Validity and Reliability of a New Device to Measure Type of Actions in Indoor Sports

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ABSTRACT

The purpose of this study was to analyze the validity and the reliability of the intensity ranges, number of actions and changes of direction measured by a commercial inertial measurement unit. Eleven elite youth futsal players performed a circuit with different type of displacements as sprinting, running at low-medium intensity, standing up and changes of direction. Data recorded by the Overtraq system were compared with video-analyzer during the six trials of each player. Standard error mean, Intraclass Correlation Coeficient and Coefficient of variation, were calculated to analyze the reliability of the device, as well as the Root Mean Square Error and Confidence Interval with correlation of Pearson for its validity. The results reported good validity for three intensity ranges (R2 > 0.7) with high reliability (Intraclass Correlation Coeficient: 0.8–0.9), especially for high intensity actions (Intraclass Correlation Coeficient: 0.95, Coefficient of Variation: 3.06 %). Furthermore, the validity for the number of different actions was almost perfect (96.3–100 %), with only small differences regarding changes of activity (mean error: 2.0 %). The Overtraq system can be considered as a valid and reliable technology for measuring and monitoring actions at different intensities and changes of direction in futsal, likewise common actions for other indoor sports.

Introduction

Team sports require the development of high intensity actions, as accelerations, decelerations, sprints, changes of directions, among others [1]. This type of movements needs high metabolic and neuromuscular demands, and are one of the keys on the individual and team performance, showing that these actions directly influence on the result of the competitions in different sports like soccer, basketball, among others [2]. Monitoring these actions in team sports should be fundamental during trainings and matches to give useful information for coaches [3].

During the last decades, different types of technologies have been designed to track and register concurrently several variables of physical performance in team sports, as global positioning systems (GPS), local position measurement (LPM), tracking systems, accelerometers, video-analyzers, etc. These devices are able to record and process the athletes' physical efforts during trainings or matches [4]. Thus, this information has enabled the analysis of actions, generating easier and faster reports with mean and individualised data about the key performance factors [5].

The most common device used for this goal in team sports is GPS, especially in football and rugby [6]. For instance, this technology can report number of accelerations, decelerations, mean of distance, etc. However, one of the main limitations of GPS is that it needs outdoor spaces and an open and free sky to track the ath-