156 - PREVALENCE OF OVERWEIGHT AND OBESITY IN SCHOOL CHILDREN: A STUDY OF DIFFERENT STANDARDIZATION TABLES

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INTRODUCTION:

Obesity and overweight in children has been concerning the population more and more, since such characteristics have been rapidly increasing. Due to these increases, sicknesses associated with obesity such as metabolic alterations, hyperlipidaemia, hypertension, type II diabetes mellitus and cardiovascular diseases that are considered to be risk factors for adults can already be observed in much younger age groups (Styne 2001).

Intense and complex morphological, physiological and sociological alterations occur primarily in the first two decades of life. Children and adolescents in school thus become the most visible population for the development of an anthropometric information profile (height, weight and corporal mass index), becoming good indicators for public health programs (Medeiros 2005). Important alterations also occur in the body composition during these phases, characterized by larger fat deposits in girls and muscular mass in boys (Ferreira, 2000; CDC, 2000).

The interpretation of the anthropometric measurements demands the use of defined standards and cut off points (Vasconcelos, 2000; Soares, 2003). Ferreira (2000), points out that the ideal reference standard could be confused as a standard of normality. Such conditions lead us to believe that at the time an individual is classified, the evaluator does not really know if the cut off points of determined tables will overestimate or underestimate the result of their evaluation.

For this reason, the objective of this study is to classify the prevalence of overweight and obesity in school children, from the public school system and private schools in the state of Rio Grande do Norte, according to different tables of reference used by Brazilian researchers and a Regional table prepared for the Rio Grande do Norte, proposed for the study.

METHODOLOGY:

The study relative to the population context was undertaken in the state of Rio Grande do Norte, a state in the northeast of Brazil, using the territorial division presented by the Institute of Geography and Statistics (IBGE, 2000). This research took a stratified random sampling (Cochran, 1977), made up of 2482 schools, with 635 of them being public schools in the interior of the state, while there were 1126 public schools, and 721 private schools in the capital of the state. The students were of both sexes with ages varying from 6 to 15.

For the weight measurement, a Filizola microelectronic scale was used, precise to within 100 grams, with a weight limit of 150 kilos, that automatically returns to zero when the weight is removed from it. Height was measured with the assistance of a nationally produced Sanny measuring device, with an extension of 200 cm which is precise to within 1 mm.

The variables used for the evaluation of overweight and obesity were the corporal mass index (CMI). The standard tables for the analysis of CMI were: CDC (2000); Cole et al(2000); Conde, Monteiro (2006). On the CDC table, overweight was considered to be the CMI equal to or above 85 percentiles and below 95 percentiles while obese was considered to be equal to or above 95 percentiles on the CMI scale.

The method used in the construction of the state curve was basically the same used in the construction of the international standard of the CMI (Cole et al2000; Conde, Monteiro 2006). Individuals with CMI values below or above a ± 4 standard deviation (SD) were discarded from the sampling, according to age and sex. The method used for the composition of the curves was the LMS combined with the cubic spline method and the statistical protocol for the standardization of subgroups (s&i); sex-age, Box-Cox, where L = the lambda coefficient (ë ) that standardizes the data within a Normal Distribution sub-group considered to be (s&i); M equals the median value of the sub-group considered to be (s&i); and S equals the variation coefficient of the sub-group considered to be (s&i). With the three previously cited variation coefficients, the respective percentage values are calculated according to the formula below:

\[ C100a_{(s&i)} = M_{(s&i)} \left[ 1 + L_{(s&i)} S_{(s&i)} Z_{(s&i)} \right]^{1/L_{(s&i)}} \]

Where Z is the normal deviation equivalent for area a; C100 , is the 100th correspondent to Z; (s&i) is the age in months and L , M , S , and C100 , indicate the values correspondent to each curve in age (s&i). To create the critical values for the nutritional state in accord with the statistical criteria, values z equivalent to the 85 and 95 percentiles were used in formula 1, recommended to respectively diagnose excess of weight and obesity (Barlow, Dietz, 2002 ; WHO, 1995; Conde, Monteiro 2006). To determine the critical values following the epidemiological criteria, the formula applied was:

\[ Z = (\text{IMC/M}^{1/4} - 1)/(LS) \]

These values permit the retrospective estimate of their values equivalent through previous ages (Berenson, 1993; Cole et al2000; Conde, Monteiro 2006). The critical values used for the classification of the nutritional state in Low weight were: CMI/Age < 5 percentiles; Overweight: CMI/Age > 85 percentiles < 95; Obesity: CMI/Age > 95 percentiles, (WHO; CDC, 2000; Soares, 2003).

