

**32 - OVERWEIGHT AND OBESITY IN ADOLESCENTS: THE INFLUENCE OF PHYSICAL ACTIVITY LEVEL**

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**INTRODUCTION**

Epidemiological studies show a trend of increasing incidence of obesity among adolescents, particularly during the last two decades (OGDEN et al., 2006; VEIGA, CUNHA, Sichieri, 2004). Data from the Pan American Health Organization (PAHO) (2003) and the World Health Organization (WHO) (2009) argue that the prevalence of childhood obesity has increased around 10% to 40% in most European countries in recent 10 years, and in Brazil the rate of juvenile obesity has risen 240% in the last two decades (PAHO, 2003). As a result of excess body weight, adolescents may suffer effects of so-called metabolic syndrome (impaired glucose tolerance or diabetes mellitus, insulin resistance, dyslipidemia, visceral obesity and albuminuria) (MORENO et al., 1998; SOAR et al., 2004; BENSIMHON, KRAUS and Donahue, 2006), and exposure to cardiovascular events (Andersen et al., 2006). Obesity juvenile has some specific aspects of this population. Besides the sedentary lifestyle and intake of foods with high calorie, obesity relate to this stage the hours of use of television, video games and computers (MISRA AND KURANA, 2008), driven by a lack of safe places for leisure, little time that parents have for family interaction, physical inactivity and exposure to the world of consumerist advertisements (product caloric) (MILLER, AND SILVERSTEIN ROSEMBLOOM, 2004). These findings are troubling given that the presence of metabolic disorders in childhood and adolescence increases the risk for early mortality in adulthood (HALLAL et al., 2006, HALLAL et al., 2006b). Furthermore, a recent systematic review of physical activity in adolescence showed that there is consistent evidence that active individuals during adolescence are more likely to become active adults (HALLAL et al., 2006). Several factors have been presented as influencers of obesity during adolescence, especially sociodemographic variables such as gender, socioeconomic status, education level, maternal education at birth, birth order, place of residence, type of school and physical activity level (PAL) (HALLAL et al. 2006b; HALLAL et al. 2006c; NELSON et al. 2,006; OEHLSCHLAEGER et al. 2004; SHI et al. 2,006; GORDIA et al., 2010). However, studies conducted in different regions have commonly shown contrasting results (HALLAL et al., 2006b; HALLAL et al., 2006c; NELSON et al., 2006; OEHLSCHLAEGER et al., 2004; SHI et al., 2006; GORDIA et al., 2010), indicating the need for further research on the association of NAF, sociodemographic status and body mass index (IMC) in adolescence. The literature recommends that adolescents should engage in physical activity of moderate to vigorous intensity for at least 60 minutes per day, accumulating, 300 minutes per week, and such activities can be practiced inside or outside the school, in a structured or Unstructured (Strong et al. 2005). However, studies worldwide have demonstrated a high prevalence of physical inactivity, for example, in Finnish adolescents (TAMMELIN et al., 2007), Americans (Berrigan et al., 2006) and Portuguese (TEIXEIRA AND SEABRA et al. 2008). A similar trend was observed in studies with young Brazilian city of Pelotas (RS) (HALLAL et al., 2006c) and São Paulo (SP) (Ceschini, and FLORINDO BENICIO, 2007). Therefore, quantifying the prevalence of physical inactivity and identification of risk groups are important in order to direct intervention strategies (Ceschini et al., 2009), however other intervening factors can accelerate the process of physical inactivity, and consequently the rise in obesity. In Brazil, there is growing interest in promoting active lifestyles, which can help fight the epidemic of overweight (obesity) observed in Brazil (Gonçalves et al., 2007). Nevertheless, the lack of such data hinders the development of primary and secondary intervention programs nationwide (Dutra, ARAÚJO, BERTOLDI, 2006; MAGALHÃES, Mendonça, 2003).

In this context, the present study aimed to determine the prevalence of obesity and overweight in adolescents in the city of Imperatriz, Maranhão, Brazil, and to identify the influence of IMC on the NAF. The research involved a sample of 118 students aged between 14 and 18 years, enrolled in high school and frequently, from a public university, chosen by availability. Students were selected by simple random sampling method and underwent two evaluations: anthropometry (weight, height and IMC) and questionnaire.

