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Somatotype, size and body composition of competitive female volleyball players

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Summary The aim of this study was to describe the morphological characteristics of competitive female volleyball players. For this purpose, body weight and height, breadths and girths as well as skinfold thickness at various body sites were assessed in 163 elite female volleyball players (age: 23.8 ± 4.7 years, years of playing: 11.5 ± 4.2 , hours of training per week: 11.9 ± 2.9 , means \pm S.D.). Seventy-nine of these players were from the A1 division and the rest from the A2 division of the Greek National League. Two-way ANOVA was used to compare the differences in these characteristics between competition level and playing position. Body height ranged from 161 cm to 194 cm, and the mean value (177.1 ± 6.5 cm) was not inferior to that of international players of similar calibre. Adiposity of these players (sum of 5 skinfolds: 51.8 ± 10.2 mm, percent body fat: 23.4 ± 2.8) was higher than that reported in other studies in which, however, different methodology was used. Volleyball athletes of this study were mainly balanced endomorphs (3.4-2.7-2.9). The A1 division players were taller and slightly leaner with greater fat-free mass than their A2 counterparts. Significant differences were found among athletes of different playing positions which are interpreted by their varying roles and physical demands during a volleyball game. The volleyball players who play as opposites were the only subgroup of players differing between divisions; the A2 opposites had more body fat than A1 opposites. These data could be added in the international literature related to the anthropometric characteristics of competitive female volleyball players. © 2007 Sports Medicine Australia. Published by Elsevier Ltd. All rights reserved.

Introduction

Identification of specific characteristics of physique that may contribute to success in sports as well

as the possible structural differences among athletes in various sports has been a subject of high interest for sport scientists and coaches. For instance, the importance of players' tall stature in some team sports (e.g., volleyball, basketball) is accepted as it is well known that body height influences positively all body segment lengths and,

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in turn, athletic performance.^{1–3} Within a team sport, however, certain positions may require more specific physique characteristics based on the physiological demands set on the players during the game.

In volleyball, similarly to other team sports, special attention has been paid to the morphological characteristics of Olympic athletes, whereas few data exist on national level athletes. The few studies in the literature dealing with morphological characteristics of female volleyball players do not examine the whole spectrum of them, since they lack either anthropometric or body composition or somatotype measurements. Some studies report only body height and mass,⁴ some others only certain body composition indices,^{1,5–11} and a small number of studies describe the somatotype variables.^{2,6,8,10–13} There are only three studies reporting both body composition and somatotype data,^{6,8,10} but the small number of subjects (19–25 players) threaten the practical applications of these findings. From the existing data it appears that the percent body fat of female volleyball players varies widely among studies ranging between 11.7% and 27.1%.^{1,5–10} As for their somatotype, volleyball players have been mainly reported as mesomorph–endomorph or mesomorphic–endomorph.

It is of interest that there is only one study on the anthropometric characteristics and somatotype of female volleyball players according to competition level (major A1 and minor A2 national leagues) and playing position (setters, centres, spikers and opposites).¹² This paper, however, refers to data collected in 1992–1993, when the volleyball game was still played with the old rules. The rules have been changed by FIVB since 1998 and the playing position named “libero” has been introduced.

A libero is a back court player, mainly a defender who cannot serve or attack. A centre moves along the centre of the net blocking and quickly attacking the ball. A hitter attacks and blocks the ball over the net on the left side, but also receives the ball. An opposite is the main attacker of the team serving several roles; blocking the ball on the right side of the net, attacking over the net as well as from the back court, and receiving the ball. A setter does not receive the ball but runs all over the court to accept the ball from the receiver in a good position and deliver a pass to the attackers.

Considering the limited number of athletes evaluated and variables examined in the existing studies dealing with the anthropometric profile of competitive female volleyball players, as well as in light of the new playing position added (“libero”),

we sought to conduct the present study. The aims of this study were: (a) to compare the mean anthropometric characteristics, body composition and somatotype of competitive Greek female volleyball players with regard to playing position; (b) to detect possible differences in relation to competition level; and (c) to provide additional data in the international literature for the determination of the anthropometric profile of competitive female volleyball players.

Material and methods

Participants

Greek female competitive athletes playing in volleyball teams of the first National League (79 from the A1 division and 84 from the A2) participated in the present study after having signed an informed consent. Athletes were chosen from several teams nationwide and included all the players belonging to the Women and Youth Greek National Volleyball Team. Only two teams from each division were not evaluated because of financial restrictions; these teams were based at the most distant places from Athens. These teams were ranked in the middle of each division. Ten players from each team were evaluated, being the ones who were more experienced and more often participated in the official games. The players were grouped according to their playing position as follows: 48 hitters (19 from the A1 and 29 from the A2 division), 51 centres (26 from the A1 and 25 from the A2 division), 17 opposites (8 from the A1 and 9 from the A2 division), 30 setters (17 from the A1 and 13 from the A2 division) and 17 liberos (9 from the A1 and 8 from the A2 division). A short questionnaire to elicit the number of playing and training years and hours of training per week was completed by the athletes before the start of the study. This study was approved by the Athens University’s ethical committee.

Anthropometric measures

Body height (BH) and mass (BM) were measured to the nearest 0.1 cm and 0.1 kg, respectively. Skinfold measurements were taken from five sites (biceps, triceps, subscapular, suprailiac and calf) to the nearest 0.1 mm.² The mid-upper-arm girth (cm) was measured with the arm in both tensed and relaxed positions, while calf girth (cm) was recorded with the subject sitting at the end of a table, having her legs hanging. Biepicondylar

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