Surface electromyography in ballistic movement: a comparative methodological analysis from taekwondo athletes

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Abstract

Surface electromyography (sEMG) signal processing methods used to assess combat sports are heterogeneous. This research aims to compare the electromyography peak (peak EMG) in taekwondo athletes with five processing methods. Secondarily, the coefficient of variation (CV) and the noise percentage regarding the peak EMG (NPRP) were compared.The sEMG record of eight leg muscles of sixteen athletes (12 male and 4 female, ages 20.31+4.1 years) was consulted. The processing methods were: a) Smoothing 1, b) Smoothing 2, c) Root mean square (RMS) 1, d) RMS 2, and e) Empirical mode decomposition (EMD). Results indicate that the peak EMG differs among Smoothing 1 vs. EMD; Smoothing 2 vs. EMD; Smoothing 1 vs. RMS 2; Smoothing 2 vs. RMS 2; Smoothing 1 vs. RMS 1; RMS 1 vs. RMS 2; RMS 1 vs. EMD, and RMS 2 vs. EMD. For all cases p<.05 in seven of the eight muscles studied. No differences were found for the CV.The EMD NPRP was lower than the other methods analyzed (p<.05). As a conclusion, there are differences among the studied methods and should be considered when interpreting the peak EMG. The EMD seems to be a useful alternative for reducing noise and artifact movement. © Federación Española de Asociaciones de Docentes de Educación Física (FEADEF).

Author keywords
Combat sports; Data processing; Electromyography; Muscle activity