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Comparison of Anthropometric Characteristics Between Athletes and Non-athletes

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Abstract

The aim of our present study was to investigate the anthropometrical status of athletes and non-athletes. The anthropometric data included 3 types of measurements: basic, girths and breadths. The research was carried out on 20 handball players, 16 volleyball players and 21 healthy non-athlete subjects. The data obtained after applying the One-Way ANOVA indicates the existence of differences between the research groups ($p<0.05$), depending on weight, BMI, girths (arm span, chest, waist, hip), and breadths (biacromial, biliocristal, transverse chest), while no differences were recorded for height and anterior-posterior chest depth. Our research demonstrated the existence of differences between the non-athletes and athletes, as a result of the targeted selection of the athletes for each post or team.

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Keywords: Stature; body mass index; arm span; girths; breadths.

1. Introduction

Anthropometric measurements have the major advantage of studying the physique of different populations, athletes and non-athletes; furthermore, large amounts of data can be collected quickly, with a non-invasive method and inexpensive equipments (Kerr, Ackland, & Schneider, 1995). Morphological characteristics are important to succeed in a sport. (Malina, Bouchard, & Bar-Or, 2004; Malina, Meleski, & Shoup, 1982) Handball is a strength type of sport, where anthropometrics and fitness characteristics are undoubtedly factors for performances. At the same time, for volleyball, adolescents are selected based on their skills, performance level, physique and muscular strength (Benetti, Schneider, & Mezer, 2005). Handball game requires the pronounced longitudinal dimensions such

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as stature, arm span, hand spread and length (Sibila, 1997; Srhoj, Marincovic, & Rogulj, 2002; Skoufas et al., 2003). In volleyball game, several elements can influence competitive success, such as height, arm span, leg length and sitting height (Gualdi-Russo, & Yaccagni, 2001). Studies on the anthropometric characteristic of the human body indicate that athletes who play in a specific sport differ in somatic characteristics from the general population (Gaurav, Singh, & Singh, 2010). Nowadays, athletes in all branches want to be faster and stronger, more efficient and, at the same time, they want to have higher quality anthropometric and physiological capacities (Ocal, Baydil, & Melekoglu, 2010). The aim of our study was to investigate the anthropometrical characteristics of handball and volleyball players and to study the differences between them and the population not involved in sports activities.

2. Methods

2.1. Subjects

The research was carried out on 57 females divided into three groups: 20 handball players, 16 volleyball players and 21 healthy non-athlete subjects, aged from 16 to 17 (16.42±0.53). We mention that, for our research, we have obtained the written consent of parents, in accordance with the Ethics Commission within the Faculty of Physical Education and Sports, and in conformity with the Declaration of Helsinki and the Treaty of Amsterdam.

2.2. Procedures

The anthropometric data included 3 types of measurements: basic (stature, body mass, arm span and body mass index), girths (chest, waist, hip) and breadths (biacromial, biliocristal, transverse chest and anterior-posterior chest depth), according to the standard methods proposed by the International Society for the Advancement of Kinanthropometry (ISAK, 2001). Based on these measurements, we have determined a profile for both sports – handball and volleyball – in contrast with the non-athlete students' population of the same age.

2.3. Statistical analysis

The mean, standard deviation and minimum and maximum values are presented, too. The variable means were compared by using One way Anova for analysis of variance. Variables were examined for homogeneity with the Levene test and Tukey's HSD post hoc test was applied for multiple comparisons to determine which differences of means were statistically significant. The statistical analysis was performed by using the SPSS 17.0 for Windows, by adopting a significant level of 5%.

3. Results and discussions

Comparisons between groups (Table 1) show that the female handball players are taller, heavier and that they have a bigger BMI. Also, they record higher values for arm span, chest, waist, and hip. The handball players have greater breadths than the groups represented by volleyball players and non-athletes. Levene's test applied for all subjects indicates that the variances are equal ($p>0.05$); hence, the condition for homogeneity was confirmed. The One Way Anova analysis shows that there statistically significant differences between the means of body mass, BMI, arm span, chest, waist, hip, biacromial, biliocristal and transverse chest. No interaction between groups ($p<0.05$) was found for stature and anterior-posterior chest. The data obtained, after applying Tukey's HSD (Multiple Comparisons) for basic measurements (Table 2), indicates the existence of insignificant differences on stature between all groups. For body mass, the biggest difference was obtained between non-athletes and handball players, that is 6.891 kg ($p<0.05$) and the smallest between non-athletes and volleyball players, that is 0.354 kg.

Table 1. Differences and homogeneity of anthropometric characteristics between groups

	Handball players		Volleyball players		Non-athletes			
	Mean	SD	Mean	SD	Mean	SD	Levene	Anova
Age (years)	16.30	0.47	16.13	0.50	16.76	0.43	-	-
Stature (m)	1.68	0.50	1.67	0.79	1.64	0.04	0.185	0.099

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