Original article

Anthropometric characteristics, somatotype and dietary patterns in youth soccer players

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A R T I C L E   I N F O
Article history:
Received 2 September 2016
Accepted 10 January 2017
Available online 8 July 2017

Keywords:
Soccer
Anthropometry
Somatotype
Dietary patterns
Body fat
Skinfolds
Team sports

A B S T R A C T
Objective: To determine the morphological characteristics, fat mass, somatotype and dietary patterns of youth soccer players from an amateur Spanish team.

Method: Height, weight, diameters, circumferences and skinfolds from sixteen youth soccer players were measured. Body fat percentage and somatotype were calculated. They completed the Kidmed questionnaire to analyze dietary patterns. Descriptive statistics (mean ± standard deviation) were used.

Results: The global body fat percentage was 9.16 ± 2.12 and the somatotype (2.56-3.73-2.77). The sum of the six skinfolds was 62.6 ± 2.7 mm. The sum of the eight skinfolds was 80.7 ± 3.1 mm. 75% of athletes consumed a fruit daily, 18.75% took a second fruit each day. 43.75% of players took vegetables once a day, 18.75% ate vegetables more than once a day.

Conclusion: Body fat percentage, the sum of the six skinfolds, the sum of the eight skinfolds and somatotype results are in agreement with previous studies where youth non-professional soccer players were analyzed. Other studies have obtained lower values in body fat percentage or in sum of six skinfolds due to they have evaluated professional soccer players. Anthropometric measures would be important to prescribed personalized diet and training plans.

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Características antropométricas, somatotipo y patrones alimentarios en jugadores jóvenes de fútbol

R E S U M E N
Objetivo: Determinar las características morfológicas, la masa grasa, el somatotipo y los patrones alimentarios de jugadores de fútbol jóvenes de un equipo amateur.

Método: Se midieron la altura, el peso, los diámetros corporales, las circunferencias y los pliegues cutáneos de 16 jugadores. Se calcularon el porcentaje de grasa corporal y el somatotipo. Se administró el cuestionario Kidmed con objeto de conocer el patrón alimentario. Se utilizaron métodos estadísticos descriptivos (media ± desviación estándar).

Resultados: El porcentaje global de grasa corporal fue 9.16 ± 2.12 y el somatotipo (2.56-3.73-2.77). El sumatorio de 6 pliegues fue 62.6 ± 2.7 mm y el sumatorio de 8 fue 80.7 ± 3.1 mm. El 75% de los futbolistas consumía una fruta diaria y el 18.75% tomaba una segunda pieza de fruta. El 43.75% de los jugadores tomaba una ración de vegetales cada día y el 18.75% comía vegetales más de una vez al día.

Conclusiones: Los resultados del porcentaje de grasa, del sumatorio de 6 pliegues, de 8 pliegues cutáneos y del somatotipo son similares a los obtenidos en estudios previos. Otras investigaciones encontraron un porcentaje de grasa inferior y un menor valor para el sumatorio de 6 pliegues debido a que analizaron jugadores profesionales. Las mediciones antropométricas son importantes para prescribir planes de alimentación y entrenamiento personalizados.

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Características antropométricas, somatotipo e padrões alimentares em jovens atletas de futebol

RESUMO

Objetivo: Determinar as características morfológicas, massa gorda, somatotipo e padrões alimentares de jovens jogadores de futebol de uma equipe amadora espanhola.

Métodos: Foram medidos altura, peso, diâmetros, circunferências e dobras cutâneas de dezesseis jovens jogadores de futebol. A porcentagem de gordura corporal e o somatotipo foram calculados. Eles completaram o questionário Kidmed para analisar padrões alimentares. Foram utilizadas estatísticas descritivas (média ± desvio padrão).

Resultados: A porcentagem de gordura corporal foi de 9.16 ± 2.12 e o somatotipo (2.56-3.73-2.77). A soma das seis dobras cutâneas foi 62.5 ± 2.77 mm. A soma das oito dobras cutâneas foi 80.7 ± 3.11 mm. 75% dos atletas que consumiam diariamente uma fruta, 18.75% ingeriam uma segunda fruta por dia. 43.75% dos jogadores ingeriam legumes uma vez por dia, 18.75% comiam vegetais mais que uma vez por dia.

Conclusão: A porcentagem de gordura corporal, a soma das seis dobras cutâneas, a soma das oito dobras cutâneas e os resultados somatotípicos estão de acordo com estudos prévios em que foram analisados jovens jogadores de futebol não profissionais. Outros estudos obtiveram valores mais baixos na porcentagem de gordura corporal ou na soma de seis dobras cutâneas devido a terem avaliado jogadores profissionais de futebol. Medidas antropométricas seriam importantes para prescrever uma dieta personalizada e planos de treinamento.

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Carter's equation was used to determine body fat. Somatotype was calculated according to Carter and can be observed mean values and standard deviations shows results of somatotype analyses, the sum of six Data were collected after the last competitive match at the end of the season.

Experimental design

The anthropometric characteristics measured were height, weight, three diameters (wrist, biepicondylar humerus and femur), six circumferences (arm relaxed and tensed, thigh, calf, hip and waist perimeter) and eight skin folds (biceps, triceps, subscapular, abdominal, thigh, calf, supraspinale and supracrestal). Data were also collected with validated material (an anthropometric tape and a small electronic sliding caliper, precision 0.01 mm). The anthropometric characteristics measured were height, weight, three diameters (wrist, biepicondylar humerus and femur), six circumferences (arm relaxed and tensed, thigh, calf, hip and waist perimeter) and eight skin folds (biceps, triceps, subscapular, abdominal, thigh, calf, supraspinale and supracrestal). Data were obtained following the standard techniques from the International Society for the Advancement of Kinanthropometry (ISAK). Carter's equation was used to determine body fat percentage. Somatotype was calculated according to Carter and Health method. Data were collected after the last competitive match at the end of the season.

Kidmed questionnaire determines the MD adherence. This questionnaire includes sixteen items on a yes/no scale. Affirmative answers from questions related with positive aspects of MD add one point (questions 1–5,7–11,13,15). Affirmative answers related with negative aspects of MD subtract one point (questions 1–5,7–11,13,15). Results between different positions of the players in the soccer field were not evaluated because there is insufficient statistical power to detect differences due to the sample size.

