening at home).

In 2<sup>nd</sup> week - Treatment of retro-walking was given for 10 min with 5 min of warm-up and 5-minutes cool down exercises before and after the retro walking program. Patient was advised to walk on a flat surface and at their comfortable pace. Same conventional therapy exercises were continued as that of the first week.

In 3<sup>rd</sup> week - Treatment of retro-walking was given for 15 min with 5 min of warm-up and 5-minutes of cool down exercises before and after the retro walking program. Patient was advised to walk on a flat surface and at their comfortable pace. Same conventional therapy exercises were continued as that of the first week.

In 4<sup>th</sup> week – same protocol as that of the 3<sup>rd</sup> week was followed.

**Table 4.** Rehabilitation table

1 <sup>ST</sup> week	Ultrasound for 8 min Exercises started from 3 <sup>rd</sup> day which included Retro-walking for 7 min with 5 minutes of warm up and 5 minutes cool down exercises. Isometric Quadriceps exercise, SLR, Isometric hip adduction exercises, Terminal knee extension. (1 set of 10 Repts twice a day)
2 <sup>nd</sup> week	Retro-walking for 10 minutes with 5 minutes of warm up and 5 minutes of cool down exercises. Isometric Quadriceps exercise, SLR, Isometric hip adduction exercises, Terminal knee extension. (1 set of 10 Repts twice a day)
3 <sup>rd</sup> week	Retro-walking for 15 minutes with 5 minutes of warm up and 5 minutes cool down exercises. Isometric Quadriceps exercise, SLR, Isometric hip adduction exercises, Terminal knee extension. (1 set of 10 Repts twice a day)
4 <sup>th</sup> week	Retro-walking for 15 minutes with 5 minutes of warm up and 5 minutes of cool down exercises. Isometric Quadriceps exercise, SLR, Isometric hip adduction exercises, Terminal knee extension. (1 set of 10 Repts twice a day)

**Figure 2:** Patient performing retro walking



## RESULT

After one month of regular treatment patient had significant improvement in his symptoms. There was improvement in patients

knee ranges and muscle strength which have been mentioned in table 1 and 2. Also pain had subsided so the VAS rating which was 7 pre-treatments reduced to 3 after regular treatment of one month. Improvement was also seen in WOMAC score which have been shown in table 3.

## DISCUSSION

Osteoarthritis is a very common case and is regularly physiotherapy clinics. Mostly the affected population is elderly in whom prominent weakening and wasting of quadriceps and hamstrings muscle is seen. This can be one of the underlying causes of the disease. As the affected population is mostly aged, they can't bear the heavy weight which is needed for strengthening. Hence one such and intervention is needed which may be easy to perform and cause strengthening of these weak muscles. Retro walking is one such intervention and has been proved beneficial in treating symptomatic osteoarthritis of knee. This type of exercise can reduce joint stress and improve muscle strength in the lower limbs<sup>[7]</sup>. Furthermore, since the main muscle is stimulated in a rhythmic and dynamic manner, this exercise has no negative effects on the body. This exercise does not necessitate the use of any special tools or equipment, making it an easy and safe way to lower health risks. Retro walking reduces eccentric quadriceps activity while maintaining concentric and isometric quadriceps activity. It activates lower-limb muscles more than forward walking. It also enhanced gait ability by increasing the strength of knee joints and quadriceps movements. When paired with knee flexion and hip extension, it stimulates muscles in the lower limbs and results in a higher energy expenditure in the lower limbs. Backward walking has a lower effect on the kneecaps and patello-femoral joints since the metatarsal joints come into contact with the ground first. Even though backward walking is not commonly practiced, it is successful in stimulating the knee joints and quadriceps muscles in a more relaxed manner. As a result, it seems that backward walking exercise could have some therapeutic benefits for people who suffer from knee pain<sup>[8]</sup>.

Ahmad H. Alghadir et al conducted a study in which he concluded that in people with knee OA, a 6-week retro walking program reduces pain and physical weakness and increases quadriceps muscle strength and efficiency as compared to forward walking or control classes<sup>[9]</sup>. Balraj AM in 2018 concluded in his study that retro-walking leads to a substantial improvement in pain and disability reduction in the OA knee subjects who were studied<sup>[10]</sup>. Pradeep Shankar conducted a study titled effectiveness of retro walking in chronic osteoarthritis of knee joint in 2013 in which he concluded that. In patients with chronic OA, retro walking is very helpful in reducing symptoms and overcoming impairment<sup>[11]</sup>. Nayyar Manisha concluded in 2015 that in knee osteoarthritis patients, retro walking is more effective in reducing pain, improving balance, and improving

functional efficiency<sup>[12]</sup>. Adilah Logde conducted a study in 2018 in which he concluded that in young adults with below-average hamstring tightness demonstrated dramatic progress in hamstring flexibility after undergoing a 4-week backward walking training protocol<sup>[13]</sup>. Gauri Arun Gondhalekar in 2013 concluded in her study that Retro walking is an effective adjunct to conventional treatment in decreasing disability in patients with knee osteoarthritis<sup>[14]</sup>. Jaydev Pandya in his study in 2020 concluded that DSTM with Retro – walking was very effective, simple and easy to apply in Hamstring tightness subjects<sup>[15]</sup>. Peeyoosha Gurudut in 2019 concluded that the Retro walking group demonstrated to be more effective than conventional physiotherapy group on walking velocity, cadence, and kinesiophobia. Hence, Retro Walking may be considered as part of the treatment protocol of OA knee patients with mild-to-moderate degenerative changes<sup>[16]</sup>. Dr. Pankaj Kumar in 2020 concluded that walking on a retro treadmill improved pain and physical capacity significantly in PFPS patients<sup>[17]</sup>. Tharani Balasukumaran in 2018 concluded that backward walking with traditional physiotherapy care is successful and clinically worthwhile in patients with knee osteoarthritis, according to a systematic examination and meta-analysis<sup>[18][19]</sup>.

## CONCLUSION

Knee pain and stiffness may hamper day to day activities of oneself. Here within 2 weeks of treatment significant improvement was seen in knee ranges and muscle strength. Even the pain had subsided drastically with improvement in WOMAC score. patient was very comfortable after completion of one-month treatment. Hence case signifies the importance of the new intervention that is retro walking and glorifies its benefits.

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### Authors' contributions

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### Informed Consent

The patient was explained about the study and informed consent was taken

### Abbreviation

OA – osteoarthritis

VAS – Visual Analogue Scale

WOMAC - The Western Ontario and McMaster Universities Osteoarthritis Index

ADL – Activities of Daily living

MMT – Manual muscle Testing

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