The Effects of Functional Fatigue and Trunk Muscle Fatigue During Functional, Semi-Functional, and Static Balance Tasks in Male Soccer Players

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Abstract

Background: Balance and core stability are critical components of athletic performance, particularly in soccer, where fatigue can significantly impact postural control and increase the risk of injury. This study aimed to investigate the effects of functional fatigue and trunk muscle fatigue on functional, semi-functional, and static balance tasks in male soccer players.

Methods: Forty-eight semi-professional male soccer players were randomly assigned to three groups: functional fatigue, core fatigue, and control. The functional fatigue group performed side-to-side lateral hops, while the core fatigue group completed a core muscle training circuit until volitional fatigue. Balance tasks, including the Timed Up and Go (TUG) test, modified Star Excursion Balance Test (SEBT), and Stork test, were assessed before and after the fatigue protocols. A two-factor Mixed Methods ANOVA was used to analyze the interactions between pre-post measurements and group differences, followed by post hoc tests to explore specific effects.

Results: Significant interactions were observed between pre-post measurements and groups for all balance tasks (p < 0.001). Both the functional fatigue and core fatigue groups showed significant declines in performance across functional, semi-functional, and static balance tasks post-fatigue, while the control group exhibited no significant changes. The functional fatigue group demonstrated the greatest decline in functional balance tasks, whereas the core fatigue group showed the most pronounced effects in semi-functional and static balance tasks.

Conclusion: The findings highlight that fatigue protocols differentially affect balance performance, with functional fatigue impacting joint coordination during dynamic tasks and core fatigue predominantly affecting stability in static and semi-functional tasks. These results suggest that incorporating fatigue-specific balance assessments could provide more ecologically valid insights into the demands of match situations, particularly for injury prevention and rehabilitation strategies in soccer players.

Keywords

Functional fatigue, Core fatigue, Balance, Soccer, Postural control.