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RELIABILITY OF THE 30-S CONTINUOUS JUMP TEST FOR ANAEROBIC FITNESS EVALUATION: A PRELIMINARY STUDY

[1,2]Daniele Detanico, [1]Juliano Dal Pupo, [1]Rodrigo G. Gheller, [1]Jonathan A. Dias, [1]Saray G. dos Santos
[1]Biomechanics Laboratory, Federal University of Santa Catarina, Florianópolis, Brazil
[2]Email: danieledetanico@gmail.com

SUMMARY

This study aimed to determine the reliability of the continuous countermovement jump test performed over 30s period (CJ_{30}). Twelve male volleyball players were tested in two separated sessions. Vertical jump height, fatigue index (FI) and peak blood lactate (LAC_{PEAK}) were obtained. The test-retest reliability was determined by intraclass correlation coefficient (ICC) and the Bland-Altman method was used to verify the measurement agreement. The CJ_{30} showed excellent reliability for the maximal jump height (H_{MAX}; ICC=0.93), mean jump height (H_{MEAN}; ICC = 0.96) and FI (ICC = 0.88). LAC_{PEAK} showed moderate reliability (ICC = 0.44). Bland-Altman plots showed the bias between test and retest for H_{MAX} (-0.5 ± 2.4 cm), H_{MEAN} (0.4 ± 1.4 cm), LAC_{PEAK} (-0.13 ± 1.2 mmol.L^{-1}) and FI (-1.6 ± 5.2%). The bias was not different from zero for all variables (H_{MAX}, p = 0.30; H_{MEAN}, p = 0.32; LAC_{PEAK}, p = 0.72 and FI, p = 0.25). It was concluded that all variables analyzed in the CJ_{30} test were considered reliable.

INTRODUCTION

The evaluation of the anaerobic fitness, considering the stretch-shortening cycle (SSC) in sports as volleyball is an important parameter while controlling or monitoring sports training performance. In this sense, Bosco et al [1] proposed a specific anaerobic power test in which continuous countermovement jumps (CJ) are executed during a period of 60 s. Regarding validity and reliability of this test, insufficient information have been presented in previous studies. Bosco et al [1] and Sands et al [2] used only a correlation approach aiming to find evidences about the validity of CJ applied during 60 s, however, limited information about the reliability were found. Besides, a variation of the test using a shorter period (i.e., 30 s) has been recently used. Dotan [3] proposed that a test of 30 s is more adequate than 60 s to anaerobic (glycolytic) capacity request, as it may contribute more effectively to maintain the subject driven during the entire test. Thus, this study aimed to determine the reliability of the continuous countermovement jump test performed over 30s period (CJ_{30}).

METHODS

Twelve male volleyball players (24.3 ± 3.6 years-old; 83.7 ± 9.4 kg; 182 ± 5.2 cm; fat mass 13.9 ± 3.5%) took part of this study. The athletes were tested in two separated sessions with an interval of 48 h between each session.

Vertical jump height over the CJ_{30} was determined by 2D video kinematic analysis. A set of body landmarks were placed on the right side and digitized using the Skill Spector software (Video4coach, Denmark). The maximal vertical displacement of the greater trochanter marker (analogous to total body centre of gravity) was used to determine the vertical jump height taking into account the initial standing position as a reference. An algorithm implemented in the Scilab 5.3.3 software (INRIA, Versailles, France) was used to identify each maximum jump height. The maximal jump height (H_{MAX}), the mean jump height (H_{MEAN}) and fatigue index (FI) were calculated. In addition, 25 µl of blood was sampled from the right earlobe using a heparinized capillary tube in the 3rd, 5th, 7th, 9th and 11th min of recovery. The highest blood lactate concentration (LAC_{PEAK}) during the recovery period was used for further analysis. The test-retest reliability was determined by intraclass correlation coefficient (ICC) and the Bland-Altman method was used to verify the measurement agreement. Also, the paired t test was used to verify the difference between BIAS and zero (value reference for perfect agreement) with the level of confidence set at 5%.

RESULTS AND DISCUSSION

Table 1 shows the test-retest reliability of the CJ_{30} parameters (H_{MAX}, H_{MEAN}, FI and LAC_{PEAK}), which ranged from good to excellent.

The Bland-Altman plots showed the degree of agreement between test and retest sessions for H_{MAX} (Bias = -0.5 ± 2.4 cm), H_{MEAN} (Bias = 0.4 ± 1.4 cm), blood lactate (Bias = -0.13 ± 1.2 mmol.L^{-1}) and FI (Bias = -1.6 ± 5.2%) in the C_{J30}. All values were within the confidence interval and limits of agreement. The Bias was not different from zero (value that represents perfect agreement) for all variables (H_{MAX}, p = 0.30; H_{MEAN}, p = 0.32; LAC_{PEAK}, p = 0.72 and FI, p = 0.25).

The study of Bosco et al [1] was the only one that analyzed the test-retest reliability of CJ, reporting high mechanical power reliability; however, the authors used a poor

statistical analysis (correlation approach) which may limit the conclusions about reliability. Additionally, the reliability of tests performed under a shorter period is not available in the literature. All variables of CJ_{30} showed excellent reliability, except the LAC_{PEAK}, that showed moderate reliability. However, LAC_{PEAK} have been showed a large variability [4,5] between assessments and further speculation requires caution and warrants future studies.

CONCLUSIONS

It was concluded that all variables analyzed in the CJ_{30} test were considered reliable. The CJ_{30} seems to be more practical and holds a more specific stimulus for sports that are acyclic and present the SSC in their actions as such basketball, volleyball, gymnast and others that involve similar movement patterns.

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Table 1. Intraclass correlation coefficient (ICC) and confidence interval (CI) of the maximum jump height (H_{MAX}), mean jump height (H_{MEAN}), fatigue index (FI) and blood lactate peak (LAC_{PEAK}) between test-retest sessions of the CJ_{30}.

	Mean ± SD		ICC	CI (95%)
	Test	Retest		
H_{MAX} (cm)	51.52 ± 5.33	52.12 ± 3.50	0.93	0.86 – 0.98
H_{MEAN} (cm)	43.64 ± 5.19	42.86 ± 4.69	0.96	0.95 – 0.99
FI (%)	24.46 ± 6.71	24.65 ± 4.63	0.88	0.60 – 0.94
LAC_{PEAK} ($mmol.L^{-1}$)	8.21 ± 1.34	8.33 ± 1.20	0.44	0.35 – 0.78

H_{MAX}: maximal jump height; H_{MEAN}: mean jump height; FI: fatigue index; LAC_{PEAK}: blood lactate peak.