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Kinematic evaluation of physical impairments of an elite Paralympic karateka

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Karate is a Japanese martial art that counts millions of practitioners worldwide and that is spreading also in Paralympic competitions, requiring accurate categories definition for disabled athletes. The aim of the study is to present kinematic data of an elite Paralympic karateka, in comparison with able-bodied athletes. The authors also aim to promote a better classification within the discipline, based on objective biomechanical evaluations of physical impairments. A male black belt Paralympic karateka (age: 36 y; body weight: 75.5 kg; height: 173 cm) with lower limbs impairments was evaluated. The athlete had been performing high level karate for 20 years before the disability took place. After the post-operative rehabilitation, he attended 3/4 sessions of para-karate training per week. He performed a standardized sequence of movements, involving a sequence of offensive and defensive techniques, (*kata*) from traditional *Shotokan* karate. Joints and body Center of Mass (CoM) kinematics were collected with an optoelectronic motion capture system and compared with those obtained in two groups of able-bodied (elite and amateurs) athletes from a previous study[1]. Knee angular range of motion (RoM) and peak angular velocity were obtained. Coordinates of CoM were estimated, using the Segmental Centroid Method[2], along with CoM average velocity and acceleration. To assess differences between Paralympic karateka and able-bodied groups, the one-sample t-test was performed. The sequence performed by the karateka lasted more than in both able-bodied groups. CoM average velocity and acceleration decreased in comparison with elite karateka. Knees range of movement and peak angular velocity were similar to amateur but lower than elite athletes. Results show that the physical impairments negatively affected the function of lower limbs in the Paralympic athlete. Fundamental skills in karate elite performance (dynamic balance control and joint RoM and angular velocity) were reduced.

1. *J Electromyogr Kinesiol*. 2015;25(6):894-900.
2. *Gait Posture*. 2014;39(1):460-465.