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Full Length Research

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In the study, it was aimed to determine the somatotype characteristics of the male athletes of the Turkish National waterpolo Team. 16 male athletes from the Turkish National Waterpolo Team voluntarily participated in the study during the national team camp in Trabzon in 2012. The age, height, weight, skinfold thickness, circumference, and width measurements of the male athletes participated in the study were taken. Heath-Carter method was used to determine their somatotypes. The 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 22.81±5.25 years old, mean height 189.31±4.96 cm, mean body weight 97.26±9.39 kg.

The mean values of the somatotype components of the male waterpolo athletes of the Turkish National waterpolo Team were found as endomorphy 3.12±0.80, mesomorphy 5.62±0.80, ectomorphy 1.62±0.80. We are of the opinion that our study, in addition to determining the somatotype characteristics of the male waterpolo athletes of the Turkish National waterpolo Team, will also contribute to the studies carried out in this field.

Keywords: Somatotype, anthropometry, waterpolo, male.

INTRODUCTION

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 (Akın and ve 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 (Tahilloğlu 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; Hebbelinck et al., 1975; Heyward and Stolarczy, 1996; Lohman et al., 1988; Maud and Foster, 1995; Uljević and Spasić, 2009; Ross and Marfell-Jones, 1991; Canossa et al., 2011; Söğüt et al., 2004; Platanou and Nikolopoulos, 2003; Tahilloğlu et al., 2000; Özer 1993; Turnagöl 1992; and 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. Therefore, this study aimed to determine the somatotype characteristics of The Turkish National Canoe Team Male Whitewater Canoe Athletes

MATERIAL AND METHOD

16 male athletes from the Turkish National Waterpolo Team voluntarily participated in the study during the national team camp in Trabzon in 2012. 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. In our study Heath-Carter method was used to determine the somatotypes of the athletes (Carter and Heath, 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 standart formulations) somatotype values were calculated. In this study Heath-Carter somatotype method was used to determine the somatotype characteristics of the athletes (Carter and Heath, 1990).

**Heath-Carter somatotype formula**

Endomorphy = - 0.7182 + 0.1451 * x − 0.00068 * x^2 + 0.0000014 * x

(x = “triceps” dkk + “subscapula” dkk + “suprailiac” dkk)

Height Adjustment Formula = x * 170.18 / height (cm)

Mesomorph = [0.858 + 0.061 * elbow width - “bicondylar humerus” (cm) + 0.061 * width of the knee - “bicondylar femur” (cm) + 0.188 * arm circumference (cm) + 0.161 * calf circumference(cm)] - [size (m) * 0.131] + 4:50

Ectomorph = (height–weight ratio) * 0732 - 28.58 (height-weight ratio = Length /3 x Weight)

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

X = ectomorph - endomorphy

Y = 2x mesomorphic - (endomorphy + ectomorph)

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

**RESULTS**

In our study, the Turkish National Waterpolo Team male athletes’ (n=16) mean weight and height were found as 97.26±9.39 kg and 189.31±4.96 cm respectively. When the triceps-one of the measurements used to determine body fat amount- were examined, triceps skinfold thickness was found as 10.35±3.30 mm. When the values of suprailiac and subscapular skinfold thicknesses (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 10.25±3.50 mm and the latter was found as 13.21±3.53 mm. In our study, the value of calf skinfold thickness was found as 13.47±3.60 mm. Of the examined anthropometric variables, biceps and calf circumference were found as 36.85±2.13 cm, and 39.72±1.60 cm respectively. The elbow and knee width values of the Anthropometric measurements carried out in our study were as 7.53±0.40 cm and as 10.85±0.58 cm respectively (Table 1).

