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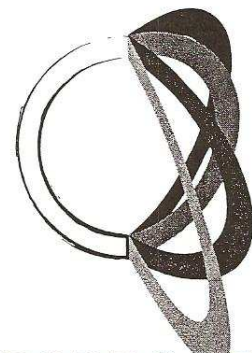
2004 PRE-OLYMPIC CONGRESS

Cloes, M., Croisier, J-L., Barsin, M., Ciccarone, G. & Forthomme, B. (2004). Analysis of the volleyball spike: relationships between several parameters and the speed of the ball. In, V. Klissouras, S. Kellis & I. Mouratidis (Eds.), Proceedings of the 2004 Pre-Olympic Congress. Sport Science through the Ages. Volume II – Posters. Thessaloniki: SYMVOLI. 57-58.

Proceedings

Editors: V. Klissouras, S. Kellis, I. Mouratidis

VOLUME II
POSTERS



**SPORT SCIENCE
THROUGH THE AGES**

6-11 AUGUST 2004
THESSALONIKI / HELLAS
ARISTOTLE UNIVERSITY CAMPUS



Aristotle University of Thessaloniki
Department of Physical Education & Sport Science

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P.061

ANALYSIS OF THE VOLLEYBALL SPIKE: RELATIONSHIPS BETWEEN SEVERAL PARAMETERS AND THE SPEED OF THE BALL

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Introduction

In volleyball, the spike's effectiveness is a determining element of the team's success. To perform at a high level, a player must be able to produce spikes characterized by a high speed of the ball that increases the defence's uncertainty. A high speed spike needs technical and muscular qualities. No multivariable research about the volleyball spike seems actually available in the literature.

Methods
Two groups of male volleyball players were compared. Group 1 (G1) comprised 11 athletes playing in the two highest Belgian national divisions. Eight players of the third division were included in the group 2 (G2). Each subject participated in field (measurement of the ball speed in a standardized situation, analysis of technical parameters, jumping performances, anthropometry, throwing performances and shoulder's flexibility) and isokinetic (Cybex Norm dynamometer) tests. A clinical protocol was also conducted (tests of Neer, Hawkins and Yocum). Data were processed to calculate the correlations between the ball speed and other variables. This paper will focus only on data provided by the field tests.

Results

Ball speed was higher in G1 (100.91 km/h vs 90.37 G2; $p = .005$). G1 players hit the ball 17 cm higher than G2 players (321.82 cm vs 305.00; $p = .001$). The angle between the vertical axle at the shoulder and shoulder-ball axle did not differ (168° vs 169.37°). Except for one player of G2, hitting arm was always outstretched. The distribution of the elbow movement pattern was similar in the both groups. G1 players presented a better performance through Counter Movement Jump arms test [1] (flying time: 680 ms vs 642; $p = .007$) and throwing test (distance: 33 m vs 28.5; $p < .05$). A positive correlation was demonstrated between ball speed and height of the hit ($r = .509$; $p = .026$), flying time in the CMJa ($r = .444$; $p = .056$) and throwing performance ($r = .504$; $p = .028$).

Discussion/Conclusion

Difference in hitting height could be explained by higher jump performance (both groups had the same results on arm reach) but also by better spike timing. Being higher, top level athletes would have more opportunities to hit the ball, especially as they develop better throwing qualities. The latter can be related to better muscular performances of the internal rotator muscles as pointed out by isokinetic testing.

References

[1]. Bosco C et al. (1983). *Eur J Appl Physiol*, 50(2), 273-282.