

Running Head: ANTHROPOMETRY, JUMP POWER, AND POSITION

CORRELATIONS AMONG ANTHROPOMETRIC PARAMETERS, JUMP POWER, AND
POSITION IN PROFESSIONAL BASKETBALL PLAYERS

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Summary: — Jump power and the anthropometric characteristics of professional basketball players were studied to assess the relationship between these attributes and a players' position. The analysis can provide objective data for individualizing training. During the 2004 and 2005 preseasons, the anthropometric characteristics (body composition) and jump power (squat jump and countermovement jump) of members of an ACB (Spanish Basketball League) team were assessed. The centers showed significantly higher height, total weight, arm span, and fat and muscle weight when compared to the forwards and point guards. With regards to the jump test, the forwards showed significantly higher values for the countermovement jump than the point guards and centers, though there were no significant differences when they performed the squat jump. When the results were correlated, there were negative relationships between higher fat weight and body mass index with countermovement jump power. Centers should focus their training on achieving greater jump values, not losing body weight, which would make them lose position and physical presence in their area of play, but by gaining muscle tissue through loss of fat.

Jump power has been described as a factor affecting performance in basketball (Greene, McGuine, Levenson, Best, 1998; Vaquera, Rodríguez, Villa, García, & Ávila, 2002). It varies according to a player's position, as it is affected by physical characteristics, which are adapted to the performance requirements of each position on the court (Vaquera, Rodríguez, Villa, García, Ávila, 2001). Determining the relationship of jump power with the anthropometric variables of the players, differentiated by the play position, provides objective data allowing strength and conditioning coaches to individualize players' training, adapting to their characteristics and the demands of the game.

METHOD

The data were gathered in August of the 2004 and 2005 preseasons, at the Technification Center in Alicante, Spain. The subjects of the study ($N=24$; M age=27.9 yr., $SD=4.56$) were the members of the first squad of a professional basketball club belonging to the Spanish Basketball Clubs Association (ACB).

The methodology used for the anthropometric technique complied with the guidelines of the International Society for the Advancement of Kinanthropometry (ISAK). Body fat percentage was calculated by using the Yuhasz equation, modified by Faulkner (as cited in Carter & Yuhasz, 1984).

The Bosco Test was used to determine the jump power of the players. Of the set of jumps performed, the data corresponding to the squat jump and the countermovement jump were selected as these jumps are the most technically similar to those executed in competitive basketball.

RESULTS

Average player weight was 96.6 kg ($SD=12.14$), height was 198 cm ($SD=7$), and arm span was 200 cm ($SD=9.4$). Centers had a greater average weight, height, and arm span than

forwards and point guards, and fat weight was significantly higher (Fig. 1). Likewise, the muscle weight of the centers was significantly higher than that of the forwards and point guards. These results coincide with those found in recent studies (McInnes, Carlson, Jones, & McKenna, 1995; Rodríguez Bravo, Cárdenas Vélez, & Amador Ramírez, 2007).

Table 1

When jump power is quantified by the squat jump, no significant differences were seen between players in different positions, though the values for forwards were higher and those of the point guards and centers were similar. However, when the jump is performed with countermovement, there were significant differences favoring the forwards, who reached greater heights than the centers and point guards.

Table 2

There were significant negative correlations of percent body fat percentage and body mass index with countermovement jump height (R Pearson=-.76 and -.84, respectively). However, no significant correlations were obtained for the squat jump.

DISCUSSION

The heaviest players (centers) show greater fat and muscle weight in their body composition as well as a higher body mass index. When they perform countermovement jumps they also show significantly inferior values to those of the forwards, which indicates that they are less able to use the reactive capacity of the muscle. This is a performance factor that should be trained, as most jumps carried out during matches use countermovement (Cook, Kiss, Khan, Purdam, & Webster, 2004). However, the final jump height achieved by centers and forwards was similar; although the centers do not jump as high, their greater arm span and height mean that they reach the same final height. With their greater weight they show a lesser reactive capacity. Centers should focus their training on achieving better jump

ability, not by losing body weight, which would make them lose physical presence in their area of play (the paint), but by gaining muscle tissue and losing fat tissue. Though point guards had less body weight, they did not have significantly better jump heights than centers in countermovement jumps, possibly indicating a deficit though jumping is not their main performance factor (Greene, *et al.*, 1998; Villa & García López, 2002).

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TABLE 1
ANTHROPOMETRIC CHARACTERISTICS OF STUDY SUBJECTS

	Guards		Forwards		Centers		<i>Effect size</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Weight (kg)	88.4††	6.3	88.3††	7.2	109.0	6.3	.56
Body mass index (kg·m ⁻²)	24.7*	1.1	21.9†	1.4	26.3	1.3	.71
Fat (kg)	11.1†	1.8	9.7†	1.5	17.2	4.2	.60
Muscle (kg)	36.9†	6.2	39.5†	8.3	51.7	2.5	.47

*Significantly different ($p < .05$) from Forwards.

†Significantly different ($p < .05$) from Centers.

††Significantly different ($p < .01$) from Centers.

TABLE 2
DATA CORRESPONDING TO THE JUMPS PERFORMED

	Guards		Forwards		Centers		<i>Effect size</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Squat jump (cm)	29.3	2.0	32.6	2.9	29.0	3.6	.36
Counter movement jump (cm)	35.5**	2.0	41.7	1.8	33.4**	1.2	.63

**Significantly different ($p < .01$) from Forwards.