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EFFECTIVENESS OF HOME-BASED EXERCISE PROGRAM ON PAIN AND FUNCTIONAL ABILITY OF PATIENTS WITH KNEE OSTEOARTHRITIS

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ABSTRACT

A Quasi experimental design was adopted for this study to find out the effectiveness of home-based exercise program on pain and functional ability of patients with knee osteoarthritis (OA). Using convenient sampling technique, 50 patients in each study and control group were allotted. Assessments were performed at baseline and at 3 months. Pain was assessed by self reported Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and self reported WOMAC scale for assessing the physical function was used. For the study group, five home based exercises were taught and asked the patients to follow this for 3 months. The study results show that the pain and physical function scores were improved in the exercise group and the difference was statistically significant ($p < 0.01$). The study concluded that a simple home exercise programme can significantly improve self reported knee pain and physical function among patients with Knee osteoarthritis.

KEYWORDS

Osteoarthritis, WOMAC, Pain, Physical function and Home exercise programme.

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INTRODUCTION

Ageing is a natural process that happens in the human life cycle, accompanied by changes in the body, mind, mental process, and lifestyle habits, resulting in a fall in senior adults' functional capability and a shorter life span. Knee osteoarthritis (OA) is a widespread condition that contributes significantly to community morbidity^{1,2}. Osteoarthritis is a disorder in which the cartilage that

functions as a cushion between the bones in joints wears down, resulting in inflammation and pain in the joints, limiting movement. By 2030, it is expected that the proportion of people with osteoarthritis among those aged 60 will increase from 20% to 30%. A World Health Organisation report identified Osteoarthritis as the 8th leading cause of non-fatal burden in the world in 2000, accounting for 2.6% of total years lost due to disability.

The prevalence of knee OA increases as one gets older³⁻⁵. Knee osteoarthritis patients are frequently dissatisfied by knee pain, joint stiffness, muscle weakness, and a lack of proprioception. As a result, they frequently have poor neuromuscular control, slower walking speeds, diminished functional ability, and a higher risk of falling⁶⁻⁸. In clinical practice, rehabilitation was often intended to increase muscle strength and to enhance proprioceptive function^{9,10}.

As the majority of older individuals suffer from joint pain, which limits their functional abilities such as walking, climbing stairs, sitting in a chair, and squatting in an Indian closet, the goal of treatment of OA is to reduce pain while maintaining function. The role of various forms of exercise treatment in OA is gaining popularity³. Exercises to strengthen the quadriceps muscles are frequently recommended however there is little evidence that they are beneficial.

Strong leg muscles support the knee and absorb shock before it reaches the knee, making exercise useful for osteoarthritis. Exercising the quad muscles improves the lubricating characteristics of the knee joint by increasing circulation and stimulating favourable biochemical changes in the joint fluid. It also improves the knee's range of motion¹⁰. Hence, the goal of this study was to see how a home-based exercise program for improving pain and functional ability of patients with knee osteoarthritis.

METHODOLOGY

A quasi experimental design was adopted for this study to find out the effectiveness of home-based exercise program on pain and functional ability of patients with knee osteoarthritis (OA). The patients who attend the ortho clinics for OA knee, of two

hospitals were selected as samples. Using convenient sampling technique, 50 patients in each study and control group were allotted. The structured instrument used to assess the functional ability among the patients with Osteoarthritis. Assessments were performed at baseline and at 3 months. Pain was assessed by the following measures such as self reported Western Ontario and McMaster Universities Osteoarthritis Index¹⁰ (WOMAC). The total pain score 0-20, with higher scores indicating more pain, for the primary outcome variable. The Self reported WOMAC physical function score (0-68, with higher scores indicating more disability) was used to assess the extent of disability of the samples. For the study group, the following exercises were taught and asked the patients to follow the home based exercise for 3 months. Five exercises were included such as

