Effects of Isometric and Isotonic Exercises in Osteoarthritis of Knee in Females of Karachi

Mahwish Shamim¹, Nazish Rafique²

ABSTRACT:
Objective: The purpose of this study is to analyze the effects of isometric and isotonic exercises in knee osteoarthritic patients. In this study 22 patients, between 45 yrs – 75 yrs of age, suffering from knee osteoarthritis were included. Out of which 11 patients performed isometric exercises for 10 days and 11 patients performed isotonic exercises for 10 days. They were assessed by visual analog scale, range of motion, Lysholm knee scale. Pain score was found to decrease after 1 week of exercises. Both of the isometric and isotonic exercises were effective in knee osteoarthritis. However isometric exercises are more effective than isotonic exercises in knee osteoarthritic pain, when compared with the isotonic exercise regime. Although isotonic exercise resulted in significant changes in pain and functional parameters but it is much lesser compared to isometric exercise regime.

Key words: Osteoarthritis; exercise; isometric; isotonic; strengthening; stretching; range of motion; NSAIDs.

INTRODUCTION
Osteoarthritis of the knee is a common cause of chronic lower limb disability in the elderly¹. Prevalence increases with age, and radiographic abnormalities are present in more than 30% of persons over 65 years of age, with approximately 40% of these persons being symptomatic².

Progression of knee osteoarthritis produces joint effusion, pain, deformity, decreased range of motion and quadriceps muscle weakness, which limits daily activities. Quadriceps muscle weakness is usually present in knee osteoarthritis patients, although this weakness is not directly related to the degree of pain³.

Exercise therapy has been a useful treatment option for the majority of knee osteoarthritis patients.

These are some examples of isometric and isotonic exercises. A lot of research has been published on the effects of muscle exercise on muscle strength and functional ability⁴⁻⁵.

Isometric Exercise:
Isometric exercise is a mode of speed constant exercise. The patient contracts the muscle at various isometric hold angles in the range of motion, as preset. The isometric muscle strengthening exercise program consisted of 10 repetitions at the maximum velocity⁶.

Hamstring isometric
Calf isometric
Quads isometric
Short Arc Quads

¹: Associate Professor, Dept. of Physical Therapy and Rehabilitation Medicine, Baqai Medical University, Karachi.
²: Final Year Student, Baqai Institute of Physical Therapy and Rehabilitation Medicine, Baqai Medical University, Karachi.
**Isotonic Exercise:**
Isotonic exercise is a mode of speed-variable exercise. The tension is generated by the muscle in response to a force in both the concentric and eccentric directions.7.

The isometric muscle strengthening exercise program consisted of 5 repetitions of Concentric/Eccentric at the maximum velocity7.

The purpose of this study is to analyze the pain and changes in functional activities in knee osteoarthritis patients.

**MATERIAL AND METHODS**
A total of 22 patients having knee osteoarthritis were randomly selected, 11 of which were treated with modalities and isometric exercises while the rest 11 were treated with modalities and isotonic exercises.

Inclusion criteria: females, BMI = 30, age =45 years and ≥75 years, hypertensive and osteoporotic patients, having no evidence of malignancy and having no evidence of infection on the skin over knee joints.

Exclusion criteria: age less than 45 years and more than 75 years, having any evidence of malignancy, having morning stiffness, for more than 30 minutes, some evidence of infection on the skin over the knee joints.

The nature of the study was discussed with the patients and written consent was taken. History, clinical examination and relevant investigations were done. The findings were recorded at first attendance and follow up was done after 10 visits.

The parameters used for comparing the treatment are visual analogue scale8, range of motion (ROM) of the knee and Lysholm Knee Scale9.

The numerical data were analyzed statistically. The results were expressed as mean ± SD and the level of significance was expressed by p-value. The t' tests was done to see the level of significance.

**RESULTS**
Significant improvement was noted after treatment in both the groups (p =0.001).

In comparison between two groups, it was noted that there is significant difference in pre-treatment assessment scores between the two groups i.e. those who were treated with isometric exercises and isotonic exercises. Finally it was found that there is significant improvement in isometric exercise group as compared
to the isotonic group. Differences in the therapeutic effects of various strengthening exercises should be identified.

Therapeutic exercise has a major influence on kinesiology. An appropriate exercise mode should be selected in accordance with the patient's condition. In our study, 10 visits of isometric or isotonic strengthening improved pain and daily functions. Table-1: The VAS Score of knee pain in each group before and after treatment

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Isometric</th>
<th>Isotonic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>5.36±1.33(11)</td>
<td>5.27±1.44(11)</td>
</tr>
<tr>
<td>After</td>
<td>2.18±1.43(11)</td>
<td>3.36±1.82(11)</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Pain and functional disability are the most common symptoms of patients with knee osteoarthritis. These are associated with cartilage and bone degeneration (articular level); with muscular weakness and limitation of joint motion (kinesiologic level); and with anxiety, obsession with symptoms, and possibly depression (psychologic level). Drugs, physical modalities, and the role of exercise in the treatment of osteoarthritis of the knee have played important role 10-11. The strengthening of the musculature with isometric muscle is more than isotonic-resistive exercises. In isometric exercises significant improvement was noticed in quadriceps strength, reduction of pain, and improved function. An isometric and isotonic strengthening exercise program improved the functional status of patients with knee osteoarthritis 12.

**Effects of exercises:**

An isometric exercise was affected in ten patients, isotonic exercises were affected in seven patients and rest of five patients received no effects.

Therapeutic exercise has a major influence on kinesiology. An appropriate exercise mode should be selected in accordance with the patient's condition, and variations in the therapeutic effects of various strengthening exercises should be identified. In our study, 10 visits of isometric or isotonic strengthening improved pain as well as daily functions.

Quadriceps weakness is common in patients of knee osteoarthritis and the isotonic exercises improve the quadriceps weakness. In knee osteoarthritis the ratio of quadriceps and hamstring muscle strength is important for the stability of the knee and for the excessive stress on the knees.

This study showed that isometric exercises are more effective than isotonic exercises. Although isotonic exercises have great importance and improved muscle strength, the isometric exercises relieved pain quickly and further the isotonic exercises used for strengthening of the muscles. It is very important to increases the muscle strength in knee osteoarthritis after relieving pain so the isotonic exercises were used to improve the muscle strength.

Both types of exercises have their own significance in the rehabilitation program and also give good results.

**CONCLUSION**

Although isotonic exercise resulted in significant changes in pain and functional parameters but compared to isometric exercise regime, it is much less. Isometric exercises were more effective than isotonic exercises because the isometric exercises show quick response against pain and also improved the functional abilities. Muscle strengthening exercise like isotonic is found to have better effect when it is used in adjunct to NSAIDs in osteoarthritis of knee joint.
REFERENCES:


