14 - COMPARATIVE STUDY OF SOMATOTYPE AMONG DIFFERENT CATEGORIES OF SOCCER PLAYERS

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Introduction

The determination of somatotype means to establish a numerical value of three components: Endomorphic - representing fat, Mesomorphic - representing muscles and bones, and Ectomorphic - representing the relative linearity. These components are always presented in sequence and characterize, in this way, the morphologic profile of the individual (14). The estimate of somatotype intends to establish a direct relation between the morphologic characteristics of the individual with its performance, being of particular interest to coaches, as it provides much more information about the morphology and body composition than the absolute somatic measures (weight and height). It allows to know the "evolution" of some of the components, demonstrating influence of age, training, competition, illness and nutrition (13).

The morphologic configuration has been the subject of study for a long time, either with the analysis of athletes of different modalities (5), or with students of different ages and even with non-athletic subjects (9).

In the evolution of soccer, while a collective game, two interdependent realities - the game and the player, have been the subject of a great deal of study and systematization (6). Nevertheless, there is a gap in the existing literature with regards to the whole process of the development of young soccer players, from the beginner to the professional level.

Tanner (16) and Carter (3) identified the exceptional athlete in each modality as possessing a morphologic archetype that easily distinguishes in the function of its modality.

Among the studies made with football players, we can cite Balardi (1) and Esparza (5) that found similar values of somatotype in the Argentine and Spanish players, respectively. With reference to young soccer players, Viviani (17), Sobral (15) and Throat (7), demonstrated a strong predominance of the mesomorphic component in Italian and Portuguese players. However, there are not studies on the profile of the young Brazilian soccer players.

In a study with youths, Beunen et al. (2) showed that the result of the mesomorphic level is the best predictor of all motor items in each level of age. In this way, high levels of mesomorphic component are always associated with better performances.

The aim of our study was to establish the morphologic feature of male soccer athletes, in the SUB 14, SUB 15, SUB 17, SUB 20 and Professional categories, besides establishing a comparison between them, as a means of verifying the possible existence of a similarity among the somatotypes of all categories.

Material and Methods Sample

A cross-sectional study was carried out using a sample of soccer athletes (n=155) in SUB 14 (n=34), SUB 15 (n=30), SUB 17 (n=30), SUB 20 (n=27) and Professional (n=34) categories of a Brazilian first division soccer club. The age range was 13 to 35 years. The sample characteristics are shown in table 1. All data were collected during January and March of 2003, in the city of Porto Alegre, state of the Rio Grande do Sul. All athletes participated voluntarily in the study. The right of secrecy of the data collected on them protects the athletes and international guidelines and norms of experimentation with human beings were followed.

<table>
<thead>
<tr>
<th></th>
<th>Sub 14 (≤ 14 ys)</th>
<th>Sub 15 (≤ 15 ys)</th>
<th>Sub 17 (≤ 17 ys)</th>
<th>Sub 20 (≤ 20 ys)</th>
<th>Professional</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>34</td>
<td>30</td>
<td>30</td>
<td>27</td>
<td>34</td>
</tr>
<tr>
<td>Weight (kg) (mean)</td>
<td>48,1</td>
<td>63,7</td>
<td>71,4</td>
<td>71,2</td>
<td>76,6</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>7,2</td>
<td>6,4</td>
<td>7,6</td>
<td>6,8</td>
<td>6,4</td>
</tr>
<tr>
<td>Height (cm) (mean)</td>
<td>159,9</td>
<td>170,0</td>
<td>178,3</td>
<td>178,8</td>
<td>179,0</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>8,1</td>
<td>6,4</td>
<td>7,7</td>
<td>5,8</td>
<td>5,9</td>
</tr>
</tbody>
</table>

Anthropometry Body measures

The following anthropometric measures were taken: height, body weight, skinfolds, bone diameter and muscle circumference. The skinfolds obtained were the following: triceps skinfold, subscapular skinfold, suprailiac skinfold and calf skinfold. The bone diameters were the following: humerus breadth and femur breadth. The muscle perimeters were made at the medial part of arm and leg, with the muscle tense, as standardized by De Rose et al. (4). For the measurement of the height a stadiometer was used with precision of 1 mm. The total body weight was measured with a mechanical scale Filizola with 0,01kg precision. For the measurement of the skinfold, a Ceschor skinfolder caliper was used (with precision of 0,1mm). The bone diameter was measured with a Mitutoyo caliper with precision of 0,1 cm. The perimeters were measured with a Stanley tape measure with precision of 0,1 cm.