**METODOLOGY**

This study has a cross-sectional descriptive and analytical. The population of the study were students of both sexes, aged 14 to 18 years, students at a public school in the state of the municipality of Empress (Maranhão). After the sample identified the researcher conducted a brief explanation of the research instruments and their goals. Each student received two copies of the Statement of Consent (IC) to obtain permission from a guardian. Data were collected during school hours, on school premises, combined with prior appointment with the Director of the School and the students participating in the research. Selected for the study were 118 students, volunteers. Students underwent an anthropometric assessment of weight and height to calculate the body mass index (IMC), and a written evaluation consists of two questionnaires, one to measure the physical activity level and other socioeconomic. Body mass was measured with the appraised standing with his back to the scale of the balance, with lateral spacing of the feet, standing on the platform between them. Then put yourself in the center and on the platform, standing with eyes fixed on a point in front of you. We performed only one measure (SON FERNANDES, 1999; PROESP-BR, 2009). At the height measurement the individual remained in the standing position (PO): a person standing upright, arms at your sides, feet together, trying to touch the instrument to measure the posterior surface of the heel, pelvic girdle, scapular and occipital region. The measurement was made with rated at maximum inspiratory apnea, to minimize possible variations in results and head oriented at the Frankfurt plane, parallel to the ground (SON FERNANDES, 1999; PROESP-BR, 2009). As was the cursor at an angle of 90 ° relative to the scale. In this study was used to measure weight and height, a scale Soehnle Professional 7755, precisely 100 grams, with embedded Asimed meter height, with a minimum height of 95 centimeters (cm). The machine has a maximum capacity of 200 kg for body weight and 230 cm for height. The evaluated were advised to wear shorts and shirt, and remain barefoot during assessments (weight and height). For body mass index was calculated: body mass in kilograms (kg) divided by height in meters (m) squared (kg/m<sup>2</sup>). Then for determining the rate of overweight and obesity among adolescents was applied to classification of Conde and Monteiro (2006). The level of physical activity was measured using the International Physical Activity Questionnaire (InternationalPhysicalActivityQuestionnaire - IPAQ, version 8, short form, last week), developed by WHO with Portuguese version validated for the Brazilian population (Matsudo et al., 2001; ), and Brazilian adolescents

(Guedes et al., 2005). The rating of physical activity among adolescents was based on criteria developed by IpaqResearchCommittee (2005), this classification takes into account the frequency and duration of physical activities performed in the last week. For this study, the NAF was subdivided into two categories: active and sedentary. The study data were analyzed by GraphPadPrism 5.0. Was used for data analysis using descriptive statistics of mean, standard deviation, minimum, and maximum frequency. For the correlation of analytical results used statistics by testing Spearman nonparametric test. The results are shown in tables using descriptive statistics.

## RESULTS

The table 1 shows the anthropometric characteristics of the participants. Are 118 teenagers, aged between 14 and 18 years, and of this total, 53 (fifty three) males and 65 (sixty-five) females. The average age was 16.05 ( $\pm$  1.04) years. For anthropometric data were observed average height of 1.63 ( $\pm$  0.09) meters and weight average of 55.78 ( $\pm$  10.68) kg. In the use of anthropometric data may identify the IMC of the sample, generally with an average of 20.84 ( $\pm$  2.96) kg/m<sup>2</sup>.

TABLE 1. Anthropometric characteristics and age of the sample.

| Characteristics          | GENERAL |            |  | N   |
|--------------------------|---------|------------|--|-----|
|                          | Average | $\pm$      |  |     |
| Age (years)              | 16,05   | 1,04       |  | 118 |
| Weight (kg)              | 55,78   | 10,68      |  | 118 |
| Height (m)               | 1,63    | 0,09       |  | 118 |
| IMC (kg/m <sup>2</sup> ) | 20,84   | $\pm$ 2,96 |  | 118 |

After identification of IMC, adolescents were classified as underweight, normal weight, overweight and obesity. Table 2 shows the classification consists of 3 (2.5%) subjects in the underweight group, 98 (83.0%) in the normal weight group, 15 (12.8%) in the overweight group and 2 (1.7%) in the obesity group.

