

*Full Length Research Paper*

# Somatotypes of male whitewater canoe athletes of the Turkish National Canoe Team

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**This study aimed to determine the somatotype characteristics of male whitewater canoe athletes of the Turkish National Canoe Team. 10 male whitewater canoe athletes from the Turkish National Canoe Team voluntarily participated in the study during the national team camp in Rize in 2011. The age, height, weight, skinfold thickness, circumference, and width measurements of the male whitewater canoe athletes who participated in the study were taken. Heath-Carter method was used to determine their somatotypes. Statistical analyses of the measurements were carried out by using SPSS 13. The mean values of the age, height, and weight of the male whitewater canoe athletes of the Turkish National Canoe Team were found as follows; mean age  $19.10 \pm 2.68$  years old; mean height  $176.20 \pm 5.69$  cm; mean body weight  $74.54 \pm 10.71$  kg. The mean values of the somatotype components of the male canoe athletes of the Turkish National Canoe Team were found as endomorphy  $2.20 \pm 0.78$ , mesomorphy  $5.00 \pm 1.86$ , and ectomorphy  $2.30 \pm 1.15$ . We are of the opinion that our study, in addition to determining the somatotype characteristics of the male canoe athletes of the Turkish National Canoe Team, will also contribute to the studies carried out in this field.**

**Key words:** Somatotype, anthropometry, canoe, male.

## INTRODUCTION

The relationship between body structure and physical activity, on which so many various speculations have been done from the ancient times to our day, has been the primary aim of the several studies as it has always been sports scientists' primary concern in terms of reaching conclusions, comparisons and its association with performance (Bilge and Tuncel, 2003). For the reasons mentioned, sports scientists have intensively studied the athletes' body compositions and physical profiles as well as their physiological profiles (Gökdemir et al., 1999). With the help of the studies on anthropometric characteristics, it has been aimed to determine which different body profiles are appropriate for which sport branches and in the talent identification process the athletes matching those profiles are selected (Söğüt et al., 2004). In order to get a good level of performance in a sport branch, firstly, a suitable body type for that branch is considered to be essential. It is known that the one's inborn body structure has a significant role on physical activity level or on his/her aptness to a specific sport

branch, yet there might become some sport specific changes in the physical structure of the body as a result of regular physical activities (Gualdi-Russo and Zaccagni, 2001). Anthropometry in general is a systematic technique which sizes the objective characteristics of the human body with principles and classifies the certain methods of measuring according to the structure (Özer, 1993). In other words, Anthropometry is an evaluation of individual's body features perfectly (Akin and Sağır, 2000). With the research on anthropometric features, it has been tried to find out which body profile suits which branch and thus the selection of the athletes who are suitable for these profiles are made during the talent selection process (Söğüt et al., 2004). Body parts bring up who will be more advantage mechanically during the sports activity as the ratio of the length, wideness and environment (Tahillioğlu et al., 2000). For many years, the appropriate body type has been considered to play an important role in sport performance. The studies reveal significant differences between the body types of the

athletes engaged in different sport branches. However, body size, proportion, body composition are important factors that affect physical performance (Maud and Foster, 1995). Anthropometric data is useful because some anthropometric variables are correlated with performance (Fry and Morton, 1991; Van Someren and Palmer, 2003). Somatotype is the identification of the human body in terms of ectomorphy, mesomorphy and ectomorphy by using scientific methods (Özer, 1993). Somatic classification or determining the body type is the concern of somatotype. Important developments in all branches of sport are the athletes' product of basic and specific assessment of anthropometric and kinesiology characters (Heimer et al., 1988). Therefore, this study aimed to determine the somatotype characteristics of The Turkish National Canoe Team Male Whitewater Canoe Athletes.

