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 frequently 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 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:

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

Where Z is the normal deviation equivalent for area a; $C100_{(s\&i)}$ is the 100th correspondent to Z; (s&i) is the age in months and $L_{(s\&i)}$, $M_{(s\&i)}$, $S_{(s\&i)}$, and $C100_{(s\&i)}$ 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:

$$Z = [(IMC/M)^{L} - 1]/(LS)$$

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:

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.

	OVERWEIGHT		OBESTY	
MALE	n	%	n	%
CDC (2000)	272	22,22	66	5,39
MONTEIRO (2006)	309	25,25	69	5,64
COLE et al (2000)	215	17,57	86	7,03
regional tables propose	132	10,80	47	3,87
FEMALE				
NCHS (2000)	207	18,17	31	2,72
MONTEIRO (2006)	229	20,11	101	8,87
COLE et al(2000)	182	15,98	60	5,27
regional tables propose	109	9,59	35	3,05

The values found in this study point out that in relation to Table 2, the values for overweight and obesity present lower values in relation to the criteria recommended by Monteiro, CDC and Cole, for both sexes.

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.

Age	Male			Female		
(years)	(LW)	(OW)	(OB)	(LW)	(OW)	(OB)
6	13,14	18,85	20,77	13,03	20,24	-
7	13,16	20,19	22,95	13,46	21,57	26,35
8	13,25	21,11	24,47	13,67	22,2	28,28
9	13,43	21,72	25,50	13,76	22,36	28,09
10	13,70	22,11	26,20	13,81	22,27	26,73
11	14,06	22,40	26,73	13,91	22,15	25,14
12	14,52	22,69	27,26	14,16	22,24	24,26
13	15,09	23,08	27,96	14,63	22,75	25,03
14	15,77	23,68	28,98	15,43	23,91	28,41
15	16,57	24,59	30,49	16,63	25,95	35,33

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.

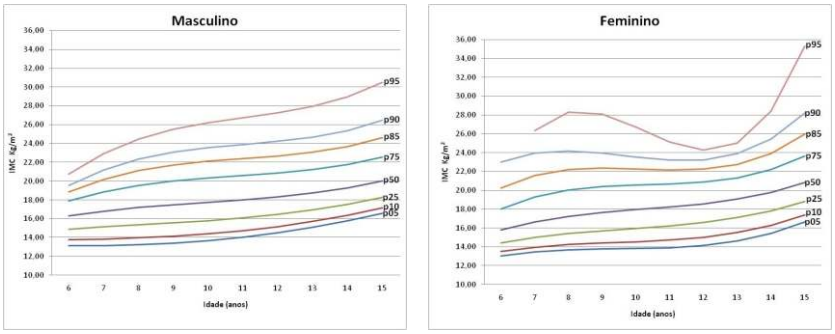


Figure 1: Distribution of the CMI curve for Rio Grande do Norte in school children of both sexes.

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 reports from pediatricians, pediatric nurse practitioners and registered dietitians. Pediatrics. 2002; 110:236-8.

2-CENTERS FOR DISEASE CONTROL AND PREVENTION AND NATIONAL CENTER FOR HEALTH STATISTICS. 2000 CDC growth charts: United States [online] Hyaltsville; 2002a [cited 2002 May 11]. Available from: http://www.cdc.gov/growthcharts

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 obesity worldwide: international survey. Br Med J 2000; 320:1-6.

5-CONDE WL, MONTEIRO CA. Body mass index cutoff points for evaluation of nutritional status in Brazilian children and adolescents. J Pediatr (RJ). 2006;82:266-72.

6-FERREIRA, HS. Avaliação nutricional de crianças pelo método antropométrico. In: Ferreira HS. Desnutrição: magnitude, significado social e possibilidade de prevenção. Maceió: EDUFAL; 2000. Cap.2. p.33-89.

7-INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA. Censo escolar 2001: resultados da pesquisa por Rio Grande do Norte. [on line] Disponível na Internet. URL: http://www.inep.gov.br/censo/Escolar/matricula/censo. Acessado em 19/02/2002

8-MEDEIROS, H. J. Perfil antropométrico, qualidades físicas básicas e a dermatoglífia de escolares através dos estágios maturacionais no estado do rio grande do norte. Tese doutorado - Universidade Federal do Rio Grande do Norte. Centro de Ciências da Saúde. Programa de Pós-Graduação em Ciências da Saúde. 2005.

9-SOARES, NT. A new growth anthropometric reference: meanings and implications Rev. Nutr., Campinas, 16(1):93-104, jan./mar., 2003

10-STYNE, DM. Childhood and adolescent obesity. Prevalence and significance. Pediat Clin North Amer 2001;48:823-53

11-VASCONCELOS, FAG. Indicadores antropométricos III. In: Vasconcelos FAG Avaliação nutricional de coletividades. 2.ed. Florianópolis: DAUFSC; 2000. p.67-81.

12-WORLD HEALTH ORGANIZATION. Physical status: the use and interpretation of anthropometry. Geneva: WHO; 1995. WHO Technical Report Series nº 854.

