EFFICACY OF RESISTED EXERCISE IN KNEE OSTEOARTHRITIS AMONG FEMALE POPULATION

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ABSTRACT

PURPOSE: This study was aimed to find out the efficacy of resisted exercise in knee osteoarthritis among female population. The objective of this study was to find the difference between the pre-test and post-test values of VAS and Push and Pull Hand Held Dynamometer for knee osteoarthritis to improve quadriceps muscle strength and to reduce pain.

METHODS: 30 subjects selected based on inclusion and exclusion criteria, study setting: The out-patient physiotherapy department, Saveetha Medical College, and Hospital. Materials: Treatment couch, Hand Held Dynamometer, Weight cuff, Stationary cycle ergometer. Study design: Experimental study. Sampling method: Convenient sampling. Outcome measures: Push and Pull dynamometer, Visual Analogue Scale (VAS). A baseline analysis VAS and Push and Pull Hand Held Dynamometer was done before the intervention began. After the intervention was given to the subjects following which a post-test was conducted and done to analyze the sustained effects of the intervention. A comparison between the mean values showed that there was a significant difference between post-test I and post-test II, hence, the results had sustained.

RESULTS: From the statistical analysis made with the quantitative data revealed a statistically significant difference between the groups.

CONCLUSION: Therefore, it was concluded that strengthening of knee flexors and knee extensors by applying resistance i.e. weight cuff and machines are all effective for improving quadriceps muscle strength and also reduces pain in female patient with knee Osteoarthritis.

Keywords: Osteoarthritis, VAS, Push and Pull Hand Held Dynamometer, Stationary Cycle Ergometer, and Resisted Exercise.

INTRODUCTION

Osteoarthritis of knee can result from injury or infection or even being overweight. Its common wear and tear arthritis. It, is a condition in which the natural cushioning between joints, cartilage wears away. Most commonly occurs at the age of 45-60 yrs old. Prevalence of osteoarthritis was found to be 28.7% among the population of India. The associated factors were found to be female gender (prevalence of 31.6%), obesity, age, and sedentary work. The step length is reduced, the base of support is narrowed and the balance ability is reduced. pain getting worse while working, swelling, warmth in the joint, stiffness in the knee especially in the morning, decreases in the mobility of knee, difficulty in getting in and out of chairs or car, use the stairs or walk. Creaking sound that is heard when the knee moves. Problem in walking and standing leads to sudden increases in swelling, pain etc. Patient can’t stand on one leg, feeling unstable like they might fall down, aches and
pains. There is no known cure for osteoarthritis of knee but exercise therapy is among the dominant non-pharmacological interventions recommended by international guidelines for amelioration of symptoms.  

The causes of osteoarthritis are Age more than 40 years, Gender commonly female, hereditary conditions, previous joint injuries, obesity, diseases of the joints, poor posture, occupational stress, a combination of the above factors. The changes in the articular cartilage vary from fibrillation to complete destruction depending on the severity of osteoarthritis. The synovium is thick and congested. The subchondral bone shows sclerosis and cyst formation. The capsule is thick and fibrosed. New bone growth results in osteophytes formation in areas not under pressure.

Osteoarthritis of the knee is very common, affecting 12.4 million (33.6%) adults over the age of 65. Interestingly, women are more affected and burdened by osteoarthritis of the knee than men. Studies have shown that osteoarthritis is expressed differently in women than in men and may affect certain parts of the knee disproportionally. This is particularly evident in the patellofemoral joint where isolated patellofemoral arthritis is more prevalent in women than in men. In addition to the anatomic area affected, women usually present in more advanced stages compared with men, have different gait patterns, and report more pain and disability. In a study about knee pain and disability in the community, McAlindon et al. found that the frequency of reported disability relating to knee arthritis was significantly higher in women than men.

Loss of leg muscular strength is associated with increased pain and disability, as well as a more rapid progression of knee Osteoarthritis. Aberrant biomechanics and abnormal joint forces have also been identified as potential culprits underlying Osteoarthritis onset and progression. Some evidence indicates that the abnormal motion at the knee often precedes degenerative changes. With decreased tibiofemoral rotation as a mechanism contributing to the development of cartilage degradation. People with medial compartment knee Osteoarthritis demonstrate an internal rotation bias with decreased tibiofemoral rotation compared to their unaffected age matched counterparts.

While option exists to treat pain due to Osteoarthritis, few treatments can affect the above-mentioned factors underlying Osteoarthritis. Muscle strengthening through resistance exercise (RX) increases physical function, decreases pain due to Osteoarthritis, reduces Components of a RX program include resistance load, repetitions, velocity of movement and frequency of sessions per week. A periodic increase in the resistance load for each exercise permits continued muscular adaptations over time. Strength is best improved with lifting heavier loads with fewer repetitions, whereas muscle endurance is optimized by lifting lighter weights with more repetitions. RX can be described in terms of workload (number of repetitions at a given weight).

When exercise total workload is kept constant, high-intensity (~6 to 8 repetitions at 80% of 1RM) and low-intensity (~12 to 15 repetitions at 60% of 1RM) induce similar strength and health adaptations in elderly women.

