Risk of overweight and obesity in preschoolers attending private and philanthropic schools

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Summary

Objective: To assess the risk prevalence of overweight and obesity in children enrolled in private and philanthropic preschools in the State of São Paulo. **Methods:** Comparison of two cross-sectional studies with children enrolled in private preschools (PPS) or philanthropic (PHP) of the São Paulo Metropolitan Region. Both surveys evaluated the children's environment. To determine the risk of overweight, excess weight and obesity, body mass index (BMI) values were transformed into z scores (according to the World Health Organization – 2006 and 2007). **Results:** The risk prevalence of overweight (≥ 1 BMIz < 2) in PPS was 21.9% and 24.6% in PHP, with PR = 1.12 (95% CI: 0.96-1.32), without statistical difference. Considering the children with overweight or obesity, (BMIz ≥ 2) the prevalence in PPS was 14.3% and in PHP was 9.0%, with PR = 1.54 (95% CI: 1.23-1.93), p = 0.0002. Overweight and obesity prevalence in males in PPS was 16.4% (n = 409) and in PHP, 11.1% (n = 829), PR = 1.48 (95% CI: 1.10-1.98) and in females it was 12.5% (n = 400) in the PPS and 6.6% (n = 698) in PHP, corresponding to PR = 1.90 (95% CI: 1.30-2.78), both significant differences. **Conclusion:** Both groups showed a similar and very high prevalence of weight excess. However, overweight and obesity showed a higher prevalence in children from private preschools. This indicates that even though a better socioeconomic level is still a risk factor for overweight and obesity in preschoolers, the same does not seem to occur when analyzing the risk of overweight.

Keywords: Child, preschool; body mass index; overweight; obesity.

Study conducted at the Department of Mother and Child Healthcare based on a database of preschoolers assessed in private and philanthropic schools of the Metropolitan region of Grande São Paulo, São Paulo, SP, Brazil

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Introduction

Obesity is a multifactorial disease involving genetic and environmental factors. There is evidence that genetic factors can modulate the body response to changes in environmental factors, such as diet and physical activity[1].

As the human genetic heritage has not changed significantly in recent times, it is considered that the "Western diet" associated with reduced physical activity and sedentary lifestyle[2] result in an imbalance between energy intake and that used by humans[3]. In children, predominantly, the chronic high intake of fats, sugars and low fiber (excessively caloric foods) associated with reduced physical activity would be an important risk factor for the development of obesity[4].

In recent decades, Brazil has seen a trend towards a progressive decrease in the prevalence of child malnutrition simultaneous to an increased prevalence of obesity[5], indicating that an important nutritional transition is occurring in the country[6].

Childhood obesity, therefore, has become a public health problem of great importance, and its high prevalence has been observed at increasingly younger ages and in virtually all socioeconomic levels of the population[7]. Most Brazilian studies are carried out with school-age children and adolescents, indicating prevalence of overweight and obesity ranging between 4.2% and 37.0% in the higher socioeconomic levels[8-10].

Few studies are carried out in the age group of preschool children who, according to some authors, have overweight and obesity prevalence ranging from 3.0 to 22.6%, regardless of the socioeconomic level[11-13], showing that obesity is present in different socioeconomic classes.

The socioeconomic level seems to be an important factor that could influence these prevalence rates, mainly through education and income, creating specific behavioral patterns that would eventually affect calorie intake and energy expenditure. However, as healthier foods become less accessible to individuals of low socioeconomic status, obesity starts to be observed also in the poorest strata of the population[14].

Considering that excess weight in the population is a significant nutritional problem due to its intensity and frequency and that it has also been increasing in younger populations with lower buying power, the aim of this study is to analyze its prevalence in preschool children of different socioeconomic levels in an urban area.

Methods

This study uses information from complete databases of two previous studies with preschool children in the metropolitan region of São Paulo in years close to 2005[15,16].

