

## **SPORTS ANTHROPOLOGICAL INVESTIGATION OF MALE BASKETBALL PLAYERS OF DIFFERENT PERFORMANCE CLASSES**

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### **ABSTRACT**

The present study focused on somatotypical and sports anthropological differences in German basketball players of different position and performance classes. German basketball players ( $n=64$ ) from Hesse and North Rhine-Westphalia (the mean age  $26.8\pm 6.3$  years) were divided by league affiliation in 3 pools (2./3. Division, 4./5. Division and 6./7. Division) and differentiated to their positions (center, winger, guards). They were measured according to the standardized guidelines of sports anthropology. The body height of the pool 1 guards averaged  $187.2\pm 5.3$  cm, the body height of the center players  $205.4\pm 5.7$  cm, and the body height of the wingers  $191.5\pm 4.7$  cm ( $p<0.001$  relative to the position,  $p<0.01$  with respect to the performance level). Calipermetry showed a significantly higher percentage of the body fat of the lower divisions. In the top divisions, the body fat percentages were 13.2% for the guards, 20% for the centers and 18.3% for the wingers ( $p<0.001$ ).

The mean somatotypes were 4.0 – 4.4 – 2.8 for all the guards, 5.7 – 4.5 – 2.5 for all the center players and 4.5 – 4.5 – 2.6 for all the wingers.

Today's German basketball players are tall and leggy. The athletes of the middle and lower levels have a higher fat content. With respect to the playing position the guards are relatively smaller players with the lower percentage of body fat. The center players show the highest body weight and the body height dimensions, wherein the wingers are classified as player somatotypes therebetween.

*Keywords: sports anthropological investigation, male basketball players*

## INTRODUCTION

Basketball is played by 2 teams of 5 players on a rectangular court. Because many techniques for shooting, passing, dribbling and rebounding were developed, in basketball specialized player positions and offensive and defensive structures (player positioning) can be differentiated. Typically, the tallest members of a team play “center”, “power forward” or “small forward” positions, while shorter players or those who possess the best ball handling skills and speed play “point guard” or “shooting guard”.

The present study focused on somatotypical and sports anthropological differences in German basketball players of different position and performance classes.

## PARTICIPANTS AND METHODS

According to their league affiliation  $n=64$  German basketball players from Hesse and North Rhine-Westphalia (the mean age  $26.8 \pm 6.3$  years) were divided by league affiliation in 3 pools (2./3. Division, 4./5. Division and 6./7. Division) and differentiated to their positions (center, winger, guards, Table 1).

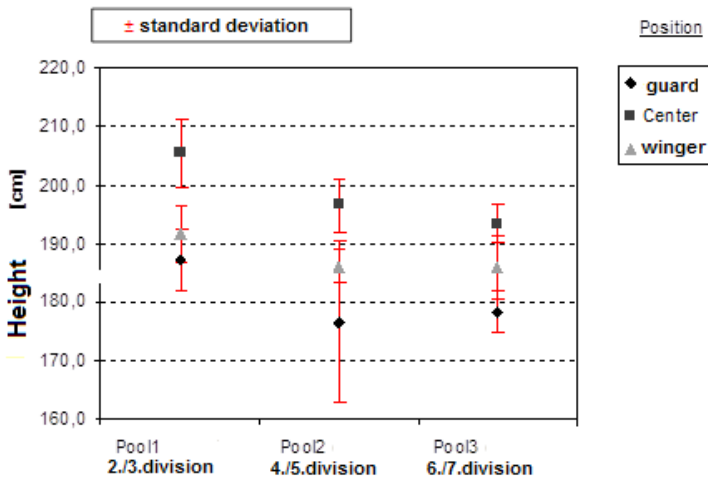
They were measured according to the standardized guidelines of sports anthropology (Raschka 2006). For somatotyping the established typologies of Conrad & Heath / Carter (see Raschka 2006) were used. Body fat was determined calipermetrically according to Parizkova and Buzkova (1971).

