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ANALYSIS OF THE PERFORMANCE OF LOWER MEMBERS IN SUSPENSION SERVICE IN VOLLEYBALL

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ABSTRACT

The objective of the present study is to analyze the performance of the lower limbs in the suspension service in volleyball. The sample consisted of 12 athletes seniors (6 women and 6 men) of Maputo. An Ergo-Jump platform (1000 Digitime, DIGITEST Finland) used to determine the values of the lower limb explosive strength test using static jump (SJ) and countermovement (CMJ). For the determination of the fatigue index (FI) the intermittent vertical jumping test (IVJT) was used, following the methodology proposed by Bosco *et al*. (1983). The test consisted of four sets of 15 jumps with countermovement and without support of the upper limbs, with intervals of 10 seconds between the series. The main findings were as follows: (i) the differences found demonstrated a high potential of the lower limbs of the male group of 1.4, compared to the female group of 0.9. Comparing the two groups of study, the value of the fatigue index presented by the boys, indicated less resistance to fatigue despite the fact that there was no statistically significant difference between the study groups.

Keywords*:* jumping, performance, volleyball, suspension service.

INTRODUCTION

The jump has been widely used in our daily life determined by tasks such as transposition of obstacles, water puddles on the asphalt, holes in the public roads.

Another factor is characterized by the generalized multiplicity of different sports modalities, which combine this motor pattern (jump), single or in combination in a cycle of stretching and shortening of eccentric and concentric muscular action of lower limbs.

The volleyball combines this multiplicity of factors for its development from the way played, the size of the field, the weight and size of the ball, the rally time in a play, the psychomotor, morphological and functional profile of the players among others. Thus, the present study seeks to analyze performance by the lower limbs in the suspension service in volleyball.

MATERIALS AND METHODS

The sample consisted of 12 athletes seniors (6 women and 6 men) of Maputo.

In order to determine the values of the lower limb by means of the static jump (SJ) and countermovement (CMJ), we used an Ergo-Jump platform (1000 Digitime, DIGITEST Finland) from the Laboratory of Cineanthropometry of the Faculty of Physical Education and Sports of the Pedagogical University.

The Ergometer was connected to a timer that recorded flight time (FT) in centimeters or in milliseconds. From which a set of equations 1 and 2 proposed by Bosco et al. (1983), for the calculation of the elevation of the center of gravity and the height reached by the subjects.

$$ECG = \frac{g \times t}{8} \quad (1)$$

$$V_f = Vi \oplus g \text{ ou } V_f = Vi^2 \oplus 2 \times g\left(V_f - V_i\right) \quad (2)$$

For the determination of the fatigue index (FI), the intermittent vertical jumping test (TSVI) was used, following the methodology proposed by Bosco et al. (1983). The test consisted of four sets of 15s of maximum jumps with countermovement and without support of the upper limbs, with intervals of 10 seconds between the series.

The calculated variables were the elastic index (EI), where EI = CMJ - SJ90º, which reflects the contribution of the elastic components of the muscle in the jump performance, and the FI (FI = PP (45-60) / PP (0- 15)), which reflects the reduction in strength production capacity and maintenance of physical performance, according to Bosco et al. (1981) and Bosco et al. (1983), respectively.

For the determination of the mean power, the following equation was used: MP = (g² * Tt * 15) / (4.n) * (15-Tt). The PP values were obtained in the last and first series of 15 seconds (45-60 and 0-15), respectively.

To describe and interpret the results of this study, we used calculations based on means and standard deviations of the data obtained in the study. The normality of the data was verified through the Shapiro-Wilk statistical test and homogeneity among the variances through the Levene statistical test. The Manny-Whitney U test was used to compare the groups. In all analyzes the significance level of 5% was considered.

RESULTS AND CONCLUSIONS

Table 2 presents the values, in centimeters (cm), referring to the highest jump of each athlete during the maximum power protocol.

Table 1 - Mean results of the SJ and CMJ and EI tests, for the male and female groups, respectively.

Group	Variables		
	EI (cm)	SE (cm)	CMJ (cm)
Male	1.5	33.0±2.0	34.5±3.2
Female	1.1	30.6±1.5	31.7±2.3

The values of SJ (32.3 ± 2.3 cm and 28.3 ± 2.6 cm) and CMJ (33.7 ± 3.4 cm and 29.2 ± 2.5 cm) were not similar to those reported in other studies (Carvalho, 2003; Pardal, 2003; Hakkinen, 1991 and Ugrinowitsch and Barbanti, 1998), which seems to indicate that our sample did not achieve good levels of performance in this test.

Analyzing the results of our study, we observed that the differences found demonstrated a high potential of the muscles of the lower limbs of the male group of 1.4 compared to the female group of 0.9.
Table 2 shows the peak power (PP), mean power (MP) and fatigue index (FI) values for the two study groups, respectively.

Table 2 - Mean results of the PP, MP and FI values for the male and female groups, respectively.

Group	**Variables**			**Difference**	
	PP (watts\Kg)	**MP (watts\Kg)**	**FI (%)**	**Z**	**P**
Male	17.8	15.9	0.86	-1.927	0.096
Female	15.5	12.4	0.91		

In the evaluation of explosive strength resistance, the results of the PP of our study are below with the findings of Valente *et al*. (1981) (25.79) and Hespanhol *et al*. (2007) (27.29).

The FI value in both study groups was high (86% and 91%, respectively). These values indicated high resistance to fatigue, compared to the studies by Hespanhol, *et al*. (2007) (59.33%) On the other hand, according to Valente et al. (1981), it is possible that the test not performed by our sample in a maximum effort, corroborated by the low number of jumps.

Comparing the two study groups, the value of FI presented by the boys indicated a lower resistance to fatigue, although no significant difference was observed (Z = -1,927, p = 0.096).

Analyzing the results of our study, regarding the maximum effort test, we observed that the differences found demonstrated a high potential of the muscles of the lower members of the male group of 1.4 with respect to the female group of 0.9.

Comparing the two study groups, the value of the fatigue index presented by the boys indicated less resistance to fatigue, although no significant difference found.

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