It is, therefore, the comparison of two cross-sectional studies, covering the first half of this decade, with children aged 2 to 6 years enrolled in private (PPS) and philanthropic (PHP) preschools of the metropolitan area of São Paulo. In the PPS, the median of the monthly family income of the children was 12 minimum wages (mw), whereas in the PHP it was 0.55 mw, characterizing two populations of extreme socioeconomic levels, one high and one very low.

The samples were convenience ones in both studies. The present study included 13 PHP and 9 PPS of the metropolitan area. Only one philanthropic and one private preschool were not included, as they did not give permission to the study. The children's environment was analyzed in 22 preschools, namely 809 children in PPS and 1527 in PHP.

The collection of anthropometric data of both studies was carried out by measuring weight using a Tanita Solar Scale 1632, and height using a Seca Bodymeter 208 stadiometer. All anthropometric measurements were obtained using the methods described by Lohman et al.[17]. The data were collected at the preschools the children attended.

The body mass index (BMI) was calculated based on the measurements of weight and height. To classify the nutritional status, weight, height and BMI values were transformed into z scores according to the references of the World Health Organization (2006 and 2007)[18]. Next, we compared the BMI of children according to age, sex and type of preschool. To verify the nutritional status, we used the classification proposed by the Ministry of Health (2009)[19]. Thus, children were considered as having excess weight when they were overweight and obese (BMIz ≥ 2). Children at risk for overweight (BMIz ≥ 1) were also analyzed.

The data were compared by calculating the frequencies (percentages), means and standard deviations (SD), median, calculation of prevalence ratio (PR). Statistical analysis was performed using the χ^2, Mann-Whitney test and 95% confidence intervals (CI). The data were initially treated using Microsoft Excel® 2002 spreadsheets and statistical analyses were performed by SPSS® 12.

The study carried out at the private and philanthropic preschools was approved by the Research Ethics Committee of the School of Public Health, Universidade de São Paulo (USP) and the Research Ethics Committee of Hospital das Clínicas, Faculdade de Medicina, Universidade de São Paulo (CAPPesq) protocols, No. 1222/05 and No. 347/02, respectively. All parents and/or tutors responsible for the children agreed to participate in the research and signed the Free and Informed Consent Form.

Results

Of the 809 children assessed in PPS, 409 were males (50.5%) and 400 children were females (49.4%). Of the 1,527 children in PHP, 829 were males (54.3%) and 698 females (45.7%). The mean age of the children in PPS was 4.6 years (SD ± 1.3) and the median was 4.6 years, whereas in PHP the mean age was 4.8 years (SD ± 1.2) and the median was 5.0.

As for the excess weight in the sample of preschoolers studied (n = 2336), a prevalence of 11.3% (95% CI: 10.1-12.7) was observed, whereas for the diagnosis of overweight risk the prevalence was 23.6% (95% CI: 21.9-25.4).

Figure 1 shows a frequency shift towards values higher than the expected median of the z scores of BMI. It can be observed that the shift is more marked in children from PPS.

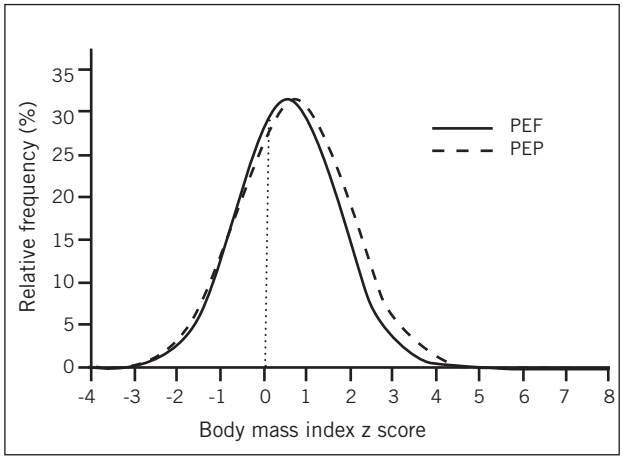

Figure 1 – Distribution of relative frequencies of the body mass index z score of children according to preschool in São Paulo, 2005.

