

Prevalence of overweight and obesity among Portuguese preschoolers

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Objective: The present study aimed to report the prevalence of being overweight/obese in a sample of Portuguese preschoolers. **Design:** A total of 625 children (males: 53.6%) aged 3 to 6 years old were included in the study. The International Obesity Task Force (IOTF) cut-offs were used to define overweight and obesity. **Results:** The overall prevalence of being overweight/obese was 33.1%. The prevalence of being overweight/obese was significantly ($p<0.05$) higher in girls (37.2%) than boys (29.6%). **Conclusion:** Despite the age of the participants in the study, the levels of overweight and obesity are alarming and call for appropriate interventions.

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Key Words: preschool children, body mass index, gender

INTRODUCTION

The prevalence of paediatric obesity has increased dramatically over recent decades in most countries (1, 2) including Portugal (3). This trend is particularly alarming not only because of the increasing risk of multiple medical co-morbidities (4), but also due to the tendency of childhood obesity to track into adulthood (5, 6). The increased obesity prevalence in children (7) has led to increased awareness of obesity as a public health problem (8). The preschool period, around the time of the adiposity or body mass index rebound (9), is considered as a possible critical period for obesity development during which the long term regulation of energy balance may be programmed (10). Thus, future interventions might target early life and focus on environmental changes targeted at relatively short periods in early life, attempting to modify predisposing factors during early childhood, which are independently related to later risk of obesity (11). Despite this concern, to the best of our knowledge, no data in the preschool age group are available for the Portuguese population. In fact, a recent systematic review found that there was relatively little prevalence data on obesity in young

children in Europe, and it called for more research on obesity prevalence in this age group (12). Therefore, the aim of this study was to report the prevalence of overweight and obesity (OV+OB) in a sample of Portuguese preschoolers.

MATERIAL AND METHODS

This is a cross-sectional study with a convenience sample carried out in kindergartens from the metropolitan Porto area. The participants were 625 healthy Portuguese preschool children (328 boys) aged 3-6 years old ($\bar{x}=4.8 \pm 1.0$ yrs-old). Mean body height was 108.1 ± 8.8 m and mean body weight was 20.1 ± 4.2 kg. Data were collected between January 2008 and January 2009. Participants were evaluated during the school day by teachers specially trained for this data collection. Informed written consent was obtained from the children's parents or guardians and school principals. Study procedures were approved by the Portuguese Foundation for Science and Technology and by the Scientific Board of Physical Activity and Health PhD program. The response rate was 96.2%. Stature and body mass were determined by standard anthropometric methods. Stature was

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measured to the nearest millimetre in bare or stocking feet with the participants standing upright against a Holtain portable stadiometer. Body mass was measured to the nearest 0.1Kg, with participants lightly dressed (underwear and t-shirt) using a portable digital beam scale (Tanita Inner Scan BC 532). The average of two measurements was used for both height and weight.

Body mass index (BMI) was used to define underweight from the references established by Cole et al. (13), and overweight and obese were defined using the reference established by Cole et al. (14) as recommended by the International Obesity Task Force (IOTF).

Socioeconomic status (SES) is defined either by the educational level of the mother or father or mother and father (parental education). In the latter case, single parent families were also included, and these children were classified according to the school education of the single parent. The SES was defined based on the Portuguese Educational system 9 years' education or less sub secondary level (scored as 1), 10-12 years' education-secondary level (scored as 2) and higher education (scored as 3). Levels 1, 2 and 3 were considered as low, middle and high SES (15), respectively.

Decimal age was calculated as the difference between date of birth and date of the data collection. Each age group was categorized by the midpoint of an age range. For example, the group of children that were 4 years old included all the children aged between 3.75 years and 4.24 years, and so forth.

Initially the SES was analyzed; however, we didn't find significant statistical differences between the

different levels of SES and BMI (data not shown), so we didn't consider SES for further analysis.

A two-sided student's T-test with Bonferroni adjustments was used to compare mean values between genders. A Chi-Square Test was calculated for BMI categories by gender.

RESULTS

Descriptive characteristics for study participants are outlined in Table 1. Compared to boys, girls were on average younger, heavier, and shorter ($p < 0.05$ for all). No statistically significant gender differences were found for BMI. The prevalence of underweight, overweight and obesity were respectively 2.1%, 27.6% and 9.7% in girls and 3.0%, 20.3% and 9.3% in boys ($p > 0.05$). The prevalence of OV+OB was 37.2% in girls and 29.6% in boys ($p < 0.05$).

Figure 1 shows the prevalence of OV+OB in both genders, according to age. In girls a steady pattern of OV+OB prevalence from 3 until 4.5 years old was observed, and thereafter the values rose until 6 years old. In boys, we found similar values between 3 and 4 years old. Then, the prevalence rates were higher (about 15%) until 5.5 years old, followed by a lower prevalence rate at the age of 6.

DISCUSSION

This study is the first that describes the prevalence of OV+OB in a sample of Portuguese preschoolers.

