Anthropometric characteristics of handball adult athletes

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ABSTRACT: The purpose of this study was to characterize the anthropometric aspects and also the body composition of the athletes who have taken part at the Amazon Adult Male Cup of Clubs, in the year of 2002. Besides defining the athletes’ position per game, it was considered the characteristics of the best player per game in each position. Therefore, some measures were taken: body mass, stature, width of the sail, hand size, wrist width, lower extremity length, sitting height, forearm circumference, abdominal circumference, % fat, fat mass, lean body mass. For the results analysis it was used score Z, considering the results of the best player and the average obtained by the others players of the same position. The results have shown that the best players and the others players of distinct positions presented values lower than the suggested average for the players of this sport, except for the left and right wings and the background central, in fat percentage. Despite the scarcity of data about this sport, these can be taken as initial parameters, and more studies should be developed aiming to characterize not only adult athletes, but also athletes of different age levels, what later on will serve as reference parameters for the improvement of athletes that practice this modality of sport, in Brazilian north region.

Keywords: handball, game position, anthropometric aspects.

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Submitted: November / 2006  Accepted: August / 2006
RESUMO

Características antropométricas de atletas adultos de handebol

O propósito desse estudo foi caracterizar os aspectos antropométricos e a composição corporal dos atletas participantes da Taça Amazônica de Clubes Masculinos Adultos, realizada no ano de 2002. Além de caracterizar os jogadores por posição, foi também verificada a característica do melhor jogador em cada uma das posições do jogo, sendo que para isso foram coletadas as seguintes medidas: massa corporal (MC), estatura, envergadura, diâmetro palmar, diâmetro rádio-ulnar, comprimento de membros inferiores, altura do tronco cefálico, perímetro do antebraço, perímetro do abdômen, somatório de dobras cutâneas, percentuais de gordura, massa gorda, massa corporal magra. Para a análise dos resultados foi utilizado tanteo Z para comparar o melhor jogador de cada posição com a média obtida para os jogadores da mesma posição. Com isso, foi observado que os melhores atletas escolhidos pelo nível técnico não tinham um perfil antropométrico condizente com o sugerido para atletas desse desporto, à exceção dos extremos esquerda e direita e do armador central, na variável percentual de gordura. Apesar da escassez de dados sobre essa modalidade, estes podem ser tomados como indicadores iniciais, pois mais estudos devem ser conduzidos, como o intuito não só de caracterizar atletas adultos, mas também de outras faixas etária, pois poderá servir posteriormente como parâmetros para a melhora do rendimento de atletas praticantes dessa modalidade na região norte do Brasil.

Palavras-chave: handebol, posição de jogo, aspectos morfológicos.

INTRODUCTION

Some aspects seem to be indispensable for the athlete’s development, among which should detach the technique, tactical, psychological and the anthropometrics and this last one, when well taken advantage, can answer to different demands inside of the situations found during the game (BAYER et al., 1987).

The specificity about the anthropometrics aspects seems to turn different when observed in different modalities and, even, in different geographical areas, could have an implementation, not only about the training planning, as well as of the process of athletes’ selection, when there is knowledge of those specific aspects form, for position. The importance is observed in some of the anthropometrics aspects for the choice and, for consequence, gets better the athlete’s performance when is in a game, as it was emphasized by Queiroga et al. (2005) in anthropometrics analyses done in indoor soccer players, in the different positions of the game.

It can be emphasized, also, that the stature is an important proportion for the defensive and offensive actions during the game, for facilitating such actions, as observed in basketball athletes in their different positions (PAIVA NETO, CÉSAR, 2005). Another proportion that has plenty influence in games, as the volleyball, the basketball and the handball, is the sail width, because as larger it goes, larger the action ray generated during the attack and defense actions. In athletes of handball of high performance that characteristic came superior to the stature, in a percentile of 6% (MARQUES, 1987).

Another important aspect is the appropriate fat percentile index for each game position, because when that percentile comes high can influence negatively the athletes’ acting (PAIVA NETO, CÉSAR, 2005; QUEIROGA et al., 2005). For this analysis, it was taken into account morphologic and physiologic characteristics, as well as the position occupied for each athlete.

