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To study the effect of quadriceps strengthening versus hamstring strengthening in patients with osteoarthritis of knee

Dr. Parveen Pathan
parveenpathan012@gmail.com
Shri. K. R. Pandav College of Physiotherapy Bhilewad, Bhandara, Nagpur, Maharashtra

Dr. Subrat Samal
subratsamal17@gmail.com
Ravi Nair Physiotherapy College, Sawangi, Maharashtra

Dr. Snehal Samal
snehalsamal11@gmail.com
Ravi Nair Physiotherapy College, Sawangi, Maharashtra

ABSTRACT

Osteoarthritis (OA) is a chronic degenerative disease affecting major joints of the body especially weight-bearing joints for example knee, one-third of adults and presenting a tendency to increase with age. OA knee can be associated with symptoms of pain, instability, reduction of the range of motion (ROM) and consequently, deterioration in the quality of life and function. This functional limitation results in an increase in the risk of an increase in disability which leads to impairment of day-to-day ability.

Keywords: *Osteoarthritis (OA) knee, Hamstring exercise, Patients.*

1. INTRODUCTION

Osteoarthritis (OA) is a chronic degenerative disease affecting major joints of the body especially weight-bearing joints for example knee, one-third of adults and presenting a tendency to increase with age. OA knee can be associated with symptoms of pain, instability, reduction of the range of motion (ROM) and consequently, deterioration in the quality of life and function. This functional limitation results in an increase in the risk of an increase in disability which leads to impairment of day-to-day ability.

Various studies reported that patients with knee OA present less quadriceps muscle strength. As the quadriceps muscle plays the role of shock absorber, a weakness of this muscle decreases the joint protection, resulting in greater stress and overload on the knee. Quadriceps strengthening exercises performed over eight weeks proved just as effective in function improvement as the use of non-hormonal anti-inflammatory drugs in patients with OA of the knee. Moreover, moderate-intensity exercises showed themselves to be a good form of treatment not only for the improvement of symptoms but also in the increase of the glycosaminoglycan content.

The researchers verified that these have a beneficial effect on pain and function. However, there was accentuated variability in terms of the type of exercise evaluated and particularly in relation to the methodological aspects. Besides the physical benefits, the exercises also had a beneficial effect on the mental health of patients with knee OA. Thus, due to the fact that reduced mobility is one of the main factors responsible for limitation of functionality and deterioration of quality of life in patients with knee OA, it is extremely important to conduct research on interventions based on an appropriate methodology, targeting the improvement of the functionality and quality of life of these patients.

2. AIMS AND OBJECTIVES

- To study the effect of quadriceps strengthening and hamstring strengthening in patients with osteoarthritis of the knee.
- To test the efficacy of hamstring strengthening in patients with osteoarthritis of the knee.
- To compare the effect of quadriceps strengthening and hamstrings strengthening versus quadriceps strengthening in patients with osteoarthritis of the knee.

3. MATERIAL

Material: numerical pain rating scale (NPRS), SF-36

4. METHODOLOGY

RESEARCH DESIGN OF THE STUDY: Experimental

STUDY SETTING: Musculoskeletal Department, RNPC

SAMPLE SIZE: 100 Subjects

SAMPLING TECHNIQUE: Simple Random Sampling

STUDY DURATION**:** 1 year.

Inclusion criteria:

- Patients who willing to participate in the study
- Patients with unilateral and bilateral involvement.
- Patients with pain in and around the knee.
- Age of subject is 40-70yr.
- Both males/females are included.

Exclusion criteria:

- Patients with any deformity of the knee, hip, and back.
- Patients who had any central or peripheral nervous system involvement.
- Patients who had received steroids injections 5 months previous.

5. PROCEDURE

The institution ethics committee clearance will be obtained. 100 participants will be selected randomly from RNPC(AVBRH) opd referred from orthopaedic department and from other departments and rural areas as per the inclusion and exclusion criteria. The informed consent will be obtained. They will be provided with of-36 scale.