| Table 1. The mean and standard deviation values of the anthropometric measurements of the national waterpolo team. |
|---|---|---|---|---|---|
|                  | N  | Min. | Max. | Ortalama | S.S. |
| Yaş              | 16 | 17   | 36   | 22.81    | 5.256|
| Kilo (kg)        | 16 | 83.5 | 115.9| 97.26    | 9.393|
| Boy (cm)         | 16 | 177.0| 199.0| 189.31   | 4.962|
| Triceps Dkk (mm) | 16 | 5.8  | 18.4 | 10.35    | 3.307|
| Subscapula (mm)  | 16 | 9.6  | 23.0 | 13.21    | 3.536|
| Suprailiac Dkk (mm)| 16 | 5.8  | 19.2 | 10.85    | 3.508|
| Calf (mm)        | 16 | 7.4  | 19.8 | 13.47    | 3.602|
| Flex Biceps (cm) | 16 | 32.1 | 40.3 | 36.85    | 2.135|
| Calf (cm)        | 16 | 38.0 | 43.2 | 39.72    | 1.606|
| Dirsek Çevre (cm)| 16 | 6.9  | 8.2  | 7.53     | 1.09  |
| Diz Çevre (cm)   | 16 | 9.5  | 11.8 | 10.85    | 0.84  |
| Endomorphy       | 16 | 2.0  | 5.0  | 3.125    | 0.806|
| Mesomorphy       | 16 | 4.0  | 7.0  | 5.625    | 0.806|
| Ectomorphy       | 16 | 0.0  | 3.0  | 1.625    | 0.806|

Individual somatotype values of National Team Waterpolo athletes participated in our study are given in table 2.

Graphic distributions of the means of somatotype values of National Waterpolo Team participated in our study are given in figure 1.

Graphic distributions of mean endomorphy, mesomorphy and ectomorphy values of the National Waterpolo Team participated in our study are given in figure 2.

The Distribution of the National Waterpolo Team average somatotype on the Somatochart according to the data obtained from this study is shown in figure 3.

Distributions of 16 National Waterpolo Team
DISCUSSION AND CONCLUSION

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 a 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 physiological structures of the athletes are very important (Carter and Heath, 1990; Heyward and Stolarczy, 1996; Ross and Marfell-Jones, 1991; and Zorba and Ziyagil, 1995).

Therefor, the anthropometric measurements taken in early periods of the athlete’s sport training (height, body weight, length measurements and so on) are very important. For this purpose, The study which we performed included the Turkish National Waterpolo Team whose somatotypes were determined here.

S. Canossa at all (2011), in their study, found the mean somatotype of the Portuguese National Waterpolo Team players as 2.8-4.5-2.3 and determined them as endomorphic mesomorph (Canossa et al., 2011).

Platanou, T. and Nikolopoulos, G. (2003), in their study, determined the somatic structures of the waterpolo players as endomorphic mesomorph (Platanou and Nikolopoulos, 2003).

Vila, H at all (2009), in their study, found the mean somatotype of the Spanish Water Polo players as 2.9-5.4-2.1 and defined them as endomorphic mesomorph (Platanou and Nikolopoulos, 2003).

Clarys and Borms, (1971), in their study found the mean somatotype of the Belgium Water Polo Team players as 3.4-5.3-1.8, whereas Alanso, (1986) in his study, found the mean somatotype of the water polo players as 2.8-4.3-3.8 (Alanso 1986; Clarys and Borms, 1971).
O. Uljević, M. Spasić (2009), in their study on male water polo players in Croatia, found the mean somatotype of the players as 3.9-4.5-2.7 (Uljević and Spasić 2009). In our study the National Waterpolo Team mean age was 22.81±5.25 years old, mean height was 189.31±4.96 cm, mean body weight was 97.26±9.39 kg and values of the mean somatotype were 3.1-5.6-1.6 and they were determined as endomorphic mesomorph.
Similarity was detected between the somatotype structures of the Turkish National waterpolo team athletes and the those of the international waterpolo athletes. Conclusively, as a result, it is considered that presentation of the somatotype values of less common waterpolo athletes 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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