The anthropometrical variables of handball athletes were observed by Glaner (1999) during the Pan-American of this modality. However, the knowledge of linked variables to the aspects anthropometrics characteristic of the North Area can facilitate the assembly of the training programs and athletes’ selection. Therefore, the objectives of this study were to describe the anthropometrics variables, to draw the percentile of these and to compare the best athletes for game position with the others of same position.

MATERIAL AND METHODS

Sample

Were appraised 63 male athletes participants of the Amazon Adult Male Cup of Clubs - 2002", of the teams of CIEC-AM, ULBRA-AM, AABB-RR, Liga de Coari-AM, Liga Esportiva de Itacoatiara-AM and Sulamérica-AM. The athletes were divided
with base in their respective game positions: goalkeeper, players of six meters (outside-left, outside-right and center) and players of nine meters (left guard, central guard and right guard). For each one of those positions was chosen the best of the championship, in agreement with the choice accomplished by the championship participant coaches, according to CBHb (Confederação Brasileira de Handball) norms. Besides the seven chosen athletes in each one of the positions, other 56 were appraised, whose data are described separately in the Table 1. All of the athletes voluntarily participated of the data collection, for that they signed a consent term, in agreement with the norms of the Resolution no. 196/96, of National Council of Health (Conselho Nacional de Saúde), on Research Involving Human beings.

Protocols and Instruments

The following variables were verified: age (ID), corporal mass (MC), stature (EST), span (ENV), trunk-cephalic height (ATC), hand size (DP), wrist size (DRU), forearm circumference (PA), abdomen circumference (PAB) and sum of the 7 cutaneous folds of the triceps (TRI), subscapular (IF), abdominal (ABD), breastplate (PE), axillary medial (AM), thigh (CX) and supra-iliac (SI)]. For the body mass a digital scale (Toledo @) was used accurately of 100g, as well as for the stature, an estadiometer with 0,1cm scale, being used for both measures the protocol described by Alvarez, Pavan (1999). For the sail width a ribbon was used with scale of 0,1 cm, fastens in a flat wall, where three measures were verified, being obtained the mean later (VELHO, LOPES, 1999).

For the trunk-cephalic height, hand size and wrist size the protocols used were suggested by Alvarez, Pavan (1999), and for the last two measures a anthropometric adjustable caliper (Mitotuyo @) was used with sliding of 3 cm accurately of 0.05 mm. In the forearm perimeter and abdomen a flexible metallic ribbon(Sanny @) accurately of a 0.1 cm7. For the cutaneous folds, a mark compass (Hapenden) with 0.2mm of precision and, to establish the anatomical points, it was used suggested them by Fernandes (1999). The length of inferior members (CMI) is the reason of the subtraction between stature (EST) and of the trunk-cephalic height (ATC) (GLANER, 1999).

The fat percentile (% F) was calculated by the estimate of the corporal density (WILMORE et al., 1991) and for the equation of fat percentile (JACKSON, POLLOCK, 1978). The fat mass (MG) and the thin corporal mass (MCM) were obtained through the equations suggested by FERNANDES (1999).

All the athletes were appraised in certain schedules for the evaluation team, that always obeyed the following criterion: at least one hour before the games, doesn’t having the accomplished athlete any type of effort that could influence in the measure, not even the warming. However, the main methodological limitation was the participation of teams of only two states, Amazonas and Roraima; this particularity is due to the displacement difficult among the states, because the main city of the cup was the city of Manaus, where the access ways are mainly fluvial and aerial, increasing the time of displacement, as well as the trip cost a lot of money.

Statistical analysis

The data were submitted to the descriptive analysis of the values of central tendency and dispersion (mean and pattern deviation) and percentile for all the variables, besides the score Z, comparison among the best athletes of each position with the other participant athletes of the same game position. For this analysis the statistical program used was SPSS 10.0 for Windows.

RESULTS AND DISCUSSION

There are few evidences in the literature about the anthropometric characteristics of handball male athletes; could stand out the studies of Glaner (1999) and of Glaner, Pires Neto (1997); in the first, were appraised athletes of the Pan-American X and, in the second, athletes of the XII Brazilian Championship.