GROUP I(Experimental Group)

1.Static Quadriceps: The patient is placed in a long sitting position, a towel roll is placed underneath the popliteal fossa and the subject is asked to press the rolled towel by isometrically contracting the quadriceps with the hold time of 10 secs and repeated for 10 times with 10 secs rest between each repetition. progression of exercise will be done by increasing duration of contraction and number of repetition.
This exercise was given to the participant on alternate days 3 days a week for 6 weeks
2.Vastus Mediallis: The patient is asked to lie in supine lying position with a pillow placed underneath the knees that the knee is bent to 30^0 flexion position and the subject is asked to straighten the knee slowly with hip adduction and internal rotation asked to maintain the contraction for 10 sec. the exercise is repeated for 10 times with 10 secs rest between each repetition. progression of exercise will be done by increasing duration of contraction and number of repetition.

Group B(Conventional Group)
Hamstrings Clenches:

Purpose: Strengthen the hamstrings muscles without having to move the knee - perfect after an injury or surgery

Starting Position: Sit in a chair with your heel against the leg of the chair and your feet firmly on the floor

Action: Press your heel firmly backwards into the chair leg feeling the back of your thigh tightening/clenching. Hold for 3-5 secs

Repetition: Do 10-20x, 2x daily

Note: The foot shouldn't move during this exercise

2) Buttock Kicks

Purpose: Strengthen hamstrings without any weight going through the knee joint, increase knee mobility (flexion), aid circulation

Starting position: Lie on your tummy (on the floor or bed) with your legs straight

Action: Lift your foot off the floor and bring it towards your bottom as far as you can. Slowly return to the starting position

Repetition: Repeat 10-25x, 3x daily

Notes: 1) You are aiming to get your heel all the way to your bottom 2) Make the exercise easier by hooking your good leg underneath the bad and using it to help lift the bad leg up

Progression: Add a weight e.g. a shoe or ankle weight

3) Kick Backs

Purpose: Improve the strength of hamstrings and mobility of the knee

Starting Position: Stand up straight holding on to something stable e.g. chair or table

Action: Lift your foot up as far as you can towards your bottom, bending the knee. Hold for 3-5 secs

Repetition: Do 5-25 times, 2x daily

Progression: Add a weight e.g. shoe or ankle weight

Note: 1) Don't bend forwards - keep your body upright 2) keep your knees in line with each other- don't let your thigh come forwards

Outcome measure-

1) Numerical pain rating scale (assessing pain)
2) Sf-36 scale (assessing functional scale)

Data Analysis:
Student's paired t-test

Week	Paired Differences					t	df	p-value
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
0 Week - 2 Week	1.72	1.04	0.16	1.39	2.05	10.45	39	0.0001, **S**,p<0.05
0 Week - 4 Week	2.65	1.52	0.24	2.16	3.14	10.99	39	0.0001 **S**,p<0.05
0 Week - Follow up 8 Week	3.80	1.59	0.25	3.29	4.31	15.07	39	0.0001 **S**,p<0.05

Comparison of pain on VAS within group B at 0^{th}, 2^{nd}, 4^{th} and 8^{th} week

Student's paired t-test

Week	Paired Differences					t	df	p-value
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
0 Week - 2 Week	1.36	0.71	0.11	1.13	1.59	12.02	39	0.0001, **S**,p<0.05
0 Week - 4 Week	2.17	1.01	0.16	1.84	2.49	13.54	39	0.0001 **S**,p<0.05
0 Week - Follow up 8 Week	3.27	1.45	0.22	2.80	3.73	14.22	39	0.0001 **S**,p<0.05

6. DISCUSSION

Table 1 and 2 shows decrease in pain after treatment within group A and Group B after treatment as compared to pre treatment. Wen-Dien ChangHung review article shows that although quadriceps exercises are more effective in OA knee hamstring strengthening also plays an important role in treating patients with OA knee and it is also a challenging task for the physiotherapist.In our study, we have found that both of these exercises are effective in reducing pain and improving functional activity but quadriceps strengthening is more effective in improving the quality of life reducing pain in patients with OA knee and they have a drastic result in reducing pain on VAS and disability. Lederman in his study stated that lower extremity strength training program has a positive effect on reducing knee pain. h kim studied 33 patients and found that The results of this study showed that quadriceps exercise along with core muscle exercise had a positive effect on Degenerative disc disease patients in reducing pain and disability, preventing atrophy of lower extremity muscles.

7. CONCLUSION

In our study, it has been found that both treatment protocols have been proved effective in reducing pain ant thus improving functional activity and quality life but quadriceps strength training program is more effective as compared to hamstring group.

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