# 179 - NUTRITIONAL STATE AND BODY FAT CONTENT FROM PUBLIC SCHOOL STUDENTS FROM THE CITY OF MARINGÁ/PR/BRAZIL.

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## INTRODUCTION

Obesity has been showing for the last decades a fast raise all over the world (OLIVEIRA; FISBERG, 2003) in a way that it has been considered by health authorities as a true world epidemic that reaches all ages, specially the children (WHO, 2006). In Brazil, according to Oliveira and Fisberg (2003, p. 107) "in some cities the overweight and obesity has reached 30% or more in children and adolescents."

A long term study showed relative risk estimates of 1.5 to mortality of all causes and of 2.0 to mortality by coronary cardiac disease for children and adolescents with weight excess, when compared with their thinner colleagues (FISBERG et al, 2004). Because of this panorama, several researches have been made with the purpose of verifying the nutritional state of children and adolescents in school phase and identify normality deviations (ARAÚJO; PETROSKI, 2002).

Like in other developing countries, Brazil shows epidemiologic characteristics extremely heterogeneous, being considered nutritional problems of public health the moderate protein-caloric sub nutrition; iron, iodine and vitamin A deficiencies and obesity (CASTRO; TIRAPEGUI, 2002). About the classification of nutritional state of children and adolescents, it's observed that there is not a consensus between the uses of a classification system proper to Brazilian population. It is known that the definition of a pattern is important to the development of politics programs that aim the improvement of this population's nutritional quality (TOMKINS, 2006), and also allow the comparison between the results obtained by different authors.

In this meaning, recently, Conde and Monteiro (2006) developed a nutritional state classification system for Brazilian children and adolescents based on the Body Mass Index distribution, from 02 to 20 years, for the clinic and epidemiologic use, including the definition of low weight, besides the usual definition of overweight and obesity. The body mass index (BMI) is a simple method, cheap and that doesn't require a high level of training and skill from the evaluator and has been recommended by several authors (DIETZ; BELLIZZI, 1999; DIETZ, 1999; SOARES, 2003; CONDE; MONTEIRO, 2006).

Thus, the objective of the following study was to evaluate the nutritional state and the body weight content from children and pre-adolescents from a public school from Maringá, Paraná, Brazil.

## MATERIAL AND METHODS

### 2.1 Study Characterization

This essay makes part of a study that is been developed by the Studies and Researches Group in Obesity and Exercise (Grepo) from State University of Maringá/PR/Brazil. The study was a descriptive type with diagnostic characteristic, because the data were raised and there wasn't any intervention process (SILVA, 1999).

### 2.2 Sample and Population

This study was accomplished with students from both genders, regularly enrolled and coursing the fundamental teaching grades, from 1$^{st}$ to 4$^{th}$ grades, from a school of the municipal teaching system, located at the northeast region of the Maringá city. The sample was composed by those children authorized by parents or responsible through the singing of the free consent term, which corresponded to more than 60% of the population. Only children pre-puberty with ages between 7 to 12 years were evaluated. The data collection was accomplished in august of 2006.

### 2.3 Measure instruments to anthropometric evaluation

Complete data about sex, age, weight (expressed in Kg) height (expressed in meters) and triciptal and subscapular skinfolds (expressed in millimeters) were obtained. The measures were made by an electronic balance (Tanita), with the capacity of 136 kg and precision of 100g, an stadiometer (SECA Bodymeter 206), with measure scale of 0,1 mm. The Body Mass Index (BMI) was calculated considering the individuals' body weight divided by the square of the height (Kg/m$^2$). The classification system proposed by Conde and Monteiro (2006) was used, because it was developed specifically to Brazilian children and adolescents and also by including the low weight classification, besides the overweight and obesity classifications, differently from the system proposed by Cole et al. (2000). The body fat percent (BF%) was estimated by the result of the triceps and subscapular skinfolds addiction, using the predictive equations proposed by Slaughter et al. (1988), recommended by Heyward and Stolarczyk (2000), who consider the sexual and ethnic variations in their calculations. The evaluators' staff was composed by experimented Physical Education teachers that performed the same functions during the data collection process.

### 2.4 Statistic Analysis

Descriptive statistics resources like means, standard deviation, frequency and percent were used. The Student's t test, for the non paired data, was used to evaluate if the differences found between genders were or were not significant. It was considered significant the difference with p=0.05. All calculation was realized using the electronic board Excel 2003® and the program Statistica.