1. For five seconds, hold an isometric quadriceps contraction in full extension (subject sits on floor or hard surface bed, with back supported and legs extended, with rolled up towel under one knee and contracts quadriceps by pushing into the floor against towel)
2. Isotonic quadriceps contraction in mid-flexion held for five seconds (subject sits in chair, lifts lower leg to partially extended posture, and holds)
3. Isotonic hamstring contraction (patients lies on front or side and bends knee bringing foot towards body)
4. Isotonic quadriceps contraction with resistance band held for five seconds
5. Dynamic stepping exercise (walking up and down one step/staircase)

The exercises were performed in the order listed above, with a maximum of 20 repetitions each leg. Exercises were taught by one of the investigators and were done at home on a daily basis. In addition to the initial visit, the investigator visited the subjects three more times (at two weeks, six weeks, and 10 weeks). The compliance of the exercise program was ensured by asking the participants to complete a diary documenting the number of exercises performed each day.

The control group did not receive specific intervention and were not visited between

assessments. The institutional ethical approval and consent from the study participants were obtained before the study. The home exercise protocol was validated by an orthopedician for ethical consideration of no harm to the study subjects.

RESULTS AND DISCUSSION

The analysis revealed that the mean age of the study participants were 53.04 ±8.26 and 54.03±9.17 for study and control group respectively. The weight of the patients was 71.2 ± 16.8 and 72.31± 17.24 for study and control group respectively (Table No.1). All subjects were advised on the importance of losing weight or not becoming overweight as general advice. The other demographic variables include 60% of them had primary education, 17% of them were unmarried, 80% of them were non-vegetarian, 63% had normal BMI, and 70% of them were having illness for 5-10 years, 77% of the senior citizens were having systolic blood pressure between 120-129 mm Hg and 83% of them were having diastolic blood pressure between 80-89 mm Hg.

Table No.2 shows the differences in WOMAC pain and physical function scores of both the groups. The pain and physical function scores were improved in the exercise group and the difference was statistically significant (p<0.01).

A similar finding was reported in a study on the effect of a home based exercise programme, designed to improve quadriceps strength, on knee pain and disability which concluded that a simple programme of home quadriceps exercises can significantly improve self reported knee pain and function^{11,12}. Another study by Jan, M H, *et al*, concluded that when compared to the control group, simple knee flexion and extension exercises (weight bearing and non-weight bearing) done over 8 weeks resulted in substantial improvements on the WOMAC function scale and knee strength. It's possible that non-weight bearing training alone will be enough to increase function and muscle strength^{13,14}. This results infer that the home based exercise program improve the pain and functional score of the patients with OA of the knees.

Table No.1: Baseline data of the patients

S.No	Variables	Study Group		Control Group	
		Mean	SD	Mean	SD
1	Age	53.04	8.26	54.03	9.17
2	Weight	71.2	16.8	72.31	17.24
3	WOMAC Pain Scale	6.75	2.75	6.75	2.83
4	WOMAC Physical Function Score	21.58	11.45	19.15	11.25

Table No.2: Comparison of Mean and Standard Deviation of Pain and functional ability

S.No	Variables	Study Group		Control Group		95% CI	* p value
		Mean		Mean			
		Baseline	Post intervention	Baseline	Post intervention		
1	WOMAC Pain Scale	6.75	5.3	6.75	7.17	-1.94, -0.14	0.01
2	WOMAC Function Score	21.58	18.03	19.15	19.14	-6.13, -0.93	0.01

CONCLUSION

Aging is a natural physiological process in which people's functional ability deteriorates as a result of osteoarthritis. Non-pharmacological therapies are low-cost, non-invasive, safe, and simple to use. The home based exercise is proved to be one of the effective non-pharmacological interventions in reducing pain and enhancing functional ability to perform their day to day activities. The study findings conclude that home based exercise was very effective in gaining the physical strength and improvement in quality of life.

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DECLARATION OF CONFLICTING INTEREST

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

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