METHODS

Study Design: Experimental study.

Sampling Method: Convenient sampling.

Sample Size: 30 subjects.

Inclusion criteria: Patients with mild to moderate knee Osteoarthritis. Gender only Female. Patients age 40-55 years. Grade II Kellgren and Lawrence classification on plain X-ray. Osteoarthritis of one or both knee. Obesity.


PROCEDURE

Thirty individuals were selected according to inclusion and exclusion criteria. The consent was obtained from the participants. Participants were explained about the risk factors, safety, and procedure of the study. All the participants were selected according to a convenient sampling technique. Subjects are allocated into the, Control Group-A fifteen individuals, Group-B fifteen individuals. The Group A received Strengthening of Knee Flexors Exercise are first level is Prone Hamstring Curls exercise for 10 minutes, progress to weights are applied to the distal leg, and progress tostanding knee flexion/hip extension against weight cuff for during 20 minutes. The Group B Strengthening of knee extensors exercise are first level is isometric quads Set for 10 minutes, progress to terminal knee extension exercise for 20 minutes, and progress to stationary cycle ergometer exercise for 32 minutes. Before initiation of the treatment session, VAS and Push and Pull Hand Held Dynamometer are done as a pre-test outcome. The patient was asked to be seated for few minutes and they were explained about the procedure after which therapist demonstrated the exercises to the patient and the outcomes were measured with the same protocol of VAS and Push and Pull Hand Held Dynamometer of the pre-test is repeated in post-test measures following the treatment procedure.

RESULTS

The collected data has been tabulated, analyzed using descriptive and inferential statistics. Hence, the parameters mean and standard deviation where it was used for paired t-test to analyze significant changes between pretest and posttest
measurement. From statistical analysis made with the quantitative data revealed statistically significant between pre and post-test values. The study included 30 subjects in the study. The age group 40-55 years had 30 females and the age group years. In this study there are 30 Osteoarthritis knee female patients grade 2. The comparison of Visual Analogue Scale and the Mean values in pre-test was 7.53 and post-test was 3.00 and the t value was found to be 34.00 with significant P value less than 0.0001. This clearly shows that the post-test values were statistically significant. The comparison of muscle strength of quadriceps muscle using the push and pull dynamometer in table 2 and graph 2 shows the statistically mean value in the pre-test as $25.3 \pm 2.41$ and post-test value as $40.16 \pm 3.12$ and the t value was $17.7687$ with significant P value less than 0.0001. This clearly shows that the post-test values were statistically significant.

The collected data were tabulated and analyzed using descriptive and inferential statistics. To all parameters mean and standard deviation (SD) was used. A paired t-test was used to analyze the significant changes between pre-test and post-test measurements. An unpaired t-test was used to analyze significant changes between the two groups.

### Table 1: Comparison of pre and post-test value for VAS and HHD

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>'t' test</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard deviation</td>
<td>Mean</td>
<td>Standard deviation</td>
</tr>
<tr>
<td>VAS</td>
<td>7.53</td>
<td>0.52</td>
<td>3.00</td>
<td>0.01</td>
</tr>
<tr>
<td>HHD</td>
<td>25.3</td>
<td>2.41</td>
<td>40.16</td>
<td>3.12</td>
</tr>
</tbody>
</table>

The findings of this study have shown that strengthening of knee flexors and knee extensors by applying resistance i.e. weight cuff and machines are all effective for improving quadriceps muscle strength and also reduces pain in female patient with knee Osteoarthritis.

### CONCLUSION

The findings of this study have shown that strengthening of knee flexors and knee extensors by applying resistance i.e. weight cuff and machines are all effective for improving quadriceps muscle strength and also reduces pain in female patient with knee Osteoarthritis.

### DISCUSSION

Resisted exercises have been used by investigators as a rehabilitation protocol for patients with osteoarthritis knee for improving quadriceps muscle strength and reducing pain. The results of the present study revealed that resisted exercise demonstrated a significant/slight increase in quadriceps muscle strength, as measured by push and pull dynamometer. The improvement in muscle strength of patients agrees with previous findings reported in literature of good to excellent results after a resisted exercise protocol. Although all patients reveal significant improvement in quadriceps muscle strength, the issues of specificity of training and reports in the literature lead one to expect that resisted exercises would demonstrate more functional benefits from the training program.

Also, since the resisted exercise develops more tension in the muscle and in the proprioceptors in and around the joint and muscles producing the movement thereby improving the training effect, this may be the primary factor in improving...
This study shows those resisted exercise programs leads to a minor improved subjective and clinical outcome in patients with osteoarthritis of knee and also suggest that this type of treatment is more effective than the other program in the treatment of osteoarthritis knee patients. The limitation of this studies are the sample size is less, no proper follow up data was collected, study duration study.To make the study more valid, long term study with large sample size is recommended. Further studies are recommended to analyse the effect of other modified exercise regimen.

LIMITATIONS & RECOMMENDATIONS
The sample size is less and the study duration was minimal, the study can be done in larger sample size & can be done in different age groups

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CONFLICT OF INTEREST
The authors declare no conflict of interest.

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