Results

In Table 1 can be observed mean values and standard deviations of anthropometric data obtained from players studied. Values in function of different positions are also shown in Table 1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Goalkeeper (n = 2)</th>
<th>Defenders (n = 3)</th>
<th>Fullbacks (n = 2)</th>
<th>Midfielders (n = 6)</th>
<th>Strikers (n = 3)</th>
<th>Global average (n = 16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (cm)</td>
<td>174.95 ± 1.48</td>
<td>180.00 ± 5.55</td>
<td>174.35 ± 0.91</td>
<td>173.93 ± 7.61</td>
<td>175.50 ± 3.77</td>
<td>175.54 ± 5.54</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>83.00 ± 2.97</td>
<td>67.40 ± 5.46</td>
<td>57.55 ± 6.71</td>
<td>69.25 ± 11.66</td>
<td>72.16 ± 6.13</td>
<td>69.70 ± 10.17</td>
</tr>
<tr>
<td>Wrist diameter (cm)</td>
<td>5.24 ± 0.29</td>
<td>5.68 ± 0.07</td>
<td>5.66 ± 0.08</td>
<td>5.35 ± 0.35</td>
<td>5.43 ± 0.16</td>
<td>5.45 ± 0.28</td>
</tr>
<tr>
<td>Humerus diameter (cm)</td>
<td>6.63 ± 0.12</td>
<td>6.92 ± 0.34</td>
<td>6.35 ± 0.14</td>
<td>6.21 ± 0.39</td>
<td>6.33 ± 0.22</td>
<td>6.43 ± 0.39</td>
</tr>
<tr>
<td>Femur diameter (cm)</td>
<td>9.67 ± 0.53</td>
<td>9.34 ± 0.18</td>
<td>8.91 ± 0.16</td>
<td>9.19 ± 0.44</td>
<td>9.02 ± 0.27</td>
<td>9.21 ± 0.39</td>
</tr>
<tr>
<td>Arm relaxed circumference (cm)</td>
<td>32.2 ± 0.3</td>
<td>26.9 ± 2.0</td>
<td>24.2 ± 1.1</td>
<td>27.1 ± 1.50</td>
<td>29.0 ± 0.4</td>
<td>27.7 ± 2.5</td>
</tr>
<tr>
<td>Arm tensed circumference (cm)</td>
<td>34.2 ± 0.3</td>
<td>29.3 ± 1.9</td>
<td>26.6 ± 0.5</td>
<td>28.6 ± 1.1</td>
<td>31.0 ± 0.6</td>
<td>28.6 ± 2.4</td>
</tr>
<tr>
<td>Thigh circumference (cm)</td>
<td>50.7 ± 2.5</td>
<td>50.8 ± 2.3</td>
<td>46.6 ± 1.0</td>
<td>51.7 ± 4.1</td>
<td>50.7 ± 1.9</td>
<td>51.6 ± 4.4</td>
</tr>
<tr>
<td>Calf circumference (cm)</td>
<td>39.6 ± 0.6</td>
<td>35.4 ± 1.3</td>
<td>33.6 ± 0.9</td>
<td>37.9 ± 3.7</td>
<td>36.3 ± 0.8</td>
<td>36.8 ± 2.9</td>
</tr>
<tr>
<td>Hip circumference (cm)</td>
<td>103.9 ± 5.6</td>
<td>92.2 ± 4.6</td>
<td>84.5 ± 0.7</td>
<td>95.7 ± 6.5</td>
<td>92.7 ± 5.8</td>
<td>94.1 ± 7.1</td>
</tr>
<tr>
<td>Waist circumference (cm)</td>
<td>82.0 ± 0.8</td>
<td>73.4 ± 3.5</td>
<td>68.1 ± 4.1</td>
<td>75.6 ± 5.1</td>
<td>78.3 ± 4.2</td>
<td>75.6 ± 5.4</td>
</tr>
<tr>
<td>Biceps skinfold (mm)</td>
<td>8.5 ± 2.1</td>
<td>4.8 ± 1.1</td>
<td>3.5 ± 1.4</td>
<td>5.1 ± 2.4</td>
<td>6.0 ± 2.0</td>
<td>5.4 ± 2.2</td>
</tr>
<tr>
<td>Triceps skinfold (mm)</td>
<td>16.2 ± 1.1</td>
<td>7.6 ± 2.6</td>
<td>6.0 ± 0.0</td>
<td>9.1 ± 2.1</td>
<td>9.5 ± 2.8</td>
<td>9.4 ± 3.4</td>
</tr>
<tr>
<td>Subscapular skinfold (mm)</td>
<td>13.5 ± 3.5</td>
<td>9.2 ± 2.2</td>
<td>9.1 ± 4.0</td>
<td>10.0 ± 3.4</td>
<td>9.7 ± 1.5</td>
<td>10.1 ± 2.9</td>
</tr>
<tr>
<td>Supraespinale skinfold (mm)</td>
<td>11.7 ± 3.2</td>
<td>5.0 ± 1.0</td>
<td>4.1 ± 1.9</td>
<td>7.0 ± 3.3</td>
<td>7.8 ± 2.6</td>
<td>7.0 ± 3.3</td>
</tr>
<tr>
<td>Supracrestal skinfold (mm)</td>
<td>17.4 ± 3.7</td>
<td>14.6 ± 9.7</td>
<td>7.4 ± 0.9</td>
<td>12.2 ± 4.4</td>
<td>12.2 ± 1.9</td>
<td>12.7 ± 5.1</td>
</tr>
<tr>
<td>Abdominal skinfold (mm)</td>
<td>23.2 ± 1.1</td>
<td>12.3 ± 7.5</td>
<td>8.5 ± 2.1</td>
<td>12.5 ± 4.9</td>
<td>13.4 ± 3.3</td>
<td>13.5 ± 5.8</td>
</tr>
<tr>
<td>Subscapular skinfold (mm)</td>
<td>22.2 ± 3.9</td>
<td>11.3 ± 1.5</td>
<td>8.7 ± 1.8</td>
<td>15.2 ± 4.2</td>
<td>12.0 ± 4.3</td>
<td>13.9 ± 5.0</td>
</tr>
<tr>
<td>Calf skinfold (mm)</td>
<td>12.0 ± 1.4</td>
<td>8.0 ± 1.7</td>
<td>5.6 ± 0.9</td>
<td>9.5 ± 3.6</td>
<td>7.2 ± 3.7</td>
<td>8.6 ± 3.2</td>
</tr>
</tbody>
</table>

Data for 16 soccer players.

of 17.38 ± 0.92 years. They had trained for ~1.5 h/day, 4 day/week (including a weekly competitive match) during the previous year. All players were regularly involved in competitive seasons. The distribution in different position in the field was goalkeeper (n = 2), defenders (n = 3), fullbacks (n = 2), midfielders (n = 6) and strikers (n = 3). They delivered informed written consents which had been signed by their parents.

Statistical analysis

SigmaPlot 13 version (Systat software) was used for Statistical Analyses. Descriptive statics (mean ± standard deviation) were reported for the different parameters analyzed. Statistical differences between different positions of the players in the soccer field were not evaluated because there is insufficient statistical power to detect differences due to the sample size.

