UNIVERSITI TEKNOLOGI MARA

EFFECTS OF FATIGUE ON BIOMECHANICAL MARKERS OF ACL INJURY RISK DURING JUMP-LANDING AND SINGLE LEG HOP TASK

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

A higher prevalence of injuries occur during the latter stages of match-play may have been attributed to match related fatigue. In the first part of the study, the purpose was to determine the effect of high intensity short duration soccer-specific fatigue simulation (SFP^5) on physiological changes in recreationally trained soccer players. Twenty (n = 20; age = 25 ± 4.9 years, height = 169 ± 6.6 cm, body mass = 70 ± 10.3 kg) male recreational soccer players completed a 5 min high intensity soccer specific fatigue simulation (SFP^5). Prior to simulation (time 0 min), immediately after simulation (time 5 min) and 15 min (time 20 min) post-simulation, participants performed three trials of maximal counter movement jumps and subjective perceived exertions (RPE) were recorded. Heart rate changes were recorded every 1 min throughout the fatigue simulation. The heart rate and RPE were significantly increased at time 5 min ($p<.001$) and was consistent with physiological responses during high intensity bouts of actual match-play. Counter movement jumps performance significantly reduced at time 5 min ($p<.001$), indicating the effect of fatigue during simulation. There were no significant changes in heart rate, RPE and maximal counter movement jumps after 15 mins of passive rest. The physiological responses observed during SFP^5 are likely due to the inclusion of soccer-specific ball handling utility movements and high accelerations and deceleration, related with a short high intensity bout observed during soccer match-play. In the second part of the study, the effect of short duration high intensity soccer-specific fatigue simulation on jump-landing mechanics were investigated. In a single-group repeated measures design, eighteen (n = 18) male recreationally trained soccer players (age: 24 ± 4 years; body mass: 71 ± 10 kg; height, 169 ± 7 cm) completed a 5 min SFP^5. Prior to simulation (time 0 min), immediately after simulation (time 5 min), and 15 min (time 20 min) post-simulation, participants were tested for three trials of jump landing task assessed using the Landing Error Scoring System (LESS) and single leg hop (SLH) assessment. A significant increase in total LESS score (time 0 min: 3.6 ± 1.1; time 5 min: 4.8 ± 1.2; time 20 min: 4.4 ± 1.8) were observed over time ($P < .001$). Pairwise comparison shown that LESS score at time 5 min ($p = .001$) and time 20 min ($p = .001$) was significantly greater compared to time 0 min. No significant changes were observed in knee extension angle. However, hip extension angle was significantly increase in SLH ($p = 0.037$). Pairwise comparison revealed that the hip is more extended at time 20 min compared to time 5 min. These findings suggest a greater risk of ACL injury in male players as a consequence of jump-landing impairments during fatigue. A 15 minutes of passive rest may also increase the risk of injury. Our findings support the utilization of a short duration, high intensity soccer-specific fatigue simulation to effectively identify markers of ACL injury risk in soccer players. It is recommended to be include as part of preseason ACL injury risk screening and return to play assessment.

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