All of the analyses were done with the statistical package Stata (version 8). This study was approved by the ethics committee of the Hospital Universitário Onofre Lopes, UFRN (Federal University of Rio Grande do Norte).

RESULTS AND DISCUSSION:

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The criteria used to identify the prevalence of overweight and obesity through the CMI (Table 1) point out marked
differences, in both sexes equally.

In relation to type, we analyzed the results by taking as a reference the standardization tables selected by the study,
we concurred that the male group presented higher values as much in the prevalence of overweight as in obesity. However, the
female group presented higher values in obesity, following the classification of Monteiro.

**Table 1 - Prevalence of overweight and obesity for school children according to type and anthropometric criteria.**

<table>
<thead>
<tr>
<th></th>
<th>MALE</th>
<th></th>
<th></th>
<th></th>
<th>FEMALE</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>regional tables propose</td>
<td>132</td>
<td>10.80</td>
<td>47</td>
<td>3.87</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2 - Critical CMI values proposed for the definition of low weight, overweight and obesity in the Rio Grande do Norte population from 6 to 15 years of age in each sex, according to age.**

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>(LW)</td>
<td>(OW)</td>
<td>(OB)</td>
</tr>
<tr>
<td>(LW)</td>
<td>(OW)</td>
<td>(OB)</td>
</tr>
<tr>
<td>6</td>
<td>13.14</td>
<td>18.85</td>
</tr>
<tr>
<td>7</td>
<td>13.16</td>
<td>20.19</td>
</tr>
<tr>
<td>8</td>
<td>13.25</td>
<td>21.11</td>
</tr>
<tr>
<td>9</td>
<td>13.43</td>
<td>21.72</td>
</tr>
<tr>
<td>10</td>
<td>13.70</td>
<td>22.11</td>
</tr>
<tr>
<td>11</td>
<td>14.06</td>
<td>22.40</td>
</tr>
<tr>
<td>12</td>
<td>14.52</td>
<td>22.69</td>
</tr>
<tr>
<td>13</td>
<td>15.09</td>
<td>23.08</td>
</tr>
<tr>
<td>14</td>
<td>15.77</td>
<td>23.68</td>
</tr>
<tr>
<td>15</td>
<td>16.57</td>
<td>24.59</td>
</tr>
</tbody>
</table>

LW = low weight; OW = overweight; OB = obesity; CMI = corporal mass index.

The curves of the 95th percentile (Figure 1), even after having been adjusted, show a discontinuity considered to be
normal. All in all, it is worth while to remember that distortions of this type are common in any statistical approach, where
the greater variations occur on the borders of a distribution.

**CONCLUSION:**

The data found in this study suggest results that differ according to each standardization table adopted. The CMI
values of the population of Rio Grande do Norte are overestimated when we use international tables since the cut off points are
lower than those proposed by this study. The consideration that there are regional and cultural differences in the Brazilian
population, suggests the need for population studies with the creation of regional tables that can adopt unique criteria for health
planning and assistance.

**BIBLIOGRAPHIC REFERENCES**

1-BARLOW SE, DIETZ WH. Management of child and adolescent obesity: summary and recommendations based on
3-COCHRAN, W. G. Sampling techniques. 3ª ed. New York: Jonh Wley. 1977
4-COLE TJ, BELLIZZI MC, FLEGAL KM, DIETZ WH. Establishing a standard definition for child overweight and
5-CONDE WL, MONTEIRO CA. Body mass index cutoff points for evaluation of nutritional status in Brazilian children
Este estudo descritivo de delineamento desenvolvimental, com corte transversal, objetivou classificar a prevalência de sobrepeso e obesidade em escolares, baseado em diferentes tabelas de referência utilizadas por pesquisadores brasileiros e uma tabela regional elaborada para o Rio Grande do Norte. A amostra foi composta por 2363 escolares, de ambos os sexos com idades variando de 6 a 15 anos, matriculados no Ensino Fundamental (2ª a 9ª Séries) do ensino público, no estado do Rio Grande do Norte selecionadas de forma estratificada. Os instrumentos utilizados foram: Balança Filizola (massa corporal); Estadômetro Sanny (Estatura), tendo como referência os critérios de CDC,2000; Conde, Monteiro, 2006 e Cole et al,2000. Os dados encontrados neste estudo aportam evidências que os resultados diferem segundo os critérios normalizados utilizados. O CMI valores para a população do Rio Grande do Norte foram descritos em estudos publicados usando diferentes tabelas de referência. Portanto, os dados encontrados neste estudo fornecem evidências que os resultados diferem segundo o critério normalizado adotado. O CMI valores para a população do Rio Grande do Norte estão desclassificados quando se utilizam as normas de referência internacionais.