## RESULTS AND DISCUSSION

They were evaluated 444 children, being 223 male (50.2%) and 221 female (49.8%). In the Table 1 are presented the general sample characteristics. It can be observed that the results found for the boys and girls were significantly different only for the triceps skin fold variable and for the folds total, indicating in a general way the sample's homogeneity. The population's mean BMI was 17.6 kg/m$^2$ and the mean body fat content was 20.9%.

| Variable | Boys (n=223) | Girls (n=221) | Total (n=444) |
|---|---|---|---|
| Age (decimal) | 9.14±1.35 | 9.04±1.22 | 9.10±1.39 |
| Stature (m) | 1.36±0.10 | 1.34±0.10 | 1.35±0.10 |
| Weight (Kg) | 32.95±9.21 | 31.84±9.18 | 32.60±9.60 |
| BMI (Kg/m$^2$) | 17.71±3.51 | 17.40±3.08 | 17.60±3.33 |
| Triceps SF (mm) | 12.47±5.90 | 13.96±5.20* | 13.20±5.60 |
| Subscapular SF(mm) | 9.98±7.70 | 11.11±6.8 | 10.60±7.30 |
| Sum of skinfolds (mm) | 22.45±13 | 25.07±11.50* | 23.80±12.4 |
| Body fat (%) | 20.09±10 | 21.66±7.5 | 20.90±8.90 |

* Significant differences at the level of 5% (p=0.05).

The evaluated school student's distribution accordingly to the nutritional state is presented on Table 2. Although the majority of the children (68.1%) was finding within the normality pattern (normal weight), it is observed that 27.8% of the boys and 33.5% of the girls were found with excess of weight (overweight) or obesity. These values are very superior to those found by Giugliano and Melo (2004) in a similar study, in which they evaluated 528 school students from 6 to 10 years in Brasilia. In this studies the authors using the BMI/Age values proposed by Cole et al. (2000), observed values of 18.8% and 21.2% between the boys and girls, respectively. For the other side, the results are close to those found by Ronque et al (2005), in school students from 07 to 10 years from Londrina (PR), whose levels associated to overweight and obesity were 37.2% and 26.6%, for the boys and girls, respectively. However, must be remembered that those authors investigated school students with high socioeconomic level, on the opposite of this study.

Table 2. Sample's nutritional classification, according to the values proposed by Conde and Monteiro (2006).

| | Boys | | Girls | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| Low weight | - | - | 6 | 2.70 | 6 | 1.30 |
| Normal weight | 161 | 72.20 | 141 | 63.80 | 302 | 68.10 |
| Weight Excess | 43 | 19.30 | 46 | 20.80 | 89 | 20.00 |
| Obese | 19 | 8.50 | 28 | 12.70 | 47 | 10.60 |
| **Total** | **223** | **100** | **221** | **100** | **444** | **100** |

According to the Araújo and Petroski (2002) study, among the students from the South Brazilian region were verified higher levels of obesity and overweight than among those from the Southeast, Northeast, North and Center Brazilian regions, where there are more cases of subnutrition, in comparison with the South. Following this sense, it must be highlighted the reduced number of children with low weight found in this study (1.3% of the total evaluated children), being all of them females.

With the purpose of verifying the sample distribution mentioned in the Table 1 according to the population's nutritional state classification, the Table 3 was proposed. In it can be observed that the girls, those classified with normal weight and the obese ones, in each one of their groups, when compared with the boys, showed significantly lower levels of BMI and weight. However when it is considered the body fat content, the normal weight girls, when compared with the normal weight boys, demonstrated values significantly higher (18.1% versus 15.5%), while the obese showed values significantly lower (33.6% versus 45.4%).

Even with lower values in comparison with the boy's group, must be highlighted the elevated risk to which the female group is exposed when starts to manifest higher fat accumulation in the pos-pubertal period. Oliveira et al (2003) still say that most of the researches demonstrate that the prevalence of infantile and adult obesity is higher in the female gender, what is probably caused by the fact of the energy excess in the female gender is, preferentially, stocked over the shape of fat and not protein, like what happens in the male gender.

Table 3. Values of the different variables evaluated according to the nutritional state classification.

| | Low Weight | | Normal | | Excess Weight | | Obesity | |
|---|---|---|---|---|---|---|---|---|
| | M | F | M | F | M | F | M | F |
| years) | - | 8.21±0.8 | 8.97±1.1 | 8.9±1.2 | 8.97±1.1 | 9.54±1.1* | 8.98±1.2 | 8.9±1.1 |
| e (m) | - | 1.29±0.05 | 1.35±0.1 | 1.32±0.1* | 1.36±0.1 | 1.39±0.1 | 1.41±0.1 | 1.38±0.1 |
| ht (Kg) | - | 21.5±1.8 | 29.4±5.6 | 27.6±5.5* | 37.8±5.8 | 38.3±6.6 | 52.9±9.6 | 44.9±9.3* |
| $Kg/m^2$) | - | 12.8±0.4 | 16.0±1.4 | 15.7±1.3 | 20.1±1.4 | 19.6±1.2 | 26.5±3.0 | 23.2±2.2* |
| mm)[1] | - | 7.1±1.2 | 9.8±3.0 | 11.6±3.2* | 17.1±4.2 | 17.0±4.0 | 25.3±3.0 | 21.9±4.5* |
| mm)[2] | - | 5.0±1.0 | 6.7±2.9 | 7.9±3.2* | 13.±4.7 | 14.6±5.6 | 30.6±5.6 | 22.7±7.2* |
| Total | - | 12.1±1.8 | 16.5±5.1 | 19.6±5.8* | 30.3±7.6 | 31.7±8.7* | 55.9±7.4 | 44.6±10.3* |
| %) | - | 11.7±1.8 | 15.5±4.4 | 18.1±4.4* | 26.4±5.2 | 26.4±5.3 | 45.4±5.8 | 33.6±5.6* |