## MATERIALS AND METHODS

10 male whitewater canoe athletes from the Turkish National Canoe Team voluntarily participated in the study during the national team camp in Rize in 2011. The anthropometric measurements of the athletes in the sample group were taken in accordance with the accredited techniques by "International Biological Programme (IBP)" (Lohman et al., 1988) and "International Society for the Advancement of Kinanthropometry (ISAK)" (Ross and Marfell-Jones, 1991). In our study body weight, height, skin fold thickness (biceps, triceps, subscapula, suprailiac, calf) measurements, the circumference (biceps, calf) and width measurements (elbow, knee) were taken. Heath-Carter method was used to determine the somatotypes of the athletes (Carter and Health, 1990).

### Statistical analysis

Arithmetic mean and the Standard deviations of all measurements taken were calculated. SPSS 13, 0 program was used for the statistical analysis of the measurements. Using the following equations (with standard formulations) somatotype values were calculated. In this study Heath-Carter somatotype method was used to determine the somatotype characteristics of the athletes (Carter and Health, 1990).

### Heath-Carter samototype formula

$$\text{Endomorphy} = -0.7182 + 0.1451 * x - 0.00068 * x^2 + 0.0000014 * x^3$$

(x = "triceps" dkk + "subscapula" dkk + "suprailiac" dkk)  
Height Adjustment Formula = x \* 170.18 / height (cm)

$$\text{Mesomorph} = [0858 + 0601 * \text{elbow width} - \text{"bicondylar humerus"} (\text{cm}) + 0601 * \text{width of the knee} - \text{"bicondylar femur"} (\text{cm}) + 0188 * \text{arm circumference} (\text{cm}) + 0161 * \text{calf circumference} (\text{cm})] - [\text{size} (\text{m}) * 0131] + 4:50$$

$$\text{Ectomorph} = (\text{height} - \text{weight ratio}) * 0732 - 28.58 (\text{height-weight ratio} = \text{Length} / \sqrt[3]{\text{Weight}})$$

The following formula was used to find the X and Y coordinates on the somatochart:

X = ectomorph - endomorphy

Y = 2x mesomorphic - (endomorphy+ectomorphy)

The somatotype is determined by checking the X and Y coordinates on Somatochart (Carter and Health, 1990).

## FINDINGS

In our study, the Turkish National Canoe Team male whitewater canoe athletes' (n=10) mean weight and height were found as 74.54±10.71 kg and 176.20±5.69 cm respectively. When the triceps-one of the measurements used to determine body fat amount was examined, triceps skinfold thickness was found as 7.86±3.13 mm. When the values of suprailiac and subscapular skinfold thickness (these sites are located in the center of the body and reflect the amount of fat in the centre) were examined, the former was found as 6.44±2.77 mm and the latter was found as 8.84±1.34 mm. In our study, the value of Calf skinfold thickness was found as 10.13±5.66 mm. Of the examined anthropometric variables, biceps and calf circumference were found as 30.55±7.45 cm, and 36.57±3.08 cm respectively. The elbow and knee width values- of the anthropometric measurements carried out in our study- were 7.12±0.42 cm and 10.06±0.66 cm, respectively (Table 1).

Individual somatotype values of National Team Whitewater Canoe Paddlers athletes that participated in our study are given in Table 2.

Graphic distributions of the means of somatotype values of National Canoe Team Whitewater Canoe Paddlers that participated in this study is given in Figure 1.

Graphic distributions of mean endomorphy, mesomorphy and ectomorphy values of the National Canoe Team Whitewater Canoe Paddlers are given in Figure 2.

Figure 3 show the distribution of the National Canoe Team Whitewater Canoe Paddlers' average somatotype on the Somatochart according to the data obtained from this study while Figure 4 show the distributions of 10 National Canoe Team Whitewater Canoe Paddlers' Somatotypes on the Somatochart according to the data obtained from this study