Analysis procedures

The anthropometrics data were analyzed through the calculation of somatotype proposed by Heath-Carter (10). The average of each component of somatotype for each category was utilized to find out the differences between the categories through the calculation of the SDD (somatotype distance dispersion) which allows checking the distances between one somatotype and another. Hebbelinck (11) arbitrarily established that this distance is not significant (p>0,05) when the SDD is smaller than 2,00.
Results and discussion

According with the values presented in table 2, a predominance of the mesomorphic component in all categories studied was observed, and this component is bigger in the category of professional players than in the others. It also became evident that muscle mass is predominant in this category. All subjects in the studied categories were classified in mesomorphy ectomorph, with the ectomorphic component presenting the second highest value of the three components.

When each component of somatotype was analyzed separately with regard to endomorphy, it was found that the values were similar in the five categories, with the SUB 20 category (2.0) and the SUB 15 category (2.3) presenting the smaller values. We observed similar values, with regard to the mesomorphic component, from the SUB 14 category through the SUB 17 one, with values of 4.1 and 4.2, respectively. In the SUB 20 and Professional categories this component presents a proportional increase with values of 4.5 and 4.9, respectively. The SUB 14 category presents the higher value of the ectomorphic component (3.7) due to the rapid growth at this age range, which is the period of the human development where the higher variations in morphology occur (12).

The values found in our study are similar to those presented by Balardini (1). When analyzing the SDD it was found that the Professional category is situated significantly (SDD=2) away from the others because of the higher values in the mesomorphic component and minor values in the ectomorphic component. This means that the Professional category has greater muscle mass and smaller relative linearity in relation to the others. The analysis of the SDD at the SUB 14, SUB 15, SUB 17 and SUB 20 categories showed that there was no significant difference (SDD=2) between them.

<table>
<thead>
<tr>
<th>Components</th>
<th>SUB 14</th>
<th>SUB 15</th>
<th>SUB 17</th>
<th>SUB 20</th>
<th>PROFISSIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endomorfo</td>
<td>2.1</td>
<td>2.3</td>
<td>2.1</td>
<td>2.0</td>
<td>2.2</td>
</tr>
<tr>
<td>Desvio Padrão</td>
<td>0.7</td>
<td>0.5</td>
<td>0.4</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Mesomorfo</td>
<td>4.1</td>
<td>4.3</td>
<td>4.2</td>
<td>4.5</td>
<td>4.9</td>
</tr>
<tr>
<td>Desvio Padrão</td>
<td>0.7</td>
<td>0.8</td>
<td>0.7</td>
<td>1.0</td>
<td>0.9</td>
</tr>
<tr>
<td>Ectomorfo</td>
<td>3.7</td>
<td>2.7</td>
<td>2.9</td>
<td>3.1</td>
<td>2.3</td>
</tr>
<tr>
<td>Desvio Padrão</td>
<td>1.0</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>X</td>
<td>1.6</td>
<td>0.3</td>
<td>0.8</td>
<td>1.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Desvio Padrão</td>
<td>1.5</td>
<td>1.1</td>
<td>0.9</td>
<td>0.9</td>
<td>1.1</td>
</tr>
<tr>
<td>Y</td>
<td>2.5</td>
<td>3.5</td>
<td>3.4</td>
<td>4.0</td>
<td>5.2</td>
</tr>
<tr>
<td>Desvio Padrão</td>
<td>2.2</td>
<td>2.0</td>
<td>2.0</td>
<td>2.6</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Table 2 - Results of the components endomorphic, mesomorphic, ectomorphic, X and Y of all the categories

Conclusion

Based on the results of our study, we can conclude that the different categories studied present similar morphologic characteristics. The endomorphic component does not change with the age, while the mesomorphic component presents higher values from the SUB 20 category to the Professional category. This shows a proportional gain of muscle mass in these categories as a result of age, maturation and, probably, of the differentiated training. On the other hand, the ectomorphic component presents higher values in the SUB 14 category, where it shows a high disproportion of the height in relation to the weight, a common characteristic for this age range. Therefore, important modifications in the height and, consequently, in somatotype occur in the adolescence.

