

ORIGINAL RESEARCH

DYNAMIC HIP ADDUCTION, ABDUCTION AND ABDOMINAL EXERCISES FROM THE HÖLMICH GROIN-INJURY PREVENTION PROGRAM ARE INTENSE ENOUGH TO BE CONSIDERED STRENGTHENING EXERCISES – A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Training intensity is an important variable in strength training and above 80% of one repetition maximum is recommended for promoting strength for athletes. Four dynamic and two isometric on-field exercises are included in the Hölmich groin-injury prevention study that initially failed to show a reduction in groin injuries in soccer players. It has been speculated that exercise-intensity in this groin-injury prevention program was too low to induce the strength gains necessary to protect against groin-related injuries.

Purpose: To estimate the intensity of the six exercises from the Hölmich program using electromyography (EMG) and possibly categorize them as strength-training exercises.

Study Design: Cross-sectional study.

Methods: 21 adult male soccer players training >5 hours weekly were included. Surface-EMG was recorded from adductor longus, gluteus medius, rectus abdominis and external obliques during isometric adduction against a football placed between the ankles (IBA), isometric adduction against a football placed between the knees (IBK), folding knife (FK), cross-country skiing on one leg (CCS), adduction partner (ADP) and abduction partner (ABP). The EMG-signals were normalized (nEMG) to an isometric maximal voluntary contraction for each tested muscle.

Results: Adductor longus activity during IBA was 84% nEMG (95% CI: 70-98) and during IBK it was 118% nEMG (95% CI 106-130). For the dynamic exercises, ADP evoked 87% nEMG (95% CI 69-105) in adductor longus, ABP evoked 88% nEMG (95% CI 76-100) in gluteus medius, FK evoked 82% nEMG (95% CI 68-96) rectus abdominis, and 101% nEMG (95% CI 85-118) in external obliques. During CSS <37% nEMG was evoked from all muscles.

Conclusion: These data suggest that exercise-intensity of all the six investigated exercises in the Hölmich groin injury prevention program, except cross-country skiing, is sufficient to be considered strength-training for specific muscle groups in and around the groin region.

Level of Evidence: 3

Key words: Abdominals, adductor longus, electromyography, gluteus medius, soccer

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