When the values of the present study are observed in relation to the same variables used by Glaner (1999), Glaner, Pires Neto (1997), is noticed that the athletes present a low stature (176 cm), a high fat mass index (17.93 kg), a high fat percentile (22,2%) and SUM7 (95.58). Those characteristics can determined if the athletes present or not overweight levels and obesity, factor that can be decisive during the game actions, after all the acceptable levels for masculine handball athletes are around 12% for the “fat percentile variable” (MARQUES, 1987).

The values of ENV (180.77 cm), CMI (84.16 cm), DP (19.37 cm) and DRU (5.48 cm) also came below the steemed ones for high performance handball players.

Table 1 - Results of the central tendency measures (mean and pattern deviation) of the championship selection and of the participant athletes of the competition

<table>
<thead>
<tr>
<th>Athletes of Amazon Cup (N=56)</th>
<th>Selection of Amazon Cup (N=7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphologic variables</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>24.52 ± 5.26</td>
</tr>
<tr>
<td>Body Mass</td>
<td>77.85 ± 11.08</td>
</tr>
<tr>
<td>Stature</td>
<td>176.34 ± 7.77</td>
</tr>
<tr>
<td>Sail Width</td>
<td>180.83 ± 8.45</td>
</tr>
<tr>
<td>Hand Size</td>
<td>19.33 ± 0.96</td>
</tr>
<tr>
<td>Wrist Width</td>
<td>5.47 ± 0.29</td>
</tr>
<tr>
<td>Lower Extremity Length</td>
<td>84.25 ± 5.06</td>
</tr>
<tr>
<td>SUM7</td>
<td>99.30 ± 40.23</td>
</tr>
<tr>
<td>%F</td>
<td>23.16 ± 10.64</td>
</tr>
<tr>
<td>Fatty Mass</td>
<td>18.80 ± 10.69</td>
</tr>
<tr>
<td>LBM</td>
<td>59.04 ± 7</td>
</tr>
</tbody>
</table>
The percentiles values for athletes of the present study are presented in the Table 2.

When the percentile values are observed for the participant athletes of the competition, it can be verified that the best athletes for position of the Table 1 are with means below the verified value in the 50 percentile for the variables MC, EST, ENV, CMI, could be inside of an influence factor for the income of the linked aspects to the game. However, variables, as SUM 7, %F and MG, are with acceptable values, carting with that positive influences, because they are related to a better acting, since LBM is above the mean; as high correlation exists among those varied, can be inferred that these individuals possess a better acting relationship, that is confirmed when observed the values of DP and DRU, that can influence in the technical aspect, facilitating offensive actions of those in relation to the other ones.

Besides the widespread analyses, other prominence aspect would be the characterization for game position and, in front of that situation, a comparison of the players’ of each position mean with the best player’s of the different position result was evidenced for each one of the analyzed variables.

The Table 3 presents the measures of central tendency and the participant goalkeepers’ dispersion (mean and pattern deviation), as well as the score Z of these in relation to the best goalkeeper of the competition. In the variable SUM7, % F and MG the best goalkeeper presents a negative result for the score Z, suggesting that, in those aspects, he presents superior mean to the other goalkeepers and that, if we consider that the variables are linked to aspects of the fat weight of the corporal composition, that factor still comes in a better perspective. For variables, like LBM, CMI, DP, ENV and EST, the results are presented in a positive way, which allows point that the best goalkeeper presents better anthropometrics characteristics than the other goalkeepers’ average.

The players of six meters (outside-right, left and center) can be observed in the Table 4, which presents negative values in the score Z for the outside-left in the variables ENV, EST, CMI and DP. Opposite situation happens for the outside-right, that possesses negative values in the score Z for variables, as MG, %F and SUM 7, being the mean of those superior to the other participants of the same position; in variables, like DP, ENV, CMI and EST, that measured value for the score Z is positive, what indicates superior values to the of the other players’ of this same position mean. The best center presents results similar to the one of the outside-left, these are smaller than the other players’ of this position mean in the variables of the fat weight, as% F, SUM 7 and MG, and the results for DP, ENV, CMI and EST are inferior to the other players’ of the same position mean.

The players of nine meters (left guard, right and central) results are presented in the Table 5. For the left and central guard, the relationships are similar to the one of the outside-left and center, since these present negative results for the variables of the fat weight, but they are also negative for the anthropometrics variables, being the right guard the only of the line of nine meters to present a negative relationship for the variables of the fat and positive weight for the anthropometrics variables.

