Effects of a Hamstring Strengthening Programme on Agility in Footballers

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Abstract

The purpose of this study was to test any effect an eccentric hamstring strengthening program (EHS) has on agility in semi-professional football players. The pilot trialled, 8 week EHS intervention consisted of Nordic hamstring exercises and foot-elevated hip-lifts.

Agility was tested using the Illinois Agility Test (IAT) pre and post EHS intervention. Participants were male semi-professional footballers from one football club. There was a significant mean improvement ($p = 0.004$) between pre & post IAT times across both groups but a non-significant ($p = 0.769$) mean improvement of IAT times was found in the intervention group, compared to the control.

The EHS programme from this study, used in conjunction with other training may produce favourable adaptations to agility performance in footballers. It is stressed that eccentric strength training should only be part of an optimum agility training programme which includes components such as plyometrics, core strength and technical skills. Keywords: Hamstring, Nordic, Eccentric Strengthening, Agility

Method

In week 1 after a 15 min warm-up, participants randomly completed the pre-IAT twice, with their best time recorded. By drawing lots, the participants were randomly selected into control (NH=8, M=24yrs, SD=5yrs) and intervention (N=8, M=26yrs, SD=5yrs) groups. All players performed the same pre-season training, the intervention group additionally performing the supervised EHS. This consisted of two sets of the NH and FHL exercises at least once per week. All participants performed no other lower limb exercises for the duration of the eight week study.

![Participant performing the Nordic Hamstring exercise](image)

Mean Illinois Agility Test times

<table>
<thead>
<tr>
<th>Week</th>
<th>Control</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17.5</td>
<td>17.3</td>
</tr>
<tr>
<td>9</td>
<td>16.2</td>
<td>16.0</td>
</tr>
</tbody>
</table>

All intervention group players completed at least 6 sessions in the 8 weeks, with one participant completing the EHS 12 times. In the ninth week all available players repeated the IAT in random order after a 15 min warm up. Pre and post IATs were performed on grass and it was stipulated that participants must wear the same footwear for all IAT attempts. Data was analysed using SPSS 17.0. T-tests found no significant anthropometric differences between groups. A Shapiro-Wilk normality test and a repeated-measure ANOVA tested the results.

Valid results were obtained from 5 intervention and 6 control group participants. Mean IAT times are displayed below:

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre IAT (SD)</th>
<th>Post IAT (SD)</th>
<th>Pre-post difference (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>17.41 (0.44)</td>
<td>16.77 (0.39)</td>
<td>-0.64 (0.85)</td>
</tr>
<tr>
<td>Intervention</td>
<td>17.11 (0.30)</td>
<td>16.36 (0.56)</td>
<td>-0.75 (0.57)</td>
</tr>
</tbody>
</table>

The intervention group averaged a marginal $\frac{1}{4}$ second faster improvement compared to the control group. The ANOVA within group main effect showed a significant decrease across both groups’ pre & post times, $F(1,9) = 15.139$, $p = 0.004$. The ANOVA interaction effect across pre & post times between control and intervention groups was found to be $F(1.9) 0.092$, $p = 0.769$. The experimental hypothesis was therefore rejected.

Results

Conclusions

The small number of participants in this study was a major limitation, reducing the power and potentially limiting the significance of the results. The small size of intervention group did offer the advantage of being easy to supervise, therefore adherence to programme was much better than previous studies. It was not practical to test hamstrings isokinetically, therefore it cannot be proven that the study EHS actually increased hamstring strength. The validity is based on previous research (Brockett et al., 2001; Mjolsnes et al., 2004 & Clark, 2005).

The validity of any agility test as a measure of footballers performance is debatable. The idea that agility requires physical, cognitive and technical skills (Sheppard & Young, 2006) suggests the need for a more function-specific test. Future research with a EHS should include tests that have been found to correlate well with football performance (1-rep max squat, 10m sprint & vertical jump height).

NH exercises have produced favourable results in terms of injury risk reduction and increased eccentric hamstring torque. The rationale of the FHL was that it functionally addresses unilateral weakness and focuses on hip extension, core and knee stability. More research is needed into the effects of multi-joint, core strength exercises such as the FHL. No significant relationship between hamstring strength training and agility was found in this study.

References