TABLE 2. IMC classification, overall and by gender.

| Characteristics    | GENERAL   |       | MALE      |       | FEMALE    |       |
|--------------------|-----------|-------|-----------|-------|-----------|-------|
|                    | Frequency | %     | Frequency | %     | Frequency | %     |
| Low weight         | 3         | 2,5%  | 1         | 1,9%  | 2         | 3,0%  |
| Normal weight      | 98        | 83,0% | 39        | 73,6% | 59        | 91,0% |
| Overweight         | 15        | 12,8% | 12        | 22,6% | 3         | 4,5%  |
| Obesity            | 2         | 1,7%  | 1         | 1,9%  | 1         | 1,5%  |
| Total              | 118       | 100%  | 53        | 100%  | 65        | 100%  |
| Overweight+Obesity | 17        | 14,5% | 13        | 24,5% | 4         | 6,0%  |

The Table 03 identifies the outcomes of the questionnaire on physical activity levels among adolescents, classified into: sedentary and active.

TABLE 3. Rate the level of physical activity, overall and by gender.

| Characteristics | GENERAL   |       | MALE      |       | FEMALE    |       |
|-----------------|-----------|-------|-----------|-------|-----------|-------|
|                 | Frequency | %     | Frequency | %     | Frequency | %     |
| Active          | 86        | 72,9% | 41        | 77,4% | 45        | 69,2% |
| Sedentary       | 32        | 27,1% | 12        | 22,6% | 20        | 30,8% |
| Total           | 118       | 100%  | 53        | 100%  | 65        | 100%  |

The NAF classification of adolescents in relation to IMC and gender, adolescents were divided into active and sedentary according to each range of IMC (underweight, normal weight, overweight or obese) and gender (male or female) can be observed in table 4.

TABLE 4. Distribution of students according to level of physical activity and the IMC.

| NAF            | GENERAL (n=118) |            | MALE (n=53) |           | FEMALE (n=65) |            |
|----------------|-----------------|------------|-------------|-----------|---------------|------------|
|                | Active          | Sedentary  | Active      | Sedentary | Active        | Sedentary  |
| IMC Low weight | 1 (0,9%)        | 2 (1,8%)   | -           | 1 (1,9%)  | 1 (1,5%)      | 1 (1,5%)   |
| IMC Normal     | 78 (66,1%)      | 20 (16,8%) | 35 (66,1%)  | 4 (7,5%)  | 43 (66,2%)    | 16 (24,8%) |
| IMC Overweight | 6 (5,1%)        | 9 (7,5%)   | 5 (9,4%)    | 7 (13,2%) | 1 (1,5%)      | 2 (3,0%)   |
| IMC Obesity    | 1 (0,9%)        | 1 (0,9%)   | 1 (1,9%)    | -         | -             | 1 (1,5%)   |

## DISCUSSION

The survey noted that the IMC in the population sample of 118 individuals and adolescents were classified as underweight, normal weight, overweight and obesity. The rating was composed of 3 (2.5%) subjects in the underweight group, 98 (83.0%) in the normal weight group, 15 (12.8%) in the overweight group and 2 (1.7%) in group obesity. So if added Overweight and obesity have SE17 (14.5%) overweight teenagers. When looking at the IMC divided by gender (male and female), the study found the underweight group: adolescent male 1, female 2 teenagers, normal weight male 39 adolescents, 59 female adolescents overweight: 12 adolescent male, female and 3 teens obesity: 1 teen male, female 1 teenager. Accordingly, the division by gender was considered overweight and obesity as overweight, constata13 (24.5%) males and adolescents (6.0%) male adolescents overweight.

In a study by Fonseca (1998) which recorded 31.10% of overweight among students in private school in Niterói / RJ was far superior to our research. The performed by Marcelo Conte (2000) highlights the prevalence of overweight (21.42%) students in a public school in the city of Sorocaba / SP, exceeding this study showed that only 12.8% adolescents in this classification, however this study was higher than the 10.7% reported by Souza (1998) research on adolescents in outpatient nutrition and adolescent service of the Secretariat of Health of the State of Pernambuco. Probably the explanation of the prevalence of overweight schoolchildren in the state of Maranhão, São Paulo, Rio de Janeiro and Pernambuco differentiate reflects the different realities to which these youths are inserted, showing the presence of this process sociodemographic indicators.

