

# The effect of duration and frequency of training on the kinanthropometric profile in amateur basketball players

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## Abstract

In this study, the effects of sports experiences (as year) and the duration of training in a week on somatotype and body composition of amateur basketball players were studied. For this purpose, 13 female and 9 male basketball players aged 16-25 years were measured. The subjects were members of a basketball club a private college in Ankara. The somatotypes of the subjects were determined using Heath-Carter anthropometric techniques. Percent body fat and fat free mass were estimated using Bale's body density formulae. The relations were tested by correlation and regression analyses. These analyses showed that the sports experiences had influenced mesomorphy component in only female basketball players ( $P < 0.05$ ). There were no relations between somatotype components and training frequency in a week in both sexes. There were a significant relation between sports experience (year) and percent body fat and fat mass in only male basketball players ( $P < 0.05$ ). The duration of training in a week has no effect on body fat and fat free mass. In conclusion, the results indicate that there is a slight relationship between sports experience and body constitution and composition in amateur basketball players.

## Introduction

It is known for a long time that regular physical activity leads to some changes in human body typology and physiology. Data in this area are usually obtained from people joining to a certain exercise or loading program. The alterations occurring in the structure and functions of the body can be revealed by comparing values of the participants of such programs before and after exercise. Looking to these studies, for example the studies about basketball players, it is seen that most of them have focused on physiological and conditional parameters (Bolonchuk et al., 1987; 1991; Brown et al., 1986; Coleman et al., 1974, McArdle et al., 1974; Sinning and Adrian, 1968, Bavlı, 2008; Küçük et al., 2014).

Another way to investigate the effects of doing regular physical activity on structure and composition of the body is retrospective examination of persons' training histories and frequency of doing exercise. If doing regular sports changes physical characteristics, it is normal to expect further changes in the structure and functions of the body in persons who do exercises for a longer time and more intensely. (Bolonchuk, 1987; Toriola and Igbokwe, 1985).

The objective of this study was to retrospectively investigate the relationships between the duration of doing regular sports (years) and hours of weekly training, and changes in the structure and composition of the body, based on the information obtained from basketballers.

## Materials and methods

This study was conducted on the players of female and male basketball team of a private high school. The study included 13 female and 9 male basketball players. The mean age was 18.44 years in the female and 17.97 in male players. A questionnaire was conducted on the basketballers included in the study, and they were questioned about how many years they have played sports and hours of weekly training.

Twelve anthropometric measurements were made in order to determine the physical structure and composition of the basketball players. Among these measurements, weight was measured with a portable weighing scale, height with Martin type anthropometer, skinfold thickness with Harpenden skinfold caliper, width with a small diameter compass, and circumferences with a tape measure. The precision was 0.1 cm in length, width and circumference measurements, and 0.2 mm in skinfold measurements. The measures were taken in line with the principles described by Carter and Heath (Carter and Heath, 1990).

Somatotype characteristics of the basketballers included in the study were determined using Heath-Carter anthropometric technique (see, Heath and Carter, 1967; Carter and Heath, 1990), height correction (170.18 cm) was made during the calculation of endomorphy component. Body density was calculated utilizing the formula developed by Bale (1984), and body fat percentage using Siri formula (Durnin and Womersley 1974).

The effects of duration of interesting with sports and hours of weekly training on structure and composition of the body were examined by regression analysis. All statistical analyses and tests were performed with SPSS software.

## Results

Anthropometric results of female and male basketballers are given in Table 1, and somatotype and body composition results in Table 2.

Table 1. Descriptive statistics of male and female basketball players

	Females		Males	
	Mean	SD	Mean	SD
Age (years)	18,44	2,81	17,97	1,19
Weight (kg)	63,50	10,80	74,68	9,08
Height (cm)	171,08	5,99	187,17	6,94
Elbow width (cm)	6,45	0,43	7,20	0,34
Knee width (cm)	8,90	0,54	10,13	0,41
Relaxed upper arm circumference (cm)	26,15	2,33	28,00	2,48
Flexed upper arm circumference (cm)	27,21	2,61	30,20	2,42
Supraspinale skinfold (mm)	9,90	3,31	7,30	3,04
Subscapular skinfold (mm)	11,53	4,34	8,09	2,45
Calf skinfold (mm)	13,08	4,29	7,66	2,71
Triceps skinfold (mm)	13,26	3,98	7,49	2,34
Femur skinfold (mm)	17,61	5,55	9,43	0,83
Biceps skinfold (mm)	6,16	2,12	3,78	0,91

SD: Standard deviation

Table 2. Somatotype ratings and body composition values in male and female basketball players