## DISCUSSION

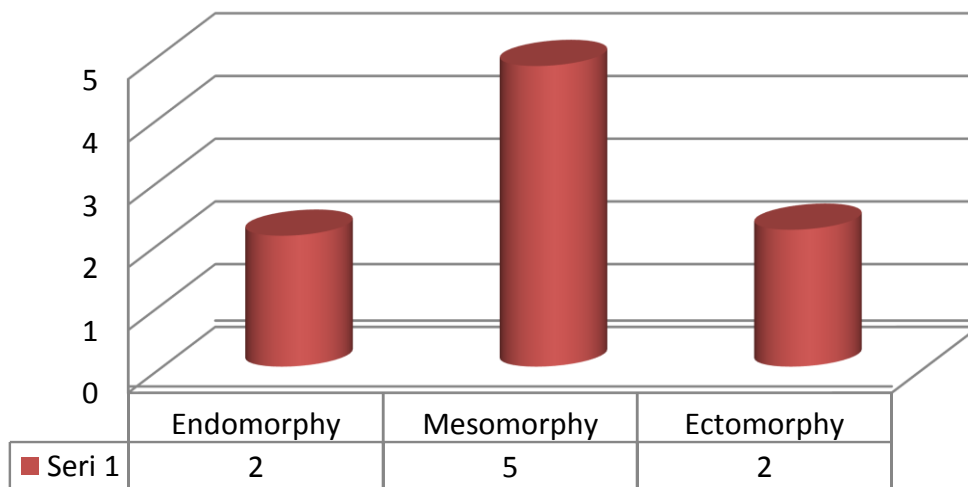
The goal in all branches of sports is to gain success. The scientific researches which are increasing more and more in our country, have a positive influence on success. It has been shown that the structural characteristics of the body have a tendency to differentiate in different sport branches and in different categories of the same sport branches. The data obtained is very important in terms of; being guidance to the sport branches for athletes; education of the young athletes; the training and improvement of performance of the elite level athletes. Therefore, the determination of the morphological and

**Table 1.** The mean and standard deviation values of the anthropometric measurements of the National Canoe Team Whitewater Canoe Paddlers.

	<b>N</b>	<b>Mean</b>	<b>S.S.</b>
Weight (kg)	10	74.54	10.71
Height (cm)	10	176.20	5.59
Triceps Skinfold Thickness (mm)	10	7.86	3.13
Subscapula Skinfold Thickness (mm)	10	8.84	1.34
Suprailiac Skinfold Thickness (mm)	10	6.44	2.77
Calf Skinfold Thickness (mm)	10	10.13	5.66
Biceps Circumference (cm)	10	30.55	7.45
Calf Circumference (cm)	10	36.57	3.08
Elbow Width(cm)	10	7.12	0.42
Knee Width (cm)	10	10.06	0.66
Endomorphy	10	2.20	0.78
Mesomorph	10	5.00	1.86
Ectomorph	10	2.30	1.15

**Table 2.** The somatotype values of the National Canoe Team Whitewater Canoe Paddlers.

<b>Athlete</b>	<b>Endomorphy</b>	<b>Mesomorph</b>	<b>Ectomorph</b>
1	1.7	0.9	1.8
2	2.1	3.5	3.6
3	2.1	3.8	3.3
4	2.0	5.0	3.1
5	1.9	6.6	2.0
6	1.7	4.7	2.9
7	3.8	7.2	0.4
8	3.3	7.2	0.9
9	1.3	4.3	3.1
10	2.1	5.7	1.6



$Y = 2x \text{ mesomorphic} - (\text{endomorphy} + \text{ectomorph})$

**Figure 1.** The mean endomorphy, mesomorphy and ectomorphy values of the National Canoe Team Whitewater Canoe Paddlers.