**Table 1.** Compilation of basketball players by position and league

Pool/Division		Center	Winger	Guard	Sum
Pool1	Second Division	2	5	3	10
	Third Division	2	4	1	7
Pool2	Fourth Division	1	1	0	2
	Fifth Division	6	6	2	14
Pool3	Sixth Division	7	7	4	18
	Seventh Division	4	6	3	13
		22	29	13	64

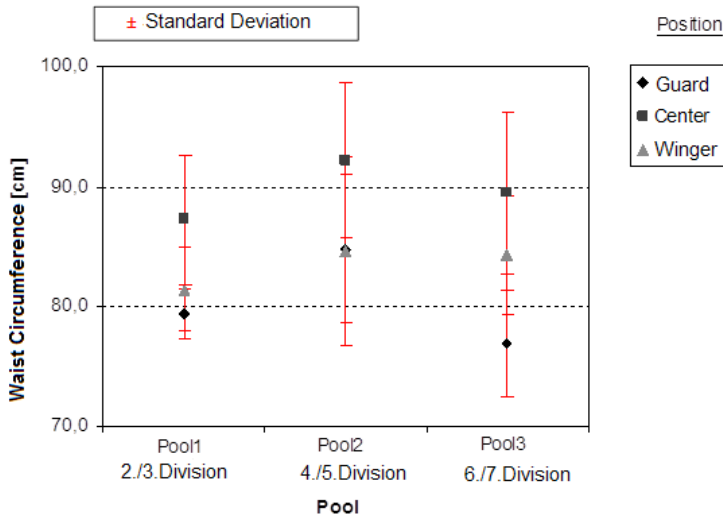
## RESULTS

The athletes of the highest performance levels dominated with all height parameters (Figure. 1).



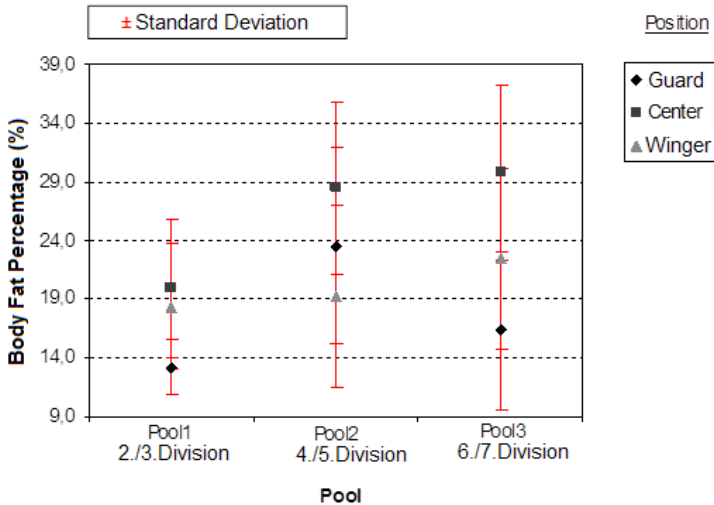
**Figure 1.** Means and standard deviations of the body height of the basketball players, differentiated by the level of performance and position

Thus, the body height of the pool 1 point and shooting guards averaged  $187.2 \pm 5.3$  cm, the body height of the center players  $205.4 \pm 5.7$  cm, and the body height of the wingers  $191.5 \pm 4.7$  cm ( $p < 0.001$  relative to the position,  $p < 0.01$  with respect to the performance level).



**Figure 2.** Means and standard deviations of the waist circumferences of the basketball players, differentiated by the level of performance and position.

Regarding the performance levels, significantly higher waist circumferences (Figure. 2) were found in the players of Pool 2 and Pool 3 in terms of a higher subcutaneous fat share ( $p < 0.05$ ).



**Figure 3.** Means and standard deviations of the Body Fat Percentage, determined according to the methodology of Parizkova & Buzkova (1971, calipermetrically), of the basketball players, differentiated by the level of performance and position.

