EFFECT OF LOW INTENSITY TRAINING ON FALL-RELATED RISK FACTORS IN ELDERLY WOMEN - A PILOT STUDY.

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INTRODUCTION

Old people experience fall episodes during activities of daily living more often than young. Every year around 50% of the 70 year old fall and the number increases exponentially with increasing age. Approximately 10% of the falls result in soft tissue lesions and fractures. Hip fractures alone constitutes a major and growing socio-economic problem since almost 50% result in permanent disability and 20% in admission to nursing homes. Epidemiological studies have identified a number of risk factors for hip fractures, e.g. decreased muscle strength, inadequate balance and low walking speed, falls during the previous year and fractures of the upper extremity (Tinetti & Speechley 1989, Dargent-Molina et al.1996). Additionally, several studies have shown that a strong relationship exists between inactivity and the decreased muscle strength and cardiovascular fitness, seen in older people. Therefore the aim of this pilot study was to investigate if regular low intensity training could reduce some of the risk factors in a population with increased risk of falling.

METHODS

Home dwelling women over 70 year, who had been examined and treated at a hospital emergency room after a fall accident were recruited to the project. Of the 40 that were contacted by telephone 12 were included in the project, with a mean age of 76.3 years (70-81). The participants should be able to train in groups and consequently exclusion criteria were: fractures of pelvis and lower extremities, neurological diseases, dependency on assistive devices such as a walker and finally dementia.

After inclusion, baseline information of perceived general health, social background and network were obtained through a questionnaire. Fear of falling was assessed by the activity-specific balance confidence scale (ABC scale, Powell & Myers 1995), where total confidence corresponds to a score of 100. A medical examination was performed. Baseline assessments included Berg's Balance Scale, a functional test with 14 items and a maximum score of 56 points (Berg 1992), a 30 m walking test, where normal and maximal speed was recorded, and isokinetic peak torque of knee extensors (KE) and flexors (KF) at low and high angular velocity, measured in a CYBEX 6000.

The women were subsequently randomized to 2 different training groups. One group performed bicycle training and the other group low load resistive training of the muscles in the lower extremities and both groups performed flexibility and balance training. Training sessions were 1 hour twice a week for 3 months.

RESULTS

There were no significant differences between the groups and consequently the data were pooled for statistical analyses.

Prior to entering the study 10 of the women had experienced two or more fall episodes during the previous year, and all but one of the women had various degrees of musculo-skeletal disorders, hypertension or heart disease. Walking speed and muscle strength was low, approximately 30% lower than expected in an agematched normal population.

Mean participation in the training was 11/2 hours per week in both groups. After 3 months of training all risk factors were improved, i.e. there was a highly significant...
increase of 20-60% in the measured parameters as shown in the table. Except for the maximal walking speed, increases during the next 3 months were not significant in 7 participants who continued training. After 6 months of training muscle strength, balance and walking speed was equal to that found in an age-matched normal population, and fear of falling was reduced by 30%. Three of the participants had fallen once during the training period, but none had sustained any injury.

TABLE  Baseline and training effect after 3 and 6 months on walking speed, muscle strength, balance and balance confidence (mean±SE).

<table>
<thead>
<tr>
<th></th>
<th>Baseline (n=12)</th>
<th>3 months (n=11) @</th>
<th>6 months (n=7) @@</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal walking speed (m/s)</td>
<td>1.01 ±0.05</td>
<td>1.15 ±0.05*</td>
<td>1.23 ±0.03</td>
</tr>
<tr>
<td>Maximal walking speed (m/s)</td>
<td>1.31 ±0.06</td>
<td>1.47 ±0.05 *</td>
<td>1.60 ±0.05 #</td>
</tr>
<tr>
<td>Isokinetic, concentric KE peak torque, 60°/s (Nm)</td>
<td>52.1 ±7.1</td>
<td>64.8 ±7.0 *</td>
<td>68.1 ±9.6</td>
</tr>
<tr>
<td>Isokinetic, concentric KE peak torque, 180°/s (Nm)</td>
<td>34.3 ±3.3</td>
<td>39.6 ±3.8 *</td>
<td>42.7 ±4.7</td>
</tr>
<tr>
<td>Isokinetic, concentric KF peak torque, 60°/s (Nm)</td>
<td>20.5 ±2.7</td>
<td>28.3 ±3.2 *</td>
<td>33.3 ±4.8</td>
</tr>
<tr>
<td>Isokinetic, concentric KF peak torque, 180°/s (Nm)</td>
<td>13.3 ±1.9</td>
<td>19.8 ±2.0 **</td>
<td>21.3</td>
</tr>
<tr>
<td>Berg Balance Scale</td>
<td>50 ±0.9</td>
<td>54.7 ±0.5 **</td>
<td>55.0 ±0.4</td>
</tr>
<tr>
<td>ABC score</td>
<td>63.7 ±6.0</td>
<td>90.45 ±1.6 on</td>
<td></td>
</tr>
</tbody>
</table>

@ One of the participants were ill for a period, and could not be tested.
@@ Data on seven women who continued training after 3 months.
Significant differences: 0-3 months (* p<0.05, ** p<0.01), 3-6 months (# p<0.05), 0-6 months (en p<0.01).

DISCUSSION

The results of this study demonstrate that elderly women with increased risk of falling gain in muscle strength, walking speed and balance performance by regular physical training. Probably due to the improved physical capacity and balance, the participants felt more confident as seen in the ABC score, and consequently they reported to be more active than before training. The lack in difference between the endurance and strength group could be explained by the fact, that the initial physical capacity was very low, and thus both bicycling and resistive training represented sufficient stimulus to improve muscle strength. Finally, this pilot study indicates that even low load, low dosage training can improve risk factors for falling and balance confidence in elderly women.

REFERENCES