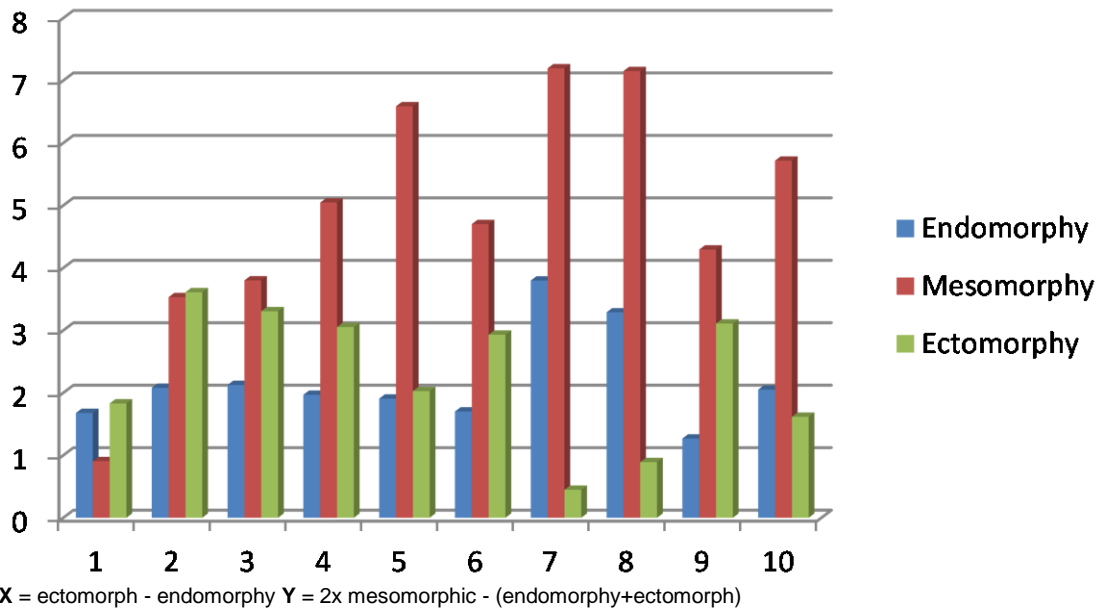


Figure 2. The display of the National Canoe Team Whitewater Canoe Paddlers' endomorphy, mesomorphy and ectomorphy values.

