28th ECSS Anniversary Congress, Paris/France, 4-7 July 2023

Maximum Velocity Sprint Training: A case study investigating eccentric hamstring strength, fascicle length and force, velocity, and power profiling in semi-professional Australian football.

Freeman, B., Talpey, S., James, L., Opar, D., Young, W.

Federation University Australia & The University of Notre Dame Australia

INTRODUCTION:
Sprint training is viewed as important for hamstring strain injury (HSI) prevention in Australian Rules Football (AF). Eccentric hamstring strength and biceps femoris long head (BFLH) fascicle length are modifiable risk factors for HSI. Maximum velocity sprint training has been viewed as less important than acceleration training for AF. Analysis of the influence of maximum velocity sprinting on force production and work completed shows a significant increase between 80% and 100% of maximum velocity. Therefore, maximum velocity training may provide a conditioning stimulus to the hamstrings that is not replicated in other training methods.
METHODS:
One Victorian Football League athlete (age = 19, height = 1.79, mass = 69.4kg) completed pre- and post-testing consisting of a 40-metre sprint, which was also analysed utilising the MySprint application. The 40-metre sprint included a 0-10-metre split to measure acceleration, and a 30-40-metre split to measure maximum speed. This was followed by an eccentric hamstring strength assessment, and an ultrasound scan of the hamstrings. The athlete then completed six weeks of maximum velocity sprint training that aligned with best practice recommendations (weekly volume = 130-210m). In these sessions, a gradual acceleration was utilised to achieve a higher maximum velocity. This consisted of two sessions per week, separated by a minimum 48 hours. A weekly ultrasound was completed 24 hours after the last session of the week. Ethical approval along with informed consent was obtained prior to the commencement of this investigation.
RESULTS:
Fascicle length increased by 1.31cm. Acceleration and maximum velocity qualities improved (0.05s and 0.15s, respectively). Eccentric hamstring strength displayed no change (pre = 343N, post = 337N), however, muscle symmetry improved (pre = 21%, post = 11%). The force-velocity-power profile displayed improved peak power (pre = 17.83 w/kg, post = 19.05 w/kg).
CONCLUSION:
The volume of sprint training was suitable to improve sprint performance and increase fascicle length in this athlete. The average eccentric hamstring strength remained unchanged, however, this may be because the training load was insufficient to elicit a positive adaptation. Despite completing targeted maximum velocity training, a small increase was observed in acceleration qualities. This is encouraging from a performance perspective. Similarly, the improved Force-Velocity-Power profile is evidence of the potential benefits that results from a maximal sprint, where key determinants of success, such as peak power, peak force, and the ratio of forces can all improve with exposure to a relatively low volume of training. The improvements in fascicle length over a short intervention are further rationale to include maximum speed sprinting as a part of a multifactorial approach to physical preparation and injury prevention. Findings indicate maximum speed sprint training was likely effective in improving sprint performance and muscle architecture.

Topic: Training and Testing

Presentation E-poster

European Database of Sport Science (EDSS)

Supported by SporTools GmbH

34753