This is a timely issue because some studies pointed out that even preschoolers are characterized by high levels of overweight and obesity (16, 17), and a

Table 1. Participants' characteristics.

| | All Group N=625 | | Girls N=290 | | Boys N=335 | | <i>p</i> ^a |
|-------------------------------|--------------------|-----|----------------|-----|---------------|-----|-----------------------|
| | mean | SD | mean | SD | mean | SD | |
| <i>Age (years)</i> | 4.8 | 1.0 | 4.7 | 1.0 | 4.9 | 1.0 | 0.014 |
| <i>Body mass (kg)</i> | 20.1 | 4.2 | 19.6 | 4.0 | 20.5 | 4.2 | 0.010 |
| <i>Body height (cm)</i> | 108.1 | 8.8 | 106.8 | 9.0 | 109.2 | 8.4 | 0.001 |
| <i>BMI (kg/m²)</i> | 17.1 | 1.8 | 17.1 | 1.8 | 17.0 | 1.9 | 0.749 |
| <i>BMI (%)</i> | | | | | | | |
| <i>Under-weight</i> | 2.6% | | 2.1% | | 3.0% | | 0.162 |
| <i>Normal-weight</i> | 64.3% | | 60.7% | | 67.5% | | |
| <i>Overweight</i> | 23.7% | | 27.6% | | 20.3% | | |
| <i>Obese</i> | 9.4% | | 9.7% | | 9.3% | | 0.042 |
| <i>Non-over</i> | 66.9% | | 62.8% | | 70.4% | | |
| <i>Overweight+Obese</i> | 33.1% | | 37.2% | | 29.6% | | |

BMI – Body Mass Index

SD – Standard Deviation

Non-over = under + normal weight

^a – compares mean values between genders with T-Test with Bonferroni adjustments.

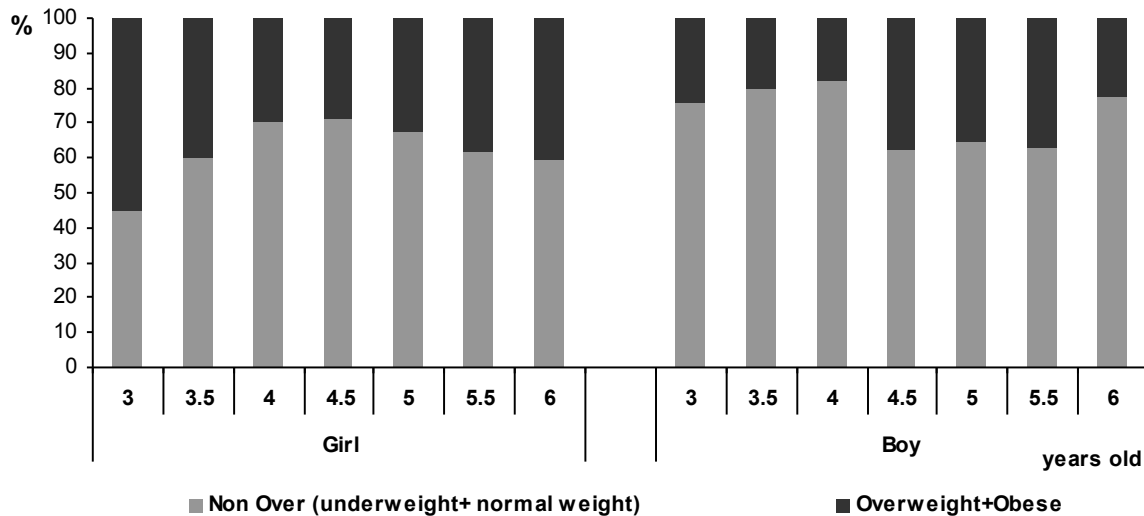


Figure 1. Prevalence of Overweight/Obesity by age in Girls and Boys.

recent review called for more research on the prevalence of obesity out that even preschoolers are characterized by high levels of overweight and obesity (16, 17), and a recent review called for more research on the prevalence of obesity among preschoolers (12).

The prevalence estimates of OV+OB found in this Portuguese sample were 37.2% in girls and 29.6% in boys ($p < 0.05$).

To the best of our knowledge, few studies have described overweight and obesity prevalence among preschool children. However, our data showed values similar to those suggested for other studies among preschool children (16, 18) and clearly highlighted the concerns with regard to obesity level in the paediatric population in Portugal. Indeed, consistent evidences showed that a high BMI for age in paediatrics has acceptable diagnostic accuracy for a high body fat content, and denotes increased risk of morbidity (19). The reasons for this important health problem are not clear; once some studies revealed that not only genetic but also environmental and behavioural factors are involved in the development of obesity at these ages (17, 20, 21). Therefore, it is worth considering the perinatal parameters and characteristics that protect or predispose children to being overweight at different stages during infancy and during preschool years (17). Additional reasons that highlight the potential importance of prevention in early childhood include adiposity rebound and the limited potential for reversing metabolic changes associated with obesity in later life (22). The data of our study suggest that girls seem to be at higher risk than boys with regard to being overweight and obese. In addition, there was a suggestion that age trends in being overweight and obese might differ between boys and girls in

this sample: while girls showed higher OV+OB prevalence as they got older (from 4.5 until 6 years old), boys showed lower prevalence rates for the same age groups. Given the age groups analyzed, the high prevalence of being overweight and obese found in our study is alarming and calls for appropriate interventions.

Limitations to the present study should be recognized. It was based on a convenience sample and so the generalisability of the prevalence estimates is unclear. However, almost all invited participants actually took part and the very high prevalence of being overweight and obese that was observed suggests that the prevalence of overweight and obesity across Portugal is very high. BMI as a measure of population prevalence of overweight and obesity has certain limitations, even though, generally related to body fat, it doesn't measure fat itself. Nevertheless, on a population level BMI is considered to be the most appropriate measure and has been used in many pieces of prevalence research. It's easily calculated on the basis of standard measures that generally show little inter observer variation and its evaluation is inexpensive, requires minimal training, and results are immediately available.

Future studies of nationally representative samples are needed to clarify the prevalence of being overweight and of obesity in preschool children in Portugal.

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