Discussion

The global fat percentage obtained in players was 9.16 ± 2.12%. The average somatotype was (2.56–3.73–2.77). Dietary patterns analysis showed variables nutritional habits, outstanding that 75% took one fruit each day, 18.75% took a second fruit each day. 43.75% took vegetables more than once a day, 31.25% of athletes evaluated went more than once a week to a fast-food restaurant.

Kidmed Indexes were: goalkeeper (7.00 ± 1.41), defenders (5.33 ± 5.03), fullbacks (5.50 ± 0.70), midfielders (4.83 ± 2.22), strikers (5.33 ± 3.78) and global players sample (6.12 ± 2.77).

Table 2 shows results of somatotype analyses, the sum of six skinfolds, the sum of eight skinfolds and body fat percentage.

Someomatoe classifications were: goalkeepers (endomesomorh), defenders (meso-ectomorph), fullbacks (meso-ectomorph), midfielders (balance mesomorph), strikers (balance mesomorph) and global players sample (balance mesomorph). These results can be observed in Fig. 2.

Kidmed questionnaire determines the MD adherence. This questionnaire includes sixteen items on a yes/no scale. Affirmative answers from questions related with positive aspects of MD add one point (questions 1–5,7–11,13,15). Affirmative answers related with negative aspects of MD subtract one point (questions 6,12,14,16). The final punctuation is known as the Kidmed Index which can be classified in three different categories:

- Final punctuation ≥ 8: high adherence.
- Final punctuation 4–7: medium adherence.
- Final punctuation ≤ 3: low adherence.

Anthropometric data were collected by a high trained technician, certified with ISAK level I. The weight was collected using an electronic weighing machine (Tanita UM-076). Height was measured with a stadiometer (Seca). The skinfolds were measured with a slim guide skinfold caliper. Bone breadths and body perimeters were also collected with validated material (an anthropometric tape and a small electronic sliding caliper, precision 0.01 mm). The experimental protocol was written following the ethics rules from Helsinki Declaration. All experimental procedures were in accordance with the Pablo de Olavide University Ethical Committee rules.
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Another investigation evaluated anthropometric characteristics from Chilean professional soccer players (n = 406). They observed differences in height, weight and fat mass in players from different positions and as result each player has his specific position in function of his body composition. Slightly lower values were observed in the sum of six skinfolds in this previous study in comparison with the data from the present study. However, it is probable that the professional level of these players could have influenced in these better results. Goalkeepers present significantly higher values for the sum of six skinfolds as this idea has been mentioned before in this paper. Additionally, a recent paper described somatotype profiles of Chilean professional male soccer players (n = 100) (23 ± 4.4 years). As in the present study, goalkeepers showed the highest weight. They also found that each position presented a different dispersion to the medium somatotype. This information must be taken in consideration in order to morphologic optimization in a specific position in the field.

To asses dietary habits in ninety elite women paddlers, they self-completed Kidmed questionnaire. 85.56% of the paddlers took one fruit each day, 53.3% consumed a second fruit daily. 76.67% took vegetables once a day and 30% ate more than one ration a day. Any athlete analyzed went to a fast food restaurant. 90% of paddlers consumed dairy products for breakfast. While the answers to Kidmed questions in the current study are closer to another previous studies which analyzed Mediterranean diet adherence in youth general population. Possibly, dietary patterns of players evaluated in the present study are not completely adequate for athlete population because their answers are not similar to answers observed in athletes evaluated with the same method. Nutritional directions could be really useful to improve body composition and probably soccer performance.

The discoveries would be of interest to coaches and medical services of young soccer teams. Anthropometric measures and dietary patterns tests would be necessary in order to prescribe personalized training and diet plans in youth soccer players from a non-professional teams.

We admit that the study has limitations, the mean is that we cannot measure significant anthropometric differences in players position due to the sample size. Other limitations would be that we only have studied Spanish amateur male soccer players so consequently, we cannot extrapolate our results to all soccer players or team sports.

Body fat percentage, the sum of six skinfolds, the sum of eight skinfolds and somatotype results are in agreement with previous studies where youth non-professional soccer players were analyzed. Other studies have obtained lower values in body fat percentage or in the sum of six skinfolds due to they have evaluated professional soccer players. Anthropometric measures would be important to prescribed personalized diet and training plans.

Ethical disclosures

Protection of human and animal subjects. The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors declare that no patient data appear in this article.

Financing

The present research did not receive any kind of finding.

Conflicts of interest

The authors have no conflicts of interest to declare.

References