Somatotype and Body Composition of Young Top-level Table Tennis Players

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Abstract: **Introduction.** The aim of this study was to analyze the anthropometric profile of young top-level table tennis players belonging to Spanish table Tennis National Team. A total of 63 players (38 males and 25 females), aged between 10 and 13 years were evaluated with the sex as a factor. **Methods.** Different body measurements were recorded following the guidelines proposed by the ISAK: body mass, height, skinfolds (biceps, triceps, subscapular, suprailiac, supraspinale, abdominal, anterior thigh, and medial calf), girths (arm flexed and relaxed; arm flexed and tensed, thigh, and calf) and breadths (biepicondylar of the humerus, bistyloid, and biepicondylar of the femur). In addition to anthropometric analysis, body composition and somatotype of participants have been assessed. A t- test for independent samples was performed to examine statistical differences between sex groups and a Pearson's coefficient was applied to evaluate the correlation between variables. **Results.** A mesomorph – endomorph somatotype was registered for the entire group. Analysis, taking into account the sex factor, revealed a balanced mesomorph somatotype for males and a mesomorph - endomorph somatotype for females. Data corresponding to body composition contrasted by sex showed higher body fat percentage in females than in males. **Conclusions.** Within the tested age interval, range body fat content in female players is higher than in male players. Although these differences may be the consequence of a normal growth, it is advisable to integrate educational and nutritional strategies in order to maintain an adequate body fat content.

Keywords: Table Tennis, Body Composition, Somatotype, Young Players.

1. INTRODUCTION

Table tennis is an acyclic sport in which work and rest time periods are continuously alternated. Also, the intensity developed during the match makes it mixed activity, taking into account the energetic metabolism [1].

The most important physical capacities of the players are endurance and velocity, due to the short time high intensity periods under anaerobic metabolism that characterize the match: Players need velocity training while the capacity to face match duration mainly depends of endurance training [2]. However, strength, coordination and flexibility may also have a key role in this sport [3].

Although it is evident that the physical training is an important factor to reach sport success, several studies demonstrated that, at the same training level, the best performances are obtained by athletes with more compatible anatomic conditions [4].

These structure relationships have been studied through observational investigations revealing how athletes with the same sport performances presented similar anthropometric parameters and body composition [5].

Nowadays, the study of human form is a useful tool for both early talent selection and for evaluating the efficacy of a training program. A good number of investigators agree on the importance of early discovering the most capacitated subjects, selecting them and carrying out a monitoring process to facilitate maximal development of young athletes in any sport [6].

In this way, and taking into account 1. the importance of early sport talents detection, 2. biotype influence in sport performance, and 3. lack of definition of suitable morphology of table tennis players, it is necessary to perform analysis that may provide a specific anthropometric reference for this sport.

Thus, the aim of this study was to determine the morphologic profile of young top-level table tennis players, assessing their somatotype and body composition.

2. METHODS

Subjects.

A total of 63 table tennis players (38 males and 25 females), aged between 10 and 13 participated in this study. All players were members of the National Sport Technification Program developed by the Spanish Table Tennis Federation at the moment of the study.

A written informed consent was obtained from parents or tutors of all subjects prior to participation in this study that was also approved by the *Ethic Committee* of the University of Seville, Spain.

Anthropometric measurements, somatotype and body composition assessment.

Different body measurements were registered following the guidelines proposed by the International Society for the Advancement of Kinanthropometry (ISAK): body mass, height, skinfolds (biceps, triceps, subscapular, suprailiac, supraspinale, abdominal, anterior thigh, and medial calf), girths (arm flexed and relaxed; arm flexed and tensed, thigh, and calf) and breadths (biepicondylar of the humerus, bistyloid, and biepicondylar of the femur).

Somatotype was calculated according to the method proposed by Heath and Carter (1967) [7]. Moreover, De Rose and Guimaraes equations [8] were used in the determination of body composition for both males and females table tennis players.

Statistical analyses.

Standard statistical methods were used for calculating mean values and standard deviations (SD). The Kolmogorov-Smirnov test was applied to determine the nature of data distribution. Since a normal distribution was confirmed, a t- test for independent samples was performed to examine statistical differences between sex groups. In any case, a 95% confidence interval was assumed.

3. RESULTS

General characteristics of table tennis players are summarized in Table 1. There were no statistical differences in any of parameters considered.

Table 1. General characteristics of the subjects.

	Age (years)	Body mass (kg)	Height (cm)	Body mass index ($Kg \cdot m^{-2}$)
Males (n=38)	11.32±1.82	41.61±1.84	149.1±12.16	18.36±2.51
Females (n=25)	11.56±1.94	44.36±11.21	150.6±10.89	19.25±3.22
Total (n=63)	11.41±1.85	42.70±11.58	149.7±11.60	18.71±2.82

Data are expressed as mean ± SD.