* significant differences for the level of 5% (p=0,05); [1] Triceps skinfold; [2]Subscapular skinfold.

According to several authors (GUEDES; GUEDES, 1998; FISBERG et al, 2004; OLIVEIRA et al, 2003) the facilities on the modern world seem to have a strong impact over the lifestyle of the children and adolescents, leading them to lifestyles more and more sedentary and with inadequate diet. The access to television, video games, computers and the large number of hours spent with those equipments, favors both the low energy spent levels and the intake of higher energetic density foods, which occurs due to the constant exposure to advertising of high caloric foods. The disposals of food, just like the low levels of physical activity are, frequently, associated with the growth of obesity in most of the populations.

## CONCLUSIONS

The results found in relation to the nutritional classification of the children revealed an expressive value of excess weight and obesity in both genders. These values corroborate the results found in similar studies, indicating that the excess of weight and obesity has been increasing among school populations in the south region of Brazil.

In relation to the care with the overweight and obesity prevalence in children and adolescents, the prevention seems to be the best way to combat the problem. Thus, considering the age level and the population studied, we believe that the school is the proper place to an intervention, where educational programs about eating habits and physical activities practice related to a healthy lifestyle must be emphasized since the pre-school phase, involving teachers, students and parents.

In this aspect, the Physical education teacher has a fundamental role, since he/she has conditions to encourage the practice of physical activities beyond the school time and, also favors the access of information and experience directed to the acquisition of healthy eating habits in the expectation that these can be incorporated by the students and contributing to the reduction of the incidence of overweight and obesity at school phase.

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**NUTRITIONAL STATE AND BODY FAT CONTENT FROM PUBLIC SCHOOL STUDENTS FROM THE CITY OF MARINGÁ/PR/BRAZIL.**

**ABSTRACT**

The objective of the present study was to evaluate the nutritional state and the body fat content from children and pre-adolescent in a public school from the city of Maringá, Paraná, Brazil. They were part of the study 444 children from 1$^{st}$ to 4$^{th}$ grade, of both gender, with age between 7 to 12 years, being 223 of male gender (50.2%) and 221 of female gender (49.8%). The classification was made from the determination of Body Mass Index (BMI). The nutritional classification system proposed by Conde and Monteiro (2006) was used, because it was specifically developed to Brazilian children and adolescent and also because it includes the classification of low weight, just like the classification of overweight and obesity. The body fat percent was estimated by predictives equations proposed by Slaughter et al (1988). The population's mean BMI was 17.6 Kg/m$^2$ and the mean body fat content was 20.9%. In spite of finding the majority of children (68.1%) within normality pattern, it was observed that 27.8% from boys and 33.5% from girls were found with weight excess, showing an expressive value of weight excess and obesity in both gender. Considering the age group studied, the school is a more adequate place to intervention, where educatives programs about eating habits and physics activity practice related to a healthy life style have to be emphasized since the pre school fase in expectation to acquire a reduction on the incidence of overweight and obesity in this population.

**Key-Words:** Overweight, Obesity, School Students.

**L'ÉTAT NUTRITIF ET TENEUR DE GRAISSE CORPOREL D'ÉLÈVES D'UNE ÉCOLE PUBLIQUE DE LA VILLE DE MARINGÁ/PARANÁ/BRÉSIL.**

**RÉSUMÉ**

L'objectif de cette étude a été d'évaluer l'état nutritif e le teneur de graisse corporel des enfants et pré adolescents d'une école publique de la ville de Maringá, Paraná, Brésil. Les 444 enfants de la 11ª (onzième) à la 9ª (neuvième) des deux sexes, à l'âge de 7 à 12 ans ont fait partie de l'étude, soyant 223 du sexe masculin (50,2%) et 221 du sexe féminin (49,8%). Les classifications ont été faites à partir de la détermination de l'Indice de la Masse Corporel (IMC). On a utilisé il système de classification proposé pour Cende et Monteiro (2006), pour avoir été developpé spécifiquement pour des enfants et des adolescents brésiliens et pour inclure aussi la classification de bas poids, au-delà des classification de sur poids et obésité. Le pourcentage de graisse corporel a été estimé a partir des equations préditives proposés par Slaughter et al (1988). Le (IMC) moyen de la population a été de 17,6 Kg/m et le teneur de graisse corporel moyen a été de 20,9 %. Malgré de la majorité des enfants (68,1%) se trouver dans le modèle de normalité, on a observé que 27,8 % des garçons et et 33,5 % des filles se trouvaeint avec excès de poids, montrant une valeur expressive d'excès de poids et l'obesité dans tous les deux sexes. Si on considère le niveau d'âge étudiéet que l'école soit le lieu plus adéquat à l'intervention où des programme éducatifs sur les habitudes