The BMI in Table 1 shows that in PPS, the prevalence of excess weight (BMIz ≥ 2) was 14.7% and 9.5% in PHP, with statistically significant difference ($p < 0.05$). When compared by gender, the difference between preschools remains statistically significant ($p < 0.05$) for both boys and girls.

Table 2 shows that there was no statistically significant difference regarding the medians, according to the preschool and sex ($p > 0.05$). As for the diagnosis of overweight risk there was a prevalence of 21.9% in PPS and 24.6% in PHP, with a PR = 1.12 (95% CI: 0.96-1.32), statistically not significant ($\chi^2 = 2.055$, $p = 0.15$).

Table 2 – Distribution of means, standard deviations and medians of the body mass index z score of the children, according to preschool and sex in São Paulo, 2005

	Mean (DP)	Median	p*
Male sex			
PPS	0.80 (± 1.40)	0.57	0.4327
PHP	0.66 (± 1.21)	0.56	
Female sex			
PPS	0.64 (± 1.13)	0.48	0.2573
PHP	0.53 (± 1.02)	0.51	
Total			
PPS	0.72 (± 1.28)	0.54	0.2192
PHP	0.60 (± 1.13)	0.55	

* Mann-Whitney test.

Discussion

According to the Family Budget Survey (POF 2002-2003)[20], carried out by the Brazilian Institute of Geography and Statistics (IBGE) in the adult and adolescent Brazilian population (10 to 22 years old), malnutrition has been replaced by excess weight. The prevalence of overweight in children has also been rising steadily in recent years, which demonstrates that Brazil as a country is undergoing a major nutritional transition.

The analysis of children in distributed in public and private schools allows us to evaluate the possible influence of the socioeconomic (SE) level in the determination of excess weight; however, is not always possible to compare data from different studies due to differences in the studied age group, type of index used, sample characteristics, assessment methodologies and so on.

This study compares data from the sample of children 2-6 years of age from two sets of preschools (private and

Table 1 – Prevalence of overweight in preschool children from private (PPS) and philanthropic (PHP) preschools, according to preschool type and sex in São Paulo, 2005

	Overweight n (%)	95% CI	χ^2	Prevalence	Confidence interval (95%)
Preschool				1,54	
PPS	119 (14.7)	12.3-17.3	13.430		1.23-1.93
PHP	146 (9.5)	8.1-11.1	(p = 0.0002)		
Male sex				1.48	
PPS	67 (16.4)	12.9-20.3	6.367		1.10-1.98
PHP	92 (11.1)	9.0-13.4	(p = 0.0116)		
Female sex				1.90	
PPS	50 (12.5)	9.4-16.2	10.402		1.30-2.78
PHP	46 (6.6)	4.9-8.7	(p = 0.0013)		

(PEP N = 809/ PEF N = 1527)

philanthropic) in the metropolitan area of São Paulo, thus, coming from two different socioeconomic groups: one with high and one with low buying power. Even if this is a case of two studies carried out independently, the two populations studied had a large number of children that were evaluated and had very similar sex and age range distribution, who showed no statistically significant differences. In addition, children were anthropometrically assessed using the same techniques, which, together, suggest that the comparison of two groups of schools is a valid one.

The prevalence of overweight risk was high in both preschool groups, with no statistically significant differences between them, affecting, in the whole, almost one child in four.

In the current decade, the majority of studies carried out to determine the prevalence of overweight were conducted with school-age children or adolescents of higher socioeconomic level, and a prevalence > 30% have been described[8-10].

In the present study, when analyzing the children classified as having excess weight (overweight and obesity), there was a higher prevalence in private preschools than in philanthropic ones. This difference, which was statistically significant, gives evidence that when considering the extreme categories of excess weight, there is still a difference between the two socioeconomic levels, with the highest level presenting a somewhat worse situation. Nevertheless, these data, combined with the prevalence of overweight risk observed, indicate that the region is already at a more advanced stage of nutritional transition, which is particularly serious, as it has been progressively affecting children who are younger and with lower buying power.