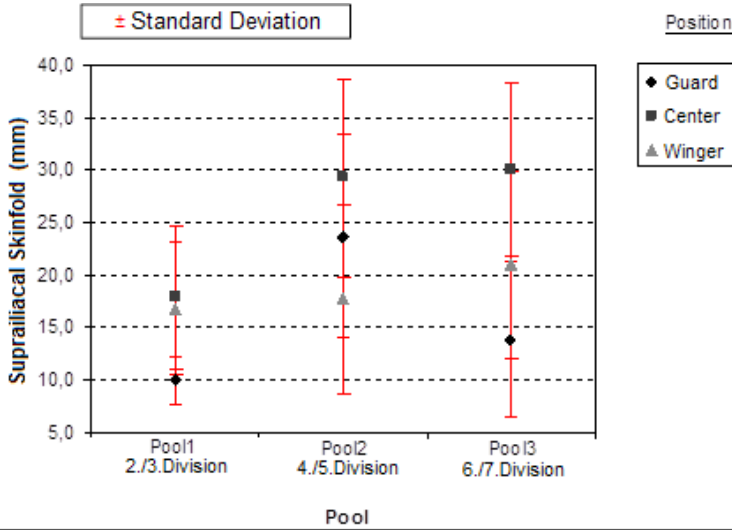
These findings are also supported by a significantly higher percentage of body fat (Figure 3) of the lower divisions.

In the top divisions, the body fat percentages were 13.2% for the guards, 20% for the centres and 18.3% for the wingers ( $p < 0.001$ ).

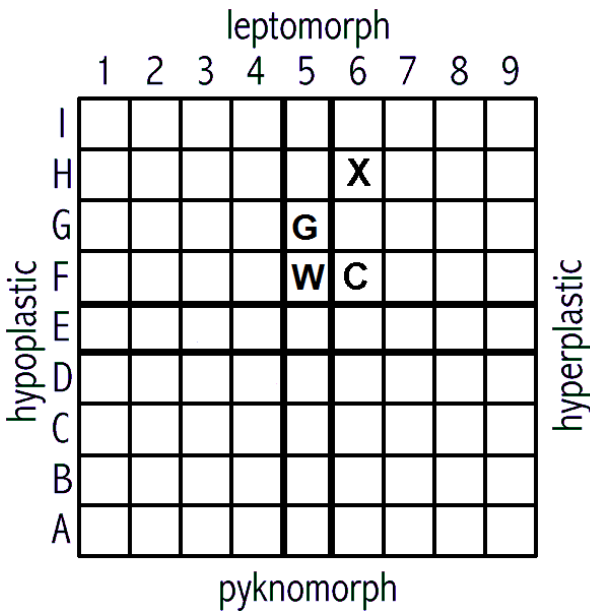
Further confirmation is given by the higher Suprailiacal skinfold values (Figure 4) of the lower divisions.

In the chessboard pattern graph after Conrad the metric (plastic) Index averages (Figure. 5 +6) are for any guards at  $-0.8$  / Class G (84/ Class 5), for the wingers at  $-0.7$  / Class F (85.6 / Class 5) and for the Centers at  $0.6$  / class F (88/Class 6).

In the somatochart of Heath & Carter (Fig. 7) there was a slight focusing of the basketball somatotypes in the mesoendomorph as well as in the endomesomorph sixth. The mean somatotypes were  $4.0 - 4.4 - 2.8$  for all the guards,  $5.7 - 4.5 - 2.5$  for all the center players and  $4.5 - 4.5 - 2.6$  for all the wingers.



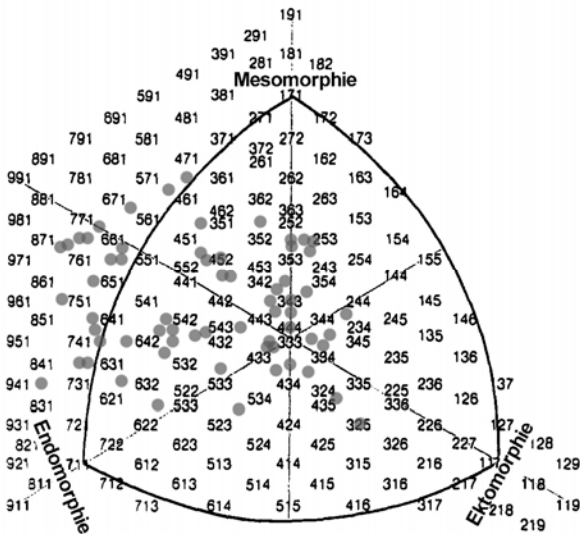
**Figure 4.** Means and standard deviations of the Suprailiacal Skinfold of the basketball players, differentiated by the level of performance and position