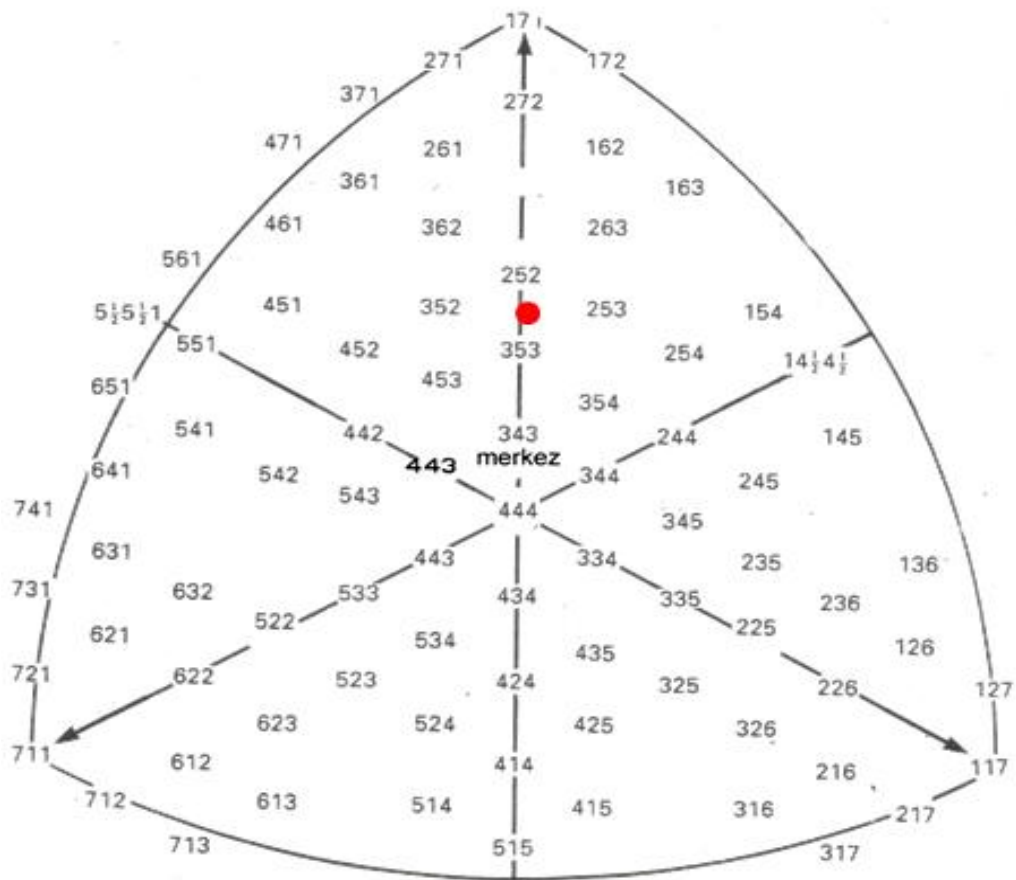
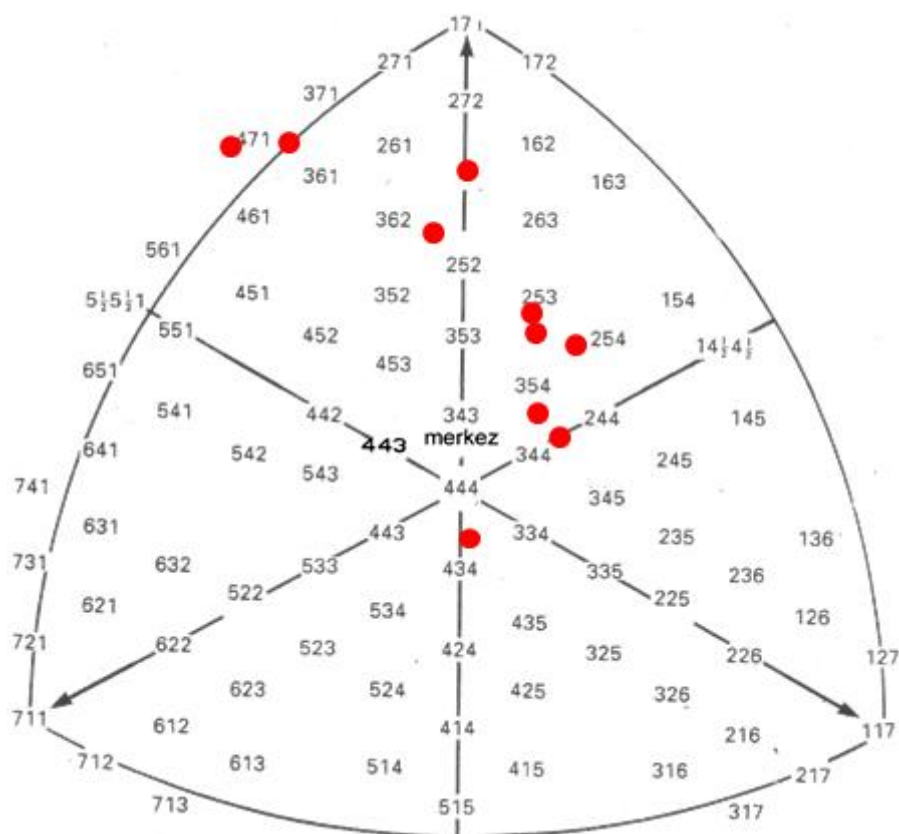


Figure 3. The distribution of the National Canoe Team Whitewater Canoe Paddlers' mean somatotype on the somatochart.



**Figure 4.** The distribution of the National Canoe Team Whitewater Canoe Paddlers' somatotypes on the somatochart.

physiological structures of the athletes is very important (Carter and Health, 1990; Heyward and Stolarczyk, 1996; Ross and Marfell-Jones, 1991; Zorba and Ziyagil, 1995).

