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Myoelectric comparison of table tennis forehand stroke using different ball sizes

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Abstract

The aim of this study was to examine the differences between forehand top spin strokes with 38 mm and 40 mm balls in table tennis. The participant was filmed as he executed the strokes. To ensure the same condition for all the performances (the same approaching ball trajectory), a table tennis machine was used. Electrodes were placed on the right side of the player's body due to his right-handedness. Absolute muscle involvement was estimated on the basis of averaged EMG signals (mV) measured in all muscles (m. biceps brachii, m. deltoideus, m. pectoralis major). Analysis of variance (ANOVA) was used for calculating differences between overall mean values of averaged EMG signals among all muscles. The peak EMG amplitude of the m. deltoideus anterior reached a value of 2.5 mV, for the 38 mm ball stroke. The comparable contraction values in strokes with balls of both sizes were obtained with the m. deltoideus medialis: the peak values ranged between 2.3 and 2.8 mV with a 38 mm ball and between 2.2 and 3.0 mV with a 40 mm ball. For the m. biceps brachii the peak EMG amplitude ranged from 1 to 2.2 mV and from 1.3 to 2.4 mV for the 38 mm and 40 mm ball strokes, respectively. A similar result was obtained for the m. pectoralis major contractions. Rather uneven intensities of contractions were obtained for the 38 mm ball strokes, ranging from 1.5 mV to 2.6 mV. More balanced values were obtained for the 40 mm ball strokes ranging from 1.6 to 2.2 mV. These findings showed us that in three observed muscles (m. deltoideus anterior, m. biceps brachii, m. pectoralis major) differences in the intensity of EMG signals are significant, so we can conclude that the player uses more muscle activities in a stroke with the larger ball, and also we conclude that the contraction of m. pectoralis major is more powerful when the player hits the larger ball.

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