EFFECTS OF A VOLLEYBALL MATCH INDUCED-FATIGUE ON KNEE JOINT POSITION SENSE

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It has been suggested that a higher incidence of injuries at the last third of practice sessions or match could be related to alteration of the lower limb neuromuscular control due to neuromuscular fatigue. This fatigue-related effect can be mediated by changes in joint proprioception. In previous studies, muscle fatigue was usually induced by isokinetic dynamometer protocols. In athletes the use of functional fatigue protocols could have the advantage of being more close to the demands of the sport activity, and thus reflecting more specifically the neuromuscular and proprioception changes found in their sport settings. The purpose of the present study was to assess the effect of fatigue induced by a volleyball match on the knee joint position sense (JPS). 17 female volleyball athletes (18.9±4.2 yrs) playing on Portuguese National Team were included in this study. JPS measures were obtained prior to and immediately after a simulated 5 sets volleyball match. Exertion level was assessed at the end of the match using the Borg scale. The technique of open-kinetic chain and active knee positioning was used to evaluate knee JPS. Athletes were seated in a comfortable position, with the legs hanging freely, and blindfolded to block visual input. Passive positioning by the examiner was performed by slowly extending the knee from the starting position of 90° of flexion to a flexion angle between 40° and 60°. The athletes maintained the position actively for 5s; during this period they might attempt to identify the test position. After that, the examiner replaced the leg to the starting position, and instructed the athletes to actively reproduce the same knee angle that was passively positioned. One test position was investigated. Each athlete had performed three consecutive trials trying to reproduce the test position. The test and the response positions were recorded with a video camera. The Ariel Performance Analysis System software (Ariel Dynamics, CA, USA) was used to measure the knee angle from videotape records of the test/response positions. All the athletes completed the volleyball match (1h30min duration), reaching or exceeding the score 15 on the Borg scale (15.6±0.7), reporting "hard/heavy work". Significant increase in the absolute angular error from rest to after match was observed (1.33±0.6° to 3.44±1.38°; p<0.01) as well as in the relative angular error (0.54±1.14° to 2.25±3.01°; p<0.01). The relative error shows the directional bias in the extension movement (over-estimation of the test position). The reliability and accuracy in estimating knee angles, as showed by the variable error (standard deviation of relative error), decreased from rest to the fatigue condition. Concluding, the results of the present study have showed that fatigue induced by a volleyball match significantly change JPS in female volleyball athletes.

Keywords: Fatigue, Proprioception, Volleyball