Therefore, the anthropometric measurements taken in early periods of the athlete's sport training (height, body weight, length measurements etc.) are very important. For this purpose, the study which we performed included the Turkish National Canoe Team Whitewater Canoe Paddlers whose somatotypes were determined here. Anthropometric data available for male and female, elite sprint canoe/kayak paddlers suggest a homogenous shape and size (Ackland et al., 2003).

Ackland et al. (2003) noted that sprint kayak paddlers possess unique characteristics not commonly observed in the general population. These include a lean body composition with proportionately large upper body girths and narrow hips (for males). The mean somatotype recorded for males by Ackland et al. (2003) was 1.6 – 5.7 – 2.2, and demonstrated that canoe paddlers are best described as mesomorphs (Ackland et al., 2003). Ackland et al. (2003) assessed 50 male and 20 female sprint canoe/kayakers that competed at the Sydney Olympic Games (2000) representing 9 countries. Sydney Olympic paddlers compared to paddlers represented at

the Montreal Olympics in 1976 were approximately five kilograms heavier on average. However, with comparable skin fold values for the two groups, it was suggested by Ackland et al. (2003) that the subjects in the present sample have a higher proportion of lean body mass. It was therefore speculated by Ackland et al. (2003) that the morphology of elite paddlers have altered during the past 25 years and shifted toward a heavier but more lean physique (Ackland et al., 2003). Alacid et al. (2011) in their studies found the mean somatotype for 13 year-old male paddlers as 2.7-4.8-3.1 and 14 year-old male paddlers as 2.6-4.6-3.1 and described them as balanced mesomorphs (Alacid et al., 2011). The young male paddlers (mean somatotype for 13 year-old male paddlers 2.7-4.8-3.1 and mean somatotype for 14 year-old male paddlers 2.6-4.6-3.1) that participated in the study of Alacid et al. were less lean, less robust musculoskeletally and less compact than Olympic sprint 1.6-5.7-2.2 and slalom 1.7-5.4-2.5 paddlers (Ackland et al., 2003; Ridge et al., 2007). In the study of Diafas et al. (2011), the men kayakers that participated in their study are best described to have endomorphic-mesomorph body type.

Carter et al. (1982) found out that the somatotype of

the male canoe paddlers that participated in the Montreal Olympics was 1.5-5.2-3.1. De Garay et al. (1974) in their study during the Mexico City Olympics in 1968 found out that the mean somatotype of the canoe athletes was 1.9-5.5-2.5. In another study carried out on the canoe athletes participating in Mexico and Montreal Olympics, Carter (1984) found out that the mean somatotype was 1.8-5.4-2.6. Stepnicka (1974) found out that the mean somatotypes of the Czechoslovakia 'speed' canoe athletes was 2.0-5.8-2.1, while in the study of Stepnicka et al. (1979), the mean somatotype of the slalom canoe athletes was found to be 2.1-5.7-2.3.

In the study of Meszaros and Mohacsi (1982), they found out that the mean somatotype of the Hungary ('paddlers') canoe athletes was 2.2-5.5-2.5. Vaccaro et al. (1984) in their study found out that the mean somatotype of the USA slalom canoe athletes was 2.9-5.2-2.4. In this study, the mean age, mean height and mean body weight of the National Canoe Team Whitewater Canoe Paddlers was 19.10±2.68 years old, 176.20±5.69 cm, and 74.54±10.71 kg respectively, while the values of the mean somatotype were 2.2-5.0-2.3 and they were determined as balanced mesomorph. However, similarity was detected between the somatotype structures of the Turkish National Canoe Team athletes and those of the international canoe athletes.

In our country, there are very few studies associating canoe paddlers' anthropometric characteristics with their somatotype components. Classification of human physique or determination of the body type is related to somatotype. Therefore, in our study, it is aimed to determine the anthropometric and somatotype characteristics of the National White Water Canoe Team Paddlers and also to contribute significantly to the studies in this field.

As a result, it is considered that presentation of the somatotype values of less common canoe paddlers will provide an important contribution to the literature in our country, and we believe that performing such studies on larger study groups and on athletes from different branches will bring better results as well.

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