	Females		Males	
	Mean	SD	Mean	SD
Endomorphy	3,48	0,92	2,04	0,78
Mesomorphy	3,42	0,98	3,67	1,19
Ectomorphy	2,94	1,03	4,04	1,45
Body density (BD, g/ml)	1,05	0,01	1,07	0,01
Body fat mass (VYK, kg)	13,25	3,67	8,07	3,06
Body fat percentage (BFP, %)	20,60	2,79	10,59	3,12
Fat free mass (FFM, kg)	50,25	7,49	66,60	6,93

SD: Standard deviation

Table 3. Relationship between duration of sport (year), weekly training hours and somatotype and body composition

	Sport history (year)		Weekly training hours	
	Females	Males	Females	Males
	<i>r</i>	<i>r</i>	<i>r</i>	<i>r</i>
Endomorphy	-0,222	0,613	0,193	-0,055
Mezomorphy	0,629*	0,228	0,463	0,013
Ektomorphy	-0,524	-0,566	-0,544	-0,092
Body density (BD, g/ml)	0,253	-0,746*	-0,166	0,048
Body fat mass (VYK, kg)	0,035	0,748*	0,265	-0,053
Body fat percentage (BFP, %)	-0,249	0,745*	0,169	-0,048
Fat free mass (FFM, kg)	0,303	0,419	0,285	-0,173

\*  $P < 0.05$

Sport history of the basketball players were revealed based on the self-report of the participants. The duration of doing regular sport was  $6.04 \pm 2.30$  (standard deviation) years in the female players. Minimum duration of doing sports was 2 years and maximum 10 years in this group. Whereas the mean duration of interesting with sports was  $5.39 \pm 1.80$  years in the male players. Minimum and maximum values were 2 and 8 years in male players, respectively. The coefficients of the correlation between the duration of interesting with sports and hours of weekly training, and structure and composition of the body—regression analysis—are presented in Table 3. As is seen, body typology and composition is correlated only with the duration of doing sports ( $P < 0.05$ ), and no significant correlation was found between the hours of weekly training and the variables studied. Looking to these data, it can be said that duration of doing sports is rather correlated with body composition variables.

Looking to the results of the regression analysis, the duration of doing sports was correlated with mesomorphy component in females, and body density, body fat mass, and body fat percentage in the male players. The correlations of other variables with the duration of doing sports were not statistically significant ( $P > 0.05$ ). No significant correlation were found between the frequency of training and the variables studied.

## Discussion

Determination of the changes in human physiology resulted from regular exercise is relatively easier than identification of the changes in somatotype and body composition. Looking to the studies conducted about basketball branch, the number of studies discussing the physiological or conditional characteristics is higher (e.g., Brumitt et al., 2016; Stojanovic et al., 2012; Iturricastillo, 2015). A similar picture is seen in the studies from Turkey (e.g., Açıkada et al., 1996; Cicioğlu et al., 1996; Dündar and Candan, 1995; Küçük et al., 2014; Bavlı, 2008).

Common feature of the above mentioned studies is that these studies have focused on the changes in the body as a result of a training or loading program executed for a certain period of time. However, as is known, some informations can be obtained about the physical changes based on the sport history. In other words, the relationship of structure and functions of the body, and regular training can also be retrospectively examined.

According to our results, there was a significant correlation between the duration of sporting activity and mesomorphy component only in the female basketball players. Higher correlation coefficient in the female compared to the male players, can be interpreted as that basketball sport is relatively more effective on body changes in female players.

The level of relationship between the somatotype components and the duration of doing sports is usually low or moderate. Ectomorphy component shows a negative correlation with the duration of doing sports in both sexes (Table 3). Although this is not an expected result, dietary habit of the participants might played a role on this manifestation. The most important factor leading to this thought is that endomorphy component was positively correlated with the duration of doing sports in the male players. In fact, the expected result is that as the duration of interest with sports prolongs endomorphy component decreases that is a negative correlation will present between these two variables. However, in contrary to the expected situation in the male basketball players in our study group, a positive correlation was observed. This unexpected result might be because the sports group that we examined was interested with sports at an amateur level.

Looking to the body composition results, significant correlations between the duration of doing sports and the variables examined were found only in the male participants. In the female players, no correlation was found between the duration of doing sports and body fat mass (FM) and fat free mass (FFM). A negative correlation was found between the body density

and sport history, might be explained by dietary factor as stated above. In the study group, players who had made sports for a longer time had a higher amount of fat in their body. It is quite difficult to answer the question that whether natural developments in the body composition with ageing, or diet and/or exercise played a role in this result. Another option is to consider these three factors together. If all three factors are responsible, the share of each factor is unanswered (Bailey et al., 1986).

In our study, we found no correlations between the hours of weekly training and both body composition and somatotype variables in amateur basketball players. Although not statistically significant, the correlation between ectomorphy and mesomorphy components, and the hours of weekly training was relatively higher. These findings are consistent with the correlation revealed with sport history. In other words, mesomorphy component increases and ectomorphy component decreased as the frequency of training increases.

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