The sample data for the identified group Active: 86 adolescents (72.9%) and Sedentary: 32 adolescents (27.1%). In the classification of the level of physical activity as a function of gender (male and female) were found in group Activity: 41 male adolescents (77.4%), female 45 adolescents (69.2%) and Sedentary: 12 male adolescents (22, 6%), female 20 adolescents

(30.8%). So, one can say that both genders showed concentration of subjects, greater in the active group, but proportionally, females have more sedentary subjects (30.8%) than males (22.6%). In a study by Gordia (2010) in Lapa-PR found that 76.8% of schoolchildren aged 14 to 20 years had high levels of physical activity, 20.9% had moderate and the PAL 2.3% were classified as low NAF, this research is consistent with data from our research, where the level of physical activity in adolescents is high in its entirety.

In the general distribution, for Normal IMC were classified 78 (66.1%) active adolescents and 20 (16.8%) Sedentary, Overweight IMC for 6 (5.1%) active adolescents and 9 (7.5%) and sedentary IMC for Obesity 1 (0.9%) active adolescents and 1 (0.9%) sedentary. In the male sample, for Normal IMC were classified 34 (66.1%) active adolescents and 4 (7.5%) sedentary, overweight IMC for 5 (9.4%) active adolescents and 7 (13.2%) Obesity and sedentary IMC 1 (1.9%) and no active teenager sedentary. In females, were classified Normal IMC for 43 (66.2%) active adolescents and 16 (24.8%) Sedentary, Overweight IMC for 1 (1.5%) active teenager and 2 (3.0%) and sedentary Obesity IMC for any active teenager and 1 (1.5%) sedentary. Based on the results of the analysis of LPA and its relationship with IMC and gender can be seen that the majority of children (82.9%) were classified as normal weight and physically active (66.1%). But if we consider the classification Normal Weight as an intermediate level of IMC levels and regroup Overweight and Obesity, then observe the overweight group 10 (8.4%) adolescents sedentary, while only 7 (6.0%) were rated active. That is, according to elevated IMC is a reversal in activity level, a slope of overweight adolescents toward sedentary lifestyle, this group evaluated.

## CONCLUSION

The results of this study suggest that the prevalence of overweight and obesity in adolescents assessed is present mainly in males (24.5%), but they present themselves more physically active than their female peers. This situation shows how important it is to follow along with the frequency of the appearance of changes in body weight of adolescents, observe the intervening factors. Although the majority of adolescents (72.9%) practicing physical activity according to recommendations of IpaqResearchCommittee (2005), the other adolescents were classified as sedentary (27.1%), particularly females and those who belonged to IMC classification obesity and Overweight. This shows that participation in physical activity and gender inequality presents a possible disinterest in adolescents with IMC overweight, differences must be considered in the development of intervention programs on physical activity in this population.

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#### **OVERWEIGHT AND OBESITY IN ADOLESCENTS: THE INFLUENCE OF PHYSICAL ACTIVITY LEVEL**

##### **ABSTRACT**

The current study aimed to determine the prevalence of obesity and overweight in adolescents in the city of Imperatriz, Maranhão, Brazil, and to identify the influence of IMC on the NAF. The research involved a sample of 118 students aged between 14 and 18 years, enrolled in high school and frequently, from a public university, chosen by availability. Students were selected by simple random sampling method and underwent two evaluations: anthropometry (weight, height and IMC) and questionnaire. The results of the analysis of LPA and its relationship with IMC and gender was observed that the majority of children (82.9%) were classified as normal weight and physically active (66.1%) according to elevated IMC occurs a reversal in activity level, a slope of overweight adolescents toward sedentary lifestyle, this group evaluated. It was concluded in this study that the prevalence of overweight and obesity in adolescents assessed is present mainly in males, but these present themselves more physically active than their female peers.