Figure 2 shows body composition parameters expressed in percentage with respect to the total body mass. Bone mass and residual mass were higher in males than in females ($p \leq 0.05$), whereas female players showed higher fat mass values ($p \leq 0.001$). There were no statistical differences for muscle mass.

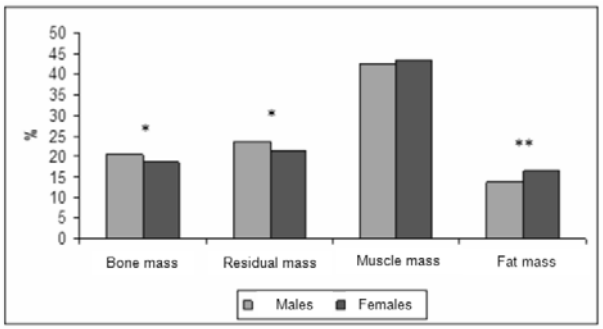

Figure 1. Body composition of table tennis players. *p≤0.05; **≤p0.001

Mean male players' somatotype was classified as balanced mesomorphy, while a mesomorph - endomorph somatotype was registered for female players and the total group. Mesomorphy component was higher in males than in females ($p \leq 0.001$) and endomorphy component was higher in females than in males ($p \leq 0.001$) (see Table 2 and Figure 2).

Table 2. Somatotype components and somatochart coordinates.

	Somatotype components			Somatochart	
	Endomorphy	Mesomorphy	Ectomorphy	X	Y
Males (n=38)	3.62±1.41	4.64±0.74**	3.28±1.18	-0.3	2.3
Females (n=25)	4.41±1.49**	4.10±1.24	2.92±1.39	-1.4	0.8
Total (n=63)	3.93±1.48	4.42±0.99	3.14±1.27	-0.7	1.7

Data are expressed as mean ± SD. **p≤0.001

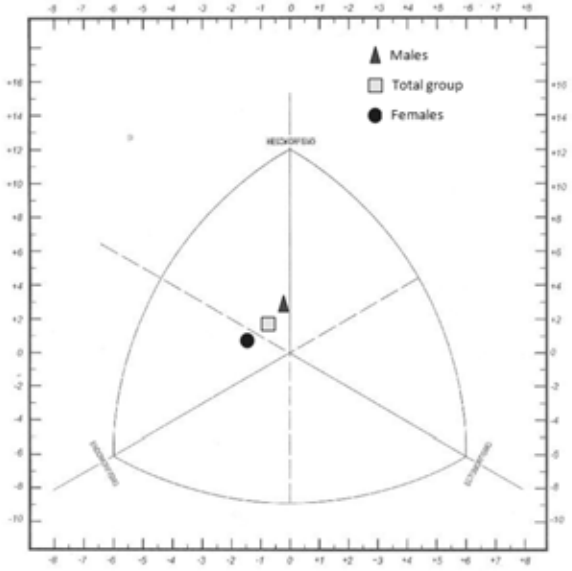

Figure 2. Somatochart.

4. CONCLUSIONS

The aim of this study was to determine body composition and somatotype of young top-level table

tennis players. Although the influence of anthropometric characteristics on table tennis performance is not clear yet, it seems obvious that a mesomorphic predominance can play a decisive role in any sport, including this one [9]. Indeed, several investigations carried out with table tennis players demonstrated a superior muscular development in lower extremities [10].

On the other hand, high levels of body fat could have a negative effect on sport performance, since body mass improvments are not correlated with the capacity of generating muscular strength. Furthermore, and considering that acceleration is directly proportional to the strength production, but inversely proportional to body mass, fat excess could reduce global or segmental velocity in any sport skill, increasing the energy cost at the same time [11].

In the present study, focused on young top-level table tennis players, a greater body fat mass was observed in female players than in male players. Bone mass and residual mass were higher in male players than in female players, something that was expected because De Rose and Guimaraes equations [8] contain constant coefficients that are different by sex. Nevertheless, muscle mass showed no statistical differences between male and female players.

Regarding to somatotype assessment, mesomorphy was the most important component in male players. In female players a remarkable endomorphic component was observed thus, mesomorph–endomorph somatotype was defined for them and when the total group was considered. In this sense, it is important to note that the age of the players analyzed correspond to the prepuberal phase in which muscles are underdeveloped and fat content can be prominent.

Data from investigations carried out using different athletes of the same age, reported similar results [12, 13]. Moreover, in a recent study, de Hoyo et al. [14] found a greater incidence of overweight in young volleyball players than in sedentary age-matched people. Taken into account these results, it is easy to conclude that anthropometric analyses and body composition evaluation may not represent a valid tool for selecting young talents in sports.

It can be concluded that at this age range body fat content in female players are higher than in male players. Although these differences are consequence of a normal growth, it is necessary to integrate educational and nutritional strategies in order to maintain an adequate body fat content.

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