EFFECTS OF ANTHROPOMETRICS AND PHYSICAL FITNESS ON SERVICE VELOCITY IN AMATEUR TENNIS PLAYERS

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INTRODUCTION

Many studies have focused in physiology and physical fitness in tennis(Kovacs, 2006, 2007). There are limited researches in on fitness and other factors affect the service; despite the fact that he service in important to success in tennis (Kovacs, 2007). What is known in regarding the services is, there is a positive relationships between height and ball speed have been observed in professional tennis players (Bonato et al., 2014). It is also known that the major contributors to the linear velocity of the racquet at serve impact depend on internal rotation of the upper arm and flexion of the hand (Kraemer et al., 2000). However, no studies have analysed the relationship between ball velocity in the service with the one-repetition maximum (1RM) and anthropometrics in amateur tennis players, the purpose of this study was to analyse the relationship between the service velocity with some physical fitness or anthropometric variables in tennis players.

METHOD

Fourteen amateur tennis players participated in this study (23.4 ± 5.2 years; 71.6 ± 7.8 kg; 178.1 ± 4.2 cm, mean ± SD). The physical fitness was evaluated through 505 Agility Test, 10-m sprint and 30-m sprint using photoelectric cells, maximal strength (1RM) was assessed using the 1RM of pull-over (PO), french press (FP), bench press (BP) and half squat (HQ) exercises. The Yo-Yo intermittent recovery test-level II (YYIRTL2) was also performed and the service velocity and throwing velocity were measured by radar.

RESULTS

The anthropometric and physical fitness measurements are show in table 1.

TABLE 1
Descriptive and inferential statistics of the most significant variables, at reduced running velocities for the two experimental conditions (racing and training shoes, respectively).

N = 14	Mean	Standard deviation
Age (yr)	23,4	5,2
Weight (kg)	71,6	7,8
Height (cm)	178,1	4,2
Agility (s)	2,4	0,1
10m sprint (s)	1,9	0,1
30m sprint (s)	4,4	0,2
1RM pull over (kg)	24,3	2,6
1RM french press (kg)	34,0	5,3
1RM bench press (kg)	56,4	17,1
1RM half squat (kg)	123,2	11,7
YYIRTL2 (m)	960,0	252,4
Ball velocity (m/s)	139,6	21,7

Pearson's correlation coefficient showed significant ($p<0.05$) positive relationships between weight and ball velocity($r=0.68$; $p=0.02$), No significant relationship was found between serve ball velocity and the other variables (table 2).

TABLE 2

N = 14	Ballvelocity (m/s)
Age (yr)	0,24
Weight (kg)	0,68#
Height (cm)	0,31
1RM pullover (kg)	0,38
1RM frenchpress (kg)	0,49
1RM benchpress (kg)	0,55
1RM halfsquat (kg)	0,26

# $p< 0.05$

DISCUSSION

In amateurs tennis players weight was a main determinating factor of serves ball velocity. The weight had a positive relationship with the ball velocity

in the service. Our results are in agreement with recent study published that found a significant correlation between body mass index (BMI) ($r=0.58$; $p<0.05$) and ball serve speed in elite tennis players (Wong et al., 2014). The correlation could be explained by Allometry theory (Wrigley, 2000) that body mass was related to toque production and thus, an increase in body mass in relation to body size would increase torque, which in turn would increase serve speed. Elite tennis players with higher BMI are likely to have higher lean muscle mass (Wong, et al., 2014). Therefore increasing BMI by increasing muscle mass may also improve serve speed both by increasing power and torque production. Results of the present study give some guidelines to measure BMI in tennis players. Beside further studies could be done including others 1RM exercise to understanding if there is a more specific 1RM that can explain the ball velocity performance in the service of tennis players. The conclusion were that body mass is a variable that could enhance ball serve speed, however the 1RM analyses did not have any correlation with the service velocity in amateur tennis players.

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