**KEYWORDS:** adolescence, BMI, obesity

#### **SURPOIDS ET D'OBÉSITÉ ADOLESCENTS: L'INFLUENCE DU NIVEAU D'ACTIVITÉ PHYSIQUE**

##### **RÉSUMÉ**

La présente étude visait à déterminer la prévalence de l'obésité et du surpoids chez les adolescents de la ville de Imperatriz, Maranhão, Brésil, et d'identifier l'influence de l'IMC sur la NAF. La recherche a porté sur un échantillon de 118 étudiants âgés entre 14 et 18 ans, inscrits à l'école secondaire et fréquemment, d'une université publique, choisie par la disponibilité. Les étudiants ont été sélectionnés par la méthode d'échantillonnage aléatoire simple et a subi deux évaluations: l'anthropométrie (poids, taille et IMC) et le questionnaire. Les résultats de l'analyse de la LPA et de ses relations avec l'IMC et le sexe a été observé que la majorité des enfants (82,9%) ont été classés comme poids normal et de l'activité physique (66,1%), selon IMC élevé se un renversement du niveau d'activité, une pente d'adolescents en surpoids à l'égard mode de vie sédentaire, ce groupe évalué. Il a été conclu dans cette étude que la prévalence du surpoids et de l'obésité chez les adolescents évalués est surtout présent chez les hommes, mais ceux-ci se présentent physiquement plus actifs que leurs pairs féminins.

**MOTS-CLÉS:** adolescence, le BMI, l'obésité

#### **SOBREPESO Y OBESIDAD EN ADOLESCENTES: LA INFLUENCIA DEL NIVEL DE ACTIVIDAD FÍSICA**

##### **RESUMEN**

El presente estudio tuvo como objetivo determinar la prevalencia de la obesidad y el sobrepeso en los adolescentes de la ciudad de Imperatriz, Maranhão, Brasil, e identificar la influencia del IMC en la NAF. La investigación incluyó una muestra de 118 estudiantes de edades comprendidas entre los 14 y 18 años, matriculados en la escuela secundaria y, con frecuencia, de una universidad pública, elegido por la disponibilidad. Los estudiantes fueron seleccionados por el método de muestreo aleatorio simple y se sometió a dos evaluaciones: antropometría (peso, talla e IMC) y el cuestionario. Los resultados del análisis de la LPA y su relación con el IMC y el sexo se observó que la mayoría de los niños (82,9%) fueron clasificados como de peso normal y físicamente activo (66,1%) de acuerdo con IMC elevado se produce un cambio en el nivel de actividad, una pendiente de adolescentes con sobrepeso hacia el estilo de vida sedentario, este grupo evaluado. Se concluye en este estudio que la prevalencia del sobrepeso y la obesidad en los adolescentes evaluados se presenta principalmente en los hombres, pero éstos se presentan más activos físicamente que sus pares femeninas.

**PALABRAS CLAVE:** adolescencia, el IMC, la obesidad

**EXCESSO DE PESO E OBESIDADE EM ADOLESCENTES: A INFLUÊNCIA DO NÍVEL DE ATIVIDADE FÍSICA  
RESUMO**

O presente estudo objetivou verificar a prevalência da obesidade e do excesso de peso em adolescentes do município de Imperatriz, Maranhão, Brasil, bem como identificar a influência do NAF sobre o IMC. A pesquisa contou com amostra de 118 alunos com idade entre 14 e 18 anos, matriculados e frequentes no ensino médio, oriundos de uma instituição pública de ensino, escolhida por disponibilidade. Os estudantes foram escolhidos pelo método de amostragem aleatória simples e submetidos a duas avaliações: antropométrica (massa, estatura e IMC) e questionário. Nos resultados da análise do NAF e a sua relação com IMC e gênero observou-se que a maioria dos adolescentes (82,9%) foram classificados como Peso Normal e fisicamente ativos (66,1%), de acordo com a elevação do IMC ocorre uma inversão no nível de atividade, uma inclinação dos adolescentes acima do peso em direção ao sedentarismo, neste grupo avaliado. Conclui-se nesse estudo que a prevalência de sobrepeso e obesidade nos adolescentes avaliados está presente, principalmente no sexo masculino, porém estes se apresentam fisicamente mais ativos que seus pares do sexo feminino.

**PALAVRAS CHAVE:** adolescência, IMC, obesidade