The obtained results for variables, as sail width, hand size and %F for goalkeepers, centers, the outside-left and outside-right players are above the suggested mean (QUEIROGA et al., 2005; PAIVA NETO, CÉSAR, 2005; JACKSON, POLLOCK, 1978). Because except the end-left best and right for the variable %F (12.1 and 11.8%), respectively, all the others present values above 12%, as well as none of it got to overcome 6% of the stature with the sail width variable and that repeated for the hand size, since none of the presented values was superior to 24 cm.

### Table 2 - Percentiles norms developed starting from the participant teams of the Amazonian Cup of Clubs (N = 63).

<table>
<thead>
<tr>
<th>PERCENTIL</th>
<th>MC</th>
<th>EST</th>
<th>ENV</th>
<th>DP</th>
<th>DRU</th>
<th>CMI</th>
<th>SOMA7</th>
<th>%G</th>
<th>MG</th>
<th>MCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>95</td>
<td>99.68</td>
<td>193.60</td>
<td>196.96</td>
<td>21.38</td>
<td>6.00</td>
<td>94.00</td>
<td>55.08</td>
<td>11.95</td>
<td>8.18</td>
<td>72.18</td>
</tr>
<tr>
<td>90</td>
<td>91.60</td>
<td>188.00</td>
<td>191.30</td>
<td>20.92</td>
<td>5.86</td>
<td>91.30</td>
<td>61.60</td>
<td>13.35</td>
<td>9.61</td>
<td>70.25</td>
</tr>
<tr>
<td>75</td>
<td>84.80</td>
<td>180.00</td>
<td>187.00</td>
<td>19.90</td>
<td>5.70</td>
<td>88.00</td>
<td>82.20</td>
<td>18.29</td>
<td>14.22</td>
<td>64.39</td>
</tr>
<tr>
<td>50</td>
<td>77.40</td>
<td>177.00</td>
<td>181.00</td>
<td>19.30</td>
<td>5.50</td>
<td>83.70</td>
<td>127.10</td>
<td>29.57</td>
<td>22.56</td>
<td>59.58</td>
</tr>
<tr>
<td>25</td>
<td>69.70</td>
<td>171.00</td>
<td>174.30</td>
<td>18.50</td>
<td>5.30</td>
<td>80.00</td>
<td>163.66</td>
<td>40.30</td>
<td>36.79</td>
<td>54.12</td>
</tr>
<tr>
<td>10</td>
<td>63.46</td>
<td>167.00</td>
<td>170.70</td>
<td>18.04</td>
<td>5.08</td>
<td>78.00</td>
<td>170.58</td>
<td>42.33</td>
<td>39.24</td>
<td>49.48</td>
</tr>
<tr>
<td>MEAN</td>
<td>77.48</td>
<td>176.38</td>
<td>180.77</td>
<td>19.37</td>
<td>5.48</td>
<td>84.16</td>
<td>95.58</td>
<td>22.20</td>
<td>17.93</td>
<td>59.54</td>
</tr>
<tr>
<td>PD</td>
<td>11.06</td>
<td>8.15</td>
<td>8.92</td>
<td>1.08</td>
<td>0.31</td>
<td>5.15</td>
<td>39.74</td>
<td>10.45</td>
<td>10.44</td>
<td>7.36</td>
</tr>
</tbody>
</table>

### Table 3 - Results of the central tendency, dispersion measures and the goalkeepers’ Score Z

<table>
<thead>
<tr>
<th>Variables</th>
<th>Best Goalkeeper</th>
<th>Goalkeepers (N=11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>21</td>
<td>26±6</td>
</tr>
<tr>
<td>Body Mass</td>
<td>83,0</td>
<td>78±11,3</td>
</tr>
<tr>
<td>Stature</td>
<td>181,0</td>
<td>175±5,7</td>
</tr>
<tr>
<td>Sail Width</td>
<td>189,0</td>
<td>179±8,3</td>
</tr>
<tr>
<td>Hand Size</td>
<td>21,0</td>
<td>19,0±7,3</td>
</tr>
<tr>
<td>Wrist Width</td>
<td>6,0</td>
<td>5,4±2,0</td>
</tr>
<tr>
<td>Lower Extremity Length</td>
<td>87,0</td>
<td>83,1±3,7</td>
</tr>
<tr>
<td>SUM7</td>
<td>77,3</td>
<td>118.2±39,3</td>
</tr>
<tr>
<td>%F</td>
<td>16,9</td>
<td>28,1±10,7</td>
</tr>
<tr>
<td>Fatty Mass</td>
<td>14,0</td>
<td>23,1±10,9</td>
</tr>
<tr>
<td>LBM</td>
<td>68,9</td>
<td>55,5±4,8</td>
</tr>
</tbody>
</table>

