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.

Key-words: Hamstring, Nordic, Eccentric Strengthening, Agility

Introduction

Recent studies (Arnason *et al.* 2008) have focused on the success an EHS has on decreasing hamstring injury risk. Inclusion of specific EHS into footballers training programs has been advocated, however very few studies have demonstrated any effect these programmes have on functional performance. Players are expected to possess well-developed aerobic endurance, lower limb power, technique, positional awareness and agility (Mujika, 2009).

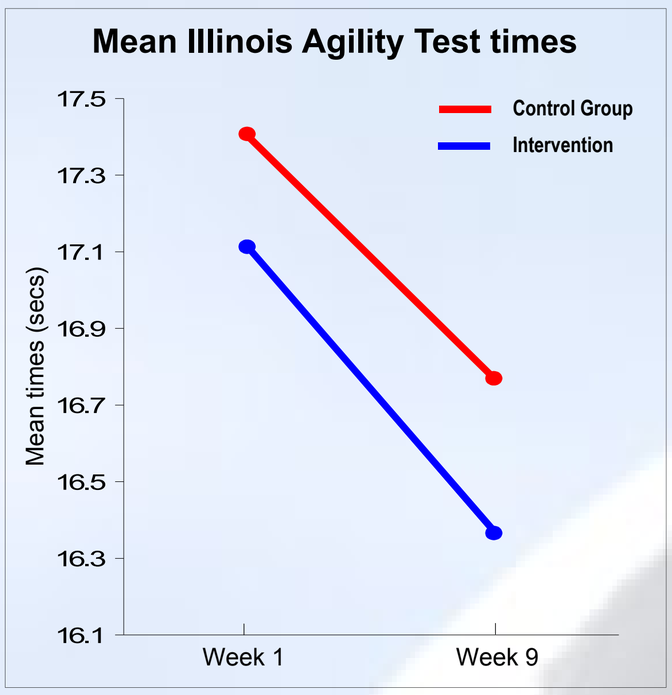
There is no consensus as to a definition of agility in sport (Sheppard & Young, 2006) and a multitude of agility tests have been published. A test that was familiar to the author and has been established as a valid test of 'agility' is the IAT (Millar *et al.*, 2006). Eccentric hamstring strength training has been shown to significantly increase hamstring peak torque and decrease the angle of peak torque towards more straightened knee, thereby aiding stability of the knee during functional activity.

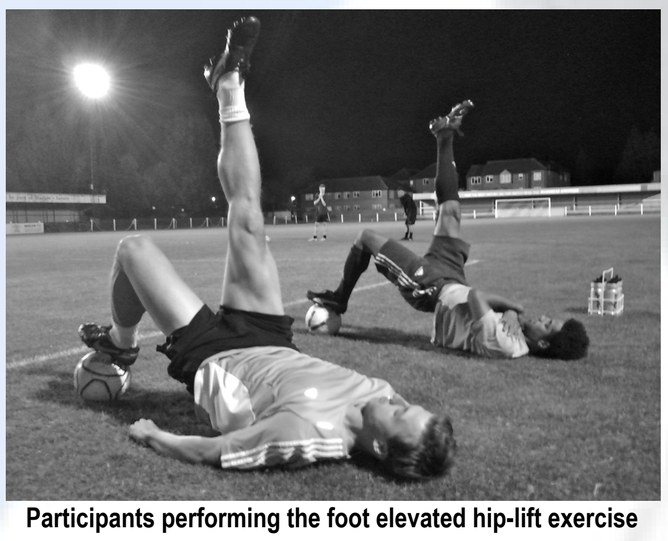
A field-based exercise used for eccentric hamstring strengthening is Nordic Hamstrings (NH), (Mjolsnes *et al*., 2004; Clark *et al*., 2005; Gabbe *et al*., 2006 & Arnason *et al*., 2008). The EHS used this study incorporated Nordics with a foot elevated, hip-lift exercise (FHL) (Boyle, 2004) which was used to try to address unilateral leg strength imbalances that could be exaggerated by NH (Clark, 2005). The experimental hypothesis of this study was that increasing eccentric hamstring strength of semi-professional footballers would significantly improve their agility as measured by an IAT, compared to a control group.

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 (N=8, M=24yrs, SD=5yrs) and intervention (N=8, M=26yrs, SD=5yrs) groups. All players performed the same preseason 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





Participants performing the foot elevated hip-lift exercise

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-Wilks normality test and a repeated-measure ANOVA tested the results.

Results

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

Mean times (SD) (secs)	Pre IAT	Post IAT	Pre-post difference
Control	17.41 (0.44)	16.77 (0.39)	-0.64 (0.60)
Intervention	17.11 (0.30)	16.36 (0.56)	-0.75 (0.57)

The intervention group averaged a marginal $^{1}/_{10}{}^{th}$ 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.

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 *et al.*, 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 stabilisation. 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.

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