**Figure 5.** Mean Constitution Type of Guards (G), Wingers (W) and Centers (C) of this Germany study, compared to East German basketball players (X) according to Tittel / Wutscherk (1972)

		leptomorph								
		1	2	3	4	5	6	7	8	9
h y p o p l a s t i c	UI						1			
	I					1	2		1	
	H	1	1	1		5	1	1	1	
	G		1	2	1	3	4	3	3	
	F		1	1	2	5	3		1	
	E				1	4	1	1		1
	D		1				1			
	C				1	1	1	2		
	B				1			1		
	A									
UA										
		pyknomorph								

**Figure 6.** Constitution type distribution by Conrad for all the studied basketball players (n = 64)



**Figure 7.** Distribution of all the Basketball somatypes in the somatochart according to Heath & Carter

For pool 1 the average somatotype was 3.9 – 4.0 – 3.2, for pool 2 5.0 – 4.9 – 2.4, and for pool 3 5.2 – 4.5 – 2.4. While inference analytically there were not any significant somatotypical differences concerning the position or performance levels for the differences in mesomorphy, there was a (very) significant influence of the performance level on differences in endomorphy or ectomorphy.

With respect to the position, only the differences in endomorphy are very significant.

## DISCUSSION

Today's German basketball players (Figure 8) are tall and leggy. In contrast to previous surveys they are not very slender. The athletes of the middle and lower levels have a higher fat content. With respect to the playing position the point guards and the shooting guards are characterized as relatively smaller players with the lower percentage of body fat. By contrast, the center players show the highest body weight and body height dimensions, wherein the wingers are classified as player somatotypes therebetween.



**Figure 8.** Basketball Players in action

Compared to the reference studies on somatotyping of basketball players, the population studied shows significant differences especially in the first component (endomorph).

**Table 2.** Comparison of International Investigations on Basketball Average Somatotypes

Authors	n	Specification	Average somatotype
Carter 1970	8	USSR	2.9 – 4.6 – 2.6
Carter 1984	68	Olympic Athletes (Montreal & Mexico)	2.0 – 4.2 – 3.5
Bale 1986	5	British sports students	2.5 – 4.7 – 3.6
Štěpnička 1977	31	Czechoslovak athletes	2.0 – 5.5 – 3.1
Viviani et al. 1991	11	Italian professional basketball players	2.6 – 3.6 – 3.3
Mészáros et al. 1982	36	Hungarian high-performance athletes 1972–1975	2.3 – 3.9 – 4.0
Mészáros et al. 1982	22	Hungarian high-performance athletes 1979–1980	2.4 – 4.8 – 3.4
Raschka et al. 2013	64	total German collective	4.8 – 4.5 – 2.6
Raschka et al. 2013	13	all German point guards/shooting guards	4.0 – 4.4 – 2.8
Raschka et al. 2013	22	all German center players	5.7 – 4.5 – 2.5
Raschka et al. 2013	29	all German wingers	4.5 – 4.5 – 2.6
Raschka et al. 2013	17	Pool 1 (2 <sup>nd</sup> and 3 <sup>d</sup> division, Germany)	3.9 – 4.0 – 3.2
Raschka et al. 2013	16	Pool 2 (4 <sup>th</sup> and 5 <sup>th</sup> division, Germany)	5.0 – 4.9 – 2.4
Raschka et al. 2013	31	Pool 3 (6 <sup>th</sup> and 7 <sup>th</sup> division, Germany)	5.2 – 4.5 – 2.4

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