BIBLIOGRAFIA

COMPARATIVE STUDY OF SOMATOTYPE AMONG DIFFERENT CATEGORIES OF SOCCER PLAYERS

ABSTRACT

This study analyzed the somatotype components of different soccer player categories in a First Division soccer club in the city of Porto Alegre (RS, Brazil). The sample consisted of 155 volunteers (age range 13 to 35 years), who belonged to the following categories: SUB 14, SUB 15, SUB 17, SUB 20 and Professional. All athletes in these categories were assessed. The Heath-Carter (10) method for measuring somatotype was used. It was shown that the mesomorphic and the ectomorphic components were more sensitive to age changes, whereas the endomorphic one remained the same in all categories. A significant Somatotype Distance Dispersion (SDD > 2) between the professional category and the other categories was found. More studies are necessary to better characterize the morphologic characteristics in soccer players throughout the country, including longitudinal ones.

Key words: somatotype; soccer; morphology.

ÉTUDE COMPARATIVE DE LA SOMATOTYPE ENTRE DIFFÉRENTES CATÉGORIES DE JOUEURS DE FOOTBALL

RÉSUMÉ

Cette étude analyse les composantes de la somatotype concernant les différentes catégories de joueurs de football d’un club de la première division du football brésilien localisé dans la ville de Porto Alegre - Rio Grande do Sul - Brasil. La population étudiée comprenait 155 sujets avec des âges entre 13 et 35 ans, appartenant aux catégories SUB 14, SUB 15, SUB 17, SUB 20 et Professionnel, en étant évalué tous les athlètes les dites catégories. Pour la détermination de la somatotype se fait appel à la méthode proposée par Heath-Carter (10), à travers les mesures anthropométriques. Moyennant les résultats trouvés, il s’observe que les composantes mesomorphe et ectomorphe ont été les plus sensibles à des modifications avec l’âge, tandis que l’endomorphe reste semblable dans toutes les catégories. L’analyse de la Distance de Dispersion du Somatotype démontre une distance significative (SDD > 2) entre la catégorie professionnelle et les autres. Il se suggère plus d’études, de même études longitudinales pour decaracteriser mieux les caractéristiques morphologiques de l’athlète de football à niveau national.

Mots clés: somatotype; football; morphologie.

ESTUDIO COMPARATIVO DEL SOMATOTIPO ENTRE DIVERSOS JUGADORES DE LAS CATEGORÍAS DE FÚTBOL

RESUMEN

Este estudio analiza los componentes del somatotipo con relación a categorías diferentes de los jugadores del balompié de un club de la primera división del fútbol brasileño localizado en la ciudad de Porto Alegre - Rio Grande do Sul - Brasil. El muestreo consistió en 155 ciudadanos con edades entre 13 y 35 años, perteneciendo a las categorías SUB 14, SUB 15, SUB 17, SUB 20 y Profesional, siendo evaluado todos los atletas que pertenecen a las categorías relacionadas. Para la determinación del somatotipo fue adoptado el método propuesto por Heath-Carter (10), por medidas antropométricas. Por medio de los resultados encontrados, se observa que los componentes mesomorfo y ectomorfo habían sufrido modificaciones con la edad, mientras que el endomorfo sigue siendo similar en todas las categorías. El análisis de la Distancia de Dispersion del Somatotipo demuestra una distancia significativa (SDD > 2) entre la categoría profesional y las otras. Uno sugiere más estudios, incluso estudios longitudinales para caracterizar mejor las características del atleta del fútbol en nivel nacional.

Palabra-clave: somatotipo; fútbol; morfología.

ESTUDO COMPARATIVO DO SOMATOTIPO ENTRE DIFERENTES CATEGORIAS DE JOGADORES DE FUTEBOL

RESUMO

Este estudo analisa os componentes do somatotipo em relação às diferentes categorias de jogadores de futebol de um clube da primeira divisão do futebol brasileiro localizado no município de Porto Alegre - Rio Grande do Sul - Brasil. A amostra constitui-se de 155 sujeitos com idades entre 13 e 35 anos, pertencentes às categorias SUB 14, SUB 15, SUB 17, SUB 20 e Profissional, sendo avaliados todos os atletas pertencentes às referidas categorias. Para a determinação do somatotipo recorreu-se ao método proposto por Heath-Carter (10), através de medidas antropométricas. Mediante os resultados encontrados, observa-se que os componentes mesomorfo e ectomorfo foram os mais sensíveis a modificações com a idade, enquanto o endomorfo permanece semelhante em todas as categorias. A análise da Distância de Dispersion do Somatotipo mostra uma distância significativa (SDD > 2) entre a categoria profissional e as demais. Sugere-se mais estudos, inclusive estudos longitudinais para caracterizar melhor as características morfológicas do atleta de futebol no nível nacional.

Palavras-chave: somatotipo; futebol; morfologia.