MRI EVALUATION OF MUSCLE ACTIVATION ASSOCIATED WITH THREE Tibialis Posterior EXERCISES

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Abstract

Introduction

Current treatment of tendon injuries includes rest, NSAIDs, correction of malalignments, stretching and strengthening exercises. Exercise frequently aims to progressively stress a muscle and its musculotendinous junction in order to promote tissue adaptation without additional injury. Current guidelines for tibialis posterior strengthening, based on anatomic and functional knowledge, have not been assessed empirically.

One method for estimating the relative activation of a muscle during exercise is to compare MRI signal intensity of the muscle recorded immediately before and after an exercise. A significant increase in MRI signal intensity following exercise reflects that the muscle was active during exercise.

The purpose of this study was to determine which exercise most selectively recruited tibialis posterior. Due to the muscle’s unique multi-joint and multi-planar action, we hypothesized that a uni-planar motion (foot adduction-abduction) with additional demand on control in other planes (plantar flexion, inversion and eversion) would most selectively activate tibialis posterior.


tables

Table 1 Results of pos-hoc t-test analyses of normalized muscle activation between exercises.

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Gastroc</th>
<th>Peroneus</th>
<th>Tibialis Anterior</th>
<th>Soleus</th>
</tr>
</thead>
<tbody>
<tr>
<td>INV-EV</td>
<td>100</td>
<td>85</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>ADD-ABD</td>
<td>85</td>
<td>100</td>
<td>70</td>
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<td>HR</td>
<td>70</td>
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<td>100</td>
</tr>
</tbody>
</table>

References


Conclusions

TP was most selectively and effectively recruited during seated slow foot adduction and abduction with resistance in individuals with an Arch Index within 1SD from norm.

This study provides insight into lower leg muscle activation specificity.

Future research is required to determine the extent to which this information can be applied to exercise prescription for persons with tibialis posterior tendinopathy.

Acknowledgment

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