ABSTRACT:

The purpose of this study descriptive character, with a transversal cut,is to classify the prevalence of overweight and obesity in schools based on different tables of reference used by Brazilian researchers, a Regional table prepared for the Rio Grande do Norte, proposed for the study. The study design has a and involves a sampling of 2363 Basic Education schools (2nd to 9th grades), In both genders with ages ranging from 6 to 15 years, in the public school system, in the state of Rio Grande do Norte, that were selected in a stratified form.

The measuring instruments used were: the Filizola Scale (wieght); a Sanny metric devise (height), having as reference criteria the NCHS2000, the Monteiro 2006 and the Cole et al2000. Critical values were presented for the measurement of low weight (LW), overweight (OW) and obesity (OB), where The results point to the prevalence of overweight and obesity as being less than the criteria established in the CDC (2000), Conde, Monteiro (2006) or the Cole et al(2000) for both sexes. Thus, the data found in this study provide evidence that the results differ according to the normative table adopted. The CMI values for the population of Rio Grande do Norte were found to be overestimated when international tables were used, since they have cut off points that are lower than the table proposed by this study.

RÉSUMÈ:

Le but de cette étude caractère descriptif, avec une coupe transversale, est à classer la prévalence de la surcharge pondérale et l'obésité dans les écoles basées sur différents tableaux de référence utilisés par les chercheurs brésiliens et une table régionale préparé pour le Rio Grande do Norte proposé pour l'étude .L'étude a une conception et implique un échantillon de 2363 l'éducation de base des écoles (2 e à la 9 e année de scolarité), dans les deux sexes âgés de 6 à 15 ans, dans le système scolaire public, dans l'Etat de Rio Grande do Norte, qui étaient Choisi d'une forme stratifiée.Les instruments de mesure ont été utilisés: la Filizola Scale (wieght); Concevoir une Sanny métriques (hauteur), ayant comme critères de référence CDC,2000; Conde, Monteiro, 2006 et Cole et al,2000. Des valeurs critiques ont été présentés pour la mesure des faibles poids (AG), le surpoids (OW) et de l'obésité (OB), où les résultats soulignent la prévalence de la surcharge pondérale et l'obésité comme étant inférieur aux critères définis dans le CDC (2000), Conde , Monteiro (2006) ou le Cole et coll (2000) pour les deux sexes. Ainsi, les données figurant dans cette étude fournissent des preuves que les résultats diffèrent selon le tableau normatif adopté. Le CMI valeurs pour la population de Rio Grande do Norte se sont révélés être surestimée lorsque les tables internationales ont été utilisées, car elles ont coupé points qui sont inférieurs au tableau proposé par cette étude.

RESUMEN:

El propósito de este estudio de carácter descriptivo, con un corte transversal, es clasificar la prevalencia de sobrepeso y obesidad en las escuelas sobre la base de diferentes cuadros de referencia utilizados por los investigadores brasileños, un cuadro preparado Regional para el Río Grande del Norte, propuesto para el estudio . El estudio tiene un diseño y consiste en una muestra de 2363 de Educación Básica escuelas (2 º a 9 º grados), en ambos sexos, con edades que van de 6 a 15 años, en las escuelas públicas, en el estado de Rio Grande do Norte, que se seleccionaron en una forma estratificada.

Los instrumentos de medida utilizados fueron: la Escala Filizola (wieght); Elaborar un Sanny métricas (altura), teniendo como referencia criterios de la NCHS2000, la Monteiro 2006 y el Cole y al2000. Se presentaron valores críticos para la medición de bajo peso (BP), sobrepeso (SP) y la obesidad (OB), donde los resultados apuntan a la prevalencia de sobrepeso y obesidad es inferior a los criterios establecidos en el CDC (2000), Conde , Monteiro (2006) o el Cole y otros (2000) para ambos sexos. Por lo tanto, los datos encontrados en este estudio aporta pruebas de que los resultados difieren según el cuadro normativo aprobado. El CMI valores de la población de Rio Grande do Norte resultaron ser sobrestimada en las tablas internacionales se utilizaron, ya que se han cortado los puntos que son más bajos que la mesa propuesta por este estudio.

RESUMO:

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); Estadiômetro Sanny (Estatura), tendo como referência os critérios de NCHS2000; Cole et al, 2000; Conde, Monteiro, 2006. Foram apresentados os valores críticos equivalentes aos valores de baixo peso (BP), sobrepeso (SP) e obesidade (OB), onde os resultados apontam que a prevalência de sobrepeso e obesidade foi menor nos critérios da tabela regional proposta do que nas do CDC (2000); Cole et al(2000); Conde, Monteiro (2006) para ambos os sexos. Assim, os dados encontrados neste trabalho evidenciam que os resultados diferem de acordo com cada tabela normativa adotada. Os valores de IMC da população do Rio Grande do Norte acabam sendo superestimados quando utilizamos tabelas internacionais, pois possuem pontos de cortes mais baixo que as da tabela regional proposta pelo estudo.