The Effects of Combined Balance and Strengthening Exercise Program in Patients with Different Grades of Primary Knee Osteoarthritis

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Introduction

The knee is one of the most commonly affected joint in (osteoarthritis) OA, as it is exposed to high stress and use of the joint. Around 250 million people are affected by knee OA (KOA) worldwide. KOA affects patient’s physical function, dynamic balance and stability. Several factors believed to have a role in affecting balance in patients with KOA such as muscle weakness, knee pain, decreased proprioception, limitation of joint range of motion and knee joint laxity. Physical exercise is the most recommended conservative treatment for patients with KOA. In patients with mild to moderate KOA, pain, physical function and dynamic balance have shown significant improvement after fulfilling an exercise program. There is lack of data regarding the effect of combined strengthening and balance exercise on patients with different severity grades of KOA. Previous studies either assessed the effect of exercise on a specific severity grade of KOA or assessed the effect of exercise on KOA patients regardless of their radiographic severity.

Results

The aim of this study was to assess the effect of combined balance and strengthening exercise program in patients with different grades of primary KOA.

The study was conducted on eighty patients diagnosed with primary KOA according to the 2010 (EULAR) evidence-based recommendations for the diagnosis of knee OA. Patients were divided into four groups (20 patients each) according to knee severity based on Kellgren and Lawrence (KL) grading scale of KOA. All patients underwent an exercise program; including balance and strengthening training 3 times a week for 6 weeks. Patients were assessed before and after fulfilling the exercise program by: Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) for Pain and physical function evaluation, timed up and go test for physical function evaluation and modified star excursion balance test (MSEBT) for dynamic balance evaluation.

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Table (1): Comparison between the different studied groups according to Total WOMAC score

<table>
<thead>
<tr>
<th>WOMAC</th>
<th>Group 1 (n = 20)</th>
<th>Group 2 (n = 20)</th>
<th>Group 3 (n = 20)</th>
<th>Group 4 (n = 20)</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total score (Mean ± SD)</td>
<td>45.81 ± 11.99</td>
<td>43.70 ± 10.65</td>
<td>48.40 ± 11.07</td>
<td>35.15 ± 11.77</td>
<td>9.27 (0.001)</td>
<td>13.43 (0.001)</td>
</tr>
<tr>
<td>Percentage of change (Mean ± SD)</td>
<td>24.85 ± 11.99</td>
<td>25.65 ± 8.54</td>
<td>23.75 ± 7.77</td>
<td>24.20 ± 8.75</td>
<td>0.76 (0.48)</td>
<td>0.50 (0.60)</td>
</tr>
<tr>
<td>Sig. bet. Grps</td>
<td>p = 0.488, p = 0.051, p = 0.002, p = 0.006, p = 0.348</td>
<td></td>
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</tbody>
</table>

Table (2): Comparison between the different studied groups according to MSEBT

<table>
<thead>
<tr>
<th>MSEBT</th>
<th>Group 1 (n = 20)</th>
<th>Group 2 (n = 20)</th>
<th>Group 3 (n = 20)</th>
<th>Group 4 (n = 20)</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior (Mean ± SD)</td>
<td>65.74 ± 7.91</td>
<td>76.02 ± 10.14</td>
<td>68.91 ± 9.52</td>
<td>75.70 ± 8.00</td>
<td>7.77 (0.001)</td>
<td>4.89 (0.001)</td>
</tr>
<tr>
<td>Mean difference (Mean ± SD)</td>
<td>10.28 ± 5.91</td>
<td>6.79 ± 6.60</td>
<td>6.34 ± 6.54</td>
<td>4.31 ± 5.92</td>
<td>8.02 (0.04)</td>
<td>3.25 (0.004)</td>
</tr>
<tr>
<td>Sig. bet. Grps</td>
<td>p = 0.088, p = 0.069, p = 0.055, p = 0.956, p = 0.287, p = 0.337</td>
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</tbody>
</table>

Conclusion

All four studied groups of KOA regardless of the OA grading showed improvement in the degree of pain, physical function and dynamic balance. Patients with mild KOA might benefit more from early exercise program that includes both strengthening and balance training.