For the players of the nine meters line, the only that presented suitable results with was suggested in the literature was the central guard, in the %F variable (9.6%); however, in variables, as sail width and hand size, none of the players presented results close to the suggested for this modality players. The anthropometrics factors, like EST, ENV, DP, DRU and CMI, are important inside of the aspects developed during the actions of the game, because they can provide better performance, as well as the corporal composition aspects, mainly if PG, SUM7 and %F are with values above LBM, because that can be an indicative that the income can be affected by those components. Another form of analyzing the obtained values would be to compare them with variables of individuals with better performance in the Table 6, for that, the best athletes of the Amazonian Cup, as well as the other ones, were observed in relation to the best athletes of the Pan-American X. It is noticed a disadvantage in relation to all the verified variables, except to MG, that shows a similar behavior for the two samples. For the other athletes, all the variables are above the mean presented by the appraised athletes during X Pan - American.

The variables MC, EST, ENV, DP, DRU and CMI are smaller for the other athletes of the Amazonian cup when observed in relation to the values presented by the athletes of the Pan-American, and this difference continues evident in the variables of the corporal weight, like SUM7, %F, MG and LBM.

CONCLUSION

The differences found in variables that characterize anthropometrics aspects of adult athletes of the north area are evident when these are compared amongst themselves or in relation to athletes involved in conditions that propitiate a better performance. But the fact of there being few available data in the literature on the morphologic aspects for athletes of the north area does with there is no comparative data. In that way, some gaps should be approached in future studies, as the existent relationship between the variables here described and physical fitness or, even, the variables of the specific technical aspect of the modality. The facts here exposed take us to believe that, for the athletes representatives of this sporting modality selection, would be important to take in consideration values above the 75 percentile for the variables MC, EST, CMI, ENV, DP, DRU, %F, MG and LBM.
Acknowledgements

To the coordination and the academics of the course of Aca-
demical Center Nilton Lins Physical education, to the Extension
Pro-rectory of that same institution, to the Federação Amazonense
de Handball (FAH), to the Confederação Brasileira de HANDBALL
(CBHb), to the Olympic Town of Manaus and the participant teams
of the championship, for the cooperation for the accomplishment
of this study.

REFERENCES

ALVAREZ, B.R.; PAVAN, A.L. Alturas e comprimentos. In: Antropometria: técnicas e pa-

BAYER, C. Técnica del balonmano: la formacion del julgador. Ed. Hipasno Europea S.A.


GLANER, M.F. Perfil morfológico dos melhores atletas por posição de jogo do pan-ameri-
cano masculino de handebol. Revista Brasileira de Cineantropometria e Desempenho

GLANER, M.F.; PIRES NETO, C.S. Morfológia de atletas pan-americanos e brasileiros de


MARQUES, A.T. A importância dos parâmetros antropométricos e das qualidades físicas

PAIVA NETO, A.; CÉSAR, M.C. Avaliação da composição corporal de atletas de basquetebol
dossex masculino participantes da liga nacional 2003. Revista Brasileira de Cineantro-

QUEIROGA, M.F.; FERREIRA, A.S.; RMANZINI, M.; MARQUES, A.T. Perfil antropométrico
dofutsal feminino de alto nível competitivo conforme função tática desempenhada no
jogo. Revista Brasileira de Cineantropometria e Desempenho Humano, v.7, n.1, p.30-
34, 2005.

SIRI, W.E. Body composition from fluid space and density. In: Techniques for measuring


MARTORELL, R.; SEEFE LD, V.D. Body breadth equipment and measurement techniques.
In: Antropometric Standardization reference manual. Lohman TG et al. Human Kinetics:
Champaign, 1991.