Barreto et al.[21], when determining the prevalence of both overweight and excess weight risk in preschoolers in the city of Natal in public and private schools found 19.7% of overweight in children from public schools and 32.5% in private schools ($p < 0.01$), showing that the prevalence of excess weight is much higher in children who attend private schools, a result which differs from this study.

Another study carried out in the Brazilian Northeast, also in Natal, to estimate the prevalence of excess weight in schoolchildren, found a prevalence of 54.5% in private schools and 15.6% in public schools ($p < 0.01$), with no statistically significant difference between the children's sex and age[22]. Even considering studies with children of different ages, including a sample of the present study, we observed that although the age and study site probably influenced the different excess weight prevalence observed, the highest prevalence among children of better socioeconomic status is a common phenomenon to all.

Nevertheless, the prevalence observed in preschools and public schools of the two aforementioned studies[21,22] was much lower than the one in this study in philanthropic preschools, in which, when considering risk of overweight and excess weight together, showed a prevalence of 31.9% of affected children, almost double the values found in the Northeast region.

At the same time, few studies have been carried out with preschoolers, which makes it difficult to compare the data in this study. However, some data indicate that the prevalence of excess weight among preschool children in private schools can be even greater than 35%[12,23].

A study carried out in 2006 to evaluate the nutritional status in a sample of 1,488 children aged 3 to 6 years in daycare centers in Taubaté (state of São Paulo) observed a prevalence of risk of overweight, overweight and obesity together of 26.8[24], which is quite high, but lower than that observed in this study.

Another recent survey that aimed to identify possible anthropometric deviations in preschoolers from the semiarid region of Alagoas, where 87.3% of the population has low socioeconomic status, found a prevalence of overweight and obesity of 6.3%, a value that, although lower than that observed in the Metropolitan Region of São Paulo, indicates that the nutritional transition is also occurring in the Northeast of Brazil[25].

In the present population study, Figure 1 illustrates the prevalence of 11.3% of excess weight seen in the sample of children and its association with socioeconomic status. In the same study one can observe a clear deviation of the frequency distribution curve towards values above the BMIz score median, which would be expected based on the reference of the World Health Organization. It is also evident that the deviation is more pronounced in the curve of the children from PPS, although the comparison of medians between the two samples, private and philanthropic, did not show statistically significant differences.

According to the criteria proposed by the Ministry of Health, ranges > +1 BMIz score defines the presence or risk of overweight, overweight or obesity[19]. In a normal population, from the nutritional point of view, regardless of the socioeconomic level considered, one would expect a prevalence of 15.9% of normal individuals with BMIz score > +1.

As this would be the maximum percentage of individuals accepted as normal, with no risk of overweight, overweight and obesity, considering the prevalence found in this study, it can be observed that the two preschool populations have a prevalence of 19.7 and 16.0 percentage points higher than the expected, respectively, in private and philanthropic preschools. These values should be considered as extremely high, especially considering that the age group of the children in the study.

Conclusion

Overweight and obesity also are more prevalent in children from private preschools. However, this does not happen for the overweight risk condition, which indicates that if this situation persists, it can be assumed that, soon the socioeconomic status will no longer discriminate the prevalence of overweight and obesity in younger children.

As a result, the need for early prevention of the risk of overweight and obesity at all socioeconomic levels becomes obvious. In this regard, a multidisciplinary approach with pediatricians, psychologists, nutritionists and other professionals to plan interventions, including nutritional education strategies, can be particularly relevant in the school environment, including preschool. In addition to their normal educational activities, these spaces concentrate, in the same time and place, a large number of children, which makes them particularly suitable for local implementation of these nutritional interventions, regardless of age and socioeconomic level of the children who attend them.

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