alimentaires et des pratiques d'activités fisiques par rapport à un style de vie salutaire doivent être emphatisé dès la phrase pré scolaire dans la expectative de s'obtenir une réduction de l'incidence de sur poids et d'obésité dans cette population.

Mots-clés : Sur poids, Obésité, des écoliers.

**ESTADO NUTRICIONAL Y TENOR GRASA CORPORAL DE ALUMNOS DE ESCUELA PÚBLICA DE LA CIUDAD DE MARINGÁ/PR/BRASIL**

**RESUMEN**

El objetivo del presente estudio fue evaluar el estado nutricional y el tenor de grasa corporal de niños y preadolescentes de una escuela pública de la ciudad de Maringá, Paraná, Brasil. Hicieron parte del estudio 444 niños de 1ª a 4ª series, de ambos los sexos, con edad entre 7 y 12 años, siendo 223 del sexo masculino (50,2%) y 221 del sexo femenino (49,8%). Las clasificaciones fueron hechas a partir de la determinación del Índice de Masa Corporal (IMC). Se utilizó el sistema de clasificación propuesto por Conde y Monteiro (2006), por haber sido desarrollado especificamente para niños y adolescentes brasileños y por incluir también la clasificación de bajo peso, además de las clasificaciones de sobrepeso y obesidad. El porcentaje de grasa corporal fue estimada a partir de las ecuaciones preditivas propuestas por Slaughter et al (1988). El IMC medio de la población fue de 17,6 kg/m$^2$ y el tenor de grasa corporal medio fue de 20,9%. A pesar de la mayoría de los niños (68,1%) encontrarse dentro del patrón de normalidad, se observó que 27,8% de los niños y 33,5% de las niñas se encontraban con exceso de peso, revelando un valor expresivo de exceso de peso y obesidad en ambos los sexos. Considerando la faja etaria estudiada, se considera que la escuela sea el local más adecuado a la intervención, donde programas educativos sobre hábitos alimentares y de práctica de actividades físicas relacionados a un estilo de vida saludable deban ser enfatizados desde la fase preescolar en la expectativa de obtenerse una reducción de la incidencia de sobrepeso y obesidad en esta población.

Palabras-Clave: Sobrepeso, Obesidad, Escolares.

**ESTADO NUTRICIONAL E TEOR DE GORDURA CORPORAL DE ALUNOS DE ESCOLA PÚBLICA DA CIDADE DE MARINGÁ/PR/BRASIL**

**RESUMO**

O objetivo do presente estudo foi avaliar o estado nutricional e o teor de gordura corporal de crianças e pré-adolescentes de uma escola pública da cidade de Maringá, Paraná, Brasil. Fizeram parte do estudo 444 crianças de 1ª à 4ª séries, de ambos os sexos, com idade entre 7 e 12 anos, sendo 223 do sexo masculino (50,2%) e 221 do sexo feminino (49,8%). As classificações foram feitas a partir da determinação do Índice de Massa Corporal (IMC). Utilizou-se o sistema de classificação proposto por Conde e Monteiro (2006), por ter sido desenvolvido especificamente para crianças e adolescentes brasileiros e por incluir também a classificação de baixo peso, além das classificações de sobrepeso e obesidade. A porcentagem de gordura corporal foi estimada a partir das equações preditivas propostas por Slaughter et al (1988). O IMC médio da população foi de 17,6 kg/m$^2$ e o teor de gordura corporal médio foi de 20,9%. Apesar da maioria das crianças (68,1%) se encontrar dentro do padrão de normalidade, observou-se que 27,8% dos meninos e 33,5% das meninas encontravam-se com excesso de peso, revelando um valor expressivo de excesso de peso e obesidade em ambos os sexos. Considerando a faixa etária estudada, considera-se que a escola seja o local mais adequado à intervenção, onde programas educativos sobre hábitos alimentares e de prática de atividades físicas relacionados a um estilo de vida saudável devam ser enfatizados desde a fase pré escolar na expectativa de se obter uma redução da incidência de sobrepeso e obesidade nesta população.

Palavras-Chave: Sobrepeso, Obesidade, Escolares.