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The prevalences of overweight and obesity in children aged 4 to 12 years in Gibraltar

Sara FL Kirk[1,*] and Melanie McLeod[2]
[1]Nutrition Epidemiology Group, Nuffield Institute for Health, University of Leeds, 71–75 Clarendon Road, Leeds LS2 9PL, UK: [2]Dietetic Department, St. Bernard's Hospital, Gibraltar

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Abstract

Objective: To determine the prevalences of overweight and obesity in children aged 4 to 12 years, using the standard definitions proposed by the International Obesity Taskforce.
Design: Population prevalence cross-sectional survey involving measurement of height and weight. Data collection took place in 1998.
Setting: Schools in Gibraltar.
Subjects: In total 2994 children, aged 4–12 years, attending these schools (1540 boys, 1454 girls).
Results: Prevalence of overweight in boys was 19.7%, while obesity prevalence was 10.8%. For the girls, overweight prevalence was 21.4%, while obesity prevalence was 10.6%. There were no significant differences in the proportions of overweight or obesity between boys and girls.
Conclusions: This was the first time that the prevalences of overweight and obesity have been estimated in children from Gibraltar. These data provide further information on prevalence rates of overweight and obesity, using defined cut-offs for comparison with data from other countries.

Keywords
Overweight
Obesity
Prevalence
Children
Body mass index cut-offs

Childhood obesity is now a well-recognised problem in Europe[1]. However, comparison of data is hindered by the lack of an agreed definition of overweight and obesity in childhood. It is important that data on prevalence are presented in a consistent way if meaningful comparisons are to be made between different populations. The need for an internationally acceptable index to assess childhood obesity has been discussed widely, as has the problem of using body mass index (BMI) in children[2]. Recently, Cole *et al.* proposed standard definitions for child overweight and obesity world-wide to address these problems[3]. These definitions, based on international datasets, are linked to the adult cut-off points of BMI of 25 and 30 $kg\,m^{-2}$ and provide the opportunity for comparison of prevalence rates for overweight and obesity between countries.

Gibraltar is a rocky promontory situated at the southern-most tip of the Iberian Peninsula. A British colony since 1704, Gibraltar's population today includes British citizens and Spanish nationals, resulting in a diet that reflects both British and Mediterranean influences. We have collected data on the weights and heights of school-age children in Gibraltar, to determine the prevalences of overweight and obesity using these proposed definitions.

Methods

There are 16 schools in Gibraltar. Only the primary schools (ages 4–12 years) were included in this study. Pre-schools and nursery schools were excluded because not all children of this age (1–4 years) in Gibraltar attended them. The two secondary schools (ages 12–18 years) were excluded for the same reason. The school attended by children of parents who are posted in Gibraltar working for the Ministry of Defence was also excluded owing to the transient nature of the school population. Children with learning disabilities or who were wheelchair-bound were excluded. There is extensive literature that suggests that disabled children are more likely to have 'abnormal' weights and heights due to their disability[4,5]. Pupils who were absent on the second visit to the school and pupils for whom no date of birth was available were also excluded from the study.

Permission to undertake this study was granted by the Director of Education in Gibraltar. All schools were contacted by letter and informed about the study. Ethical approval was not sought as data collection was for statistical purposes only and no feedback or intervention was given to parents or schools. No names of children

*Corresponding author: Email s.f.l.kirk@leeds.ac.uk

were taken; instead each child was allocated a registration number. Data collection took place over three months from January to April 1998, with absentees measured during May 1998.

The same height stand and scales were used throughout the study and all measurements made by the same person (M.M.). Weight was measured using battery-operated, self-calibrating Seca scales. The children removed their shoes to be weighed and weight was recorded to the nearest 0.1 kg. Weights were not corrected for clothing. However, two children had either an arm or a leg in plaster. These weights were corrected by 0.8 kg for the arm plaster and 1.6 kg for the leg plaster. The height stand was calibrated using a measuring tape to measure length from the foot platform to the ruler. Children were measured without shoes, their heels together and standing with their heels, buttocks and shoulder blades in contact with the vertical rod. Heights were recorded to the nearest 0.5 cm. Children were not told their heights or weights. The ages of the children were calculated to the nearest month according to the day they were measured. Absentees who were measured on the second visit had their ages calculated according to that day. No children refused to be measured. All the schools were English-speaking, although no data are available on the ethnicity of the children measured.

Height and weight were converted to BMI and *Z*-scores were calculated using the British 1990 growth reference[6]. Using the definitions of Cole *et al.*[3] for British children, the prevalences of overweight and obesity were based on average percentiles estimated to pass through BMI of 25 and 30 kg m^{-2}, respectively, at age 18 years. Thus, a *Z*-score of 1.30 for males and 1.19 for females was taken as an indicator of overweight, while a *Z*-score of 2.37 for males and 2.25 for females was taken as an indicator of obesity. Statistical analyses were performed using SPSS version 9.0 (SPSS, Inc., Chicago, IL, USA). The prevalences of overweight and obesity were calculated for each age group and over the whole sample population. Within each age group, chi-square tests were performed to look at differences in the proportions of boys and girls who were overweight or obese within any age group. Within both boys and girls, chi-square tests for trend were also performed to determine any differences in the percentage who were overweight or obese across the age ranges reported.

Results

Out of a possible total of 3034 children, 2994 were included, a participation rate of 98.7%. Forty children were excluded from the study, due to absence at the time of data collection, through disability or because of missing data.

Using the cut-offs proposed by Cole *et al.*[3], the prevalence of overweight (based on an adult BMI of 25–30 kg m^{-2}) in boys was 19.7%, while obesity prevalence (based on an adult BMI >30 kg m^{-2}) was 10.8%. For the girls, overweight prevalence (based on an adult BMI of 25–30 kg m^{-2}) was 21.4% overall, while obesity prevalence (based on an adult BMI >30 kg m^{-2}) was 10.6%. There were no significant differences in the proportions of overweight or obesity between boys and girls ($P = 0.5$).

Table 1 gives the proportion of children who were overweight or obese at each age group. The prevalence of overweight in boys generally increased with age, except at ages 6 and 8 years. Overweight prevalence peaked at age 12 years. Obesity prevalence started to rise from age 6 years, with a peak at age 9 years, before falling. In girls, overweight prevalence was higher than in boys for all ages, except at ages 5 and 12 years. Prevalence dropped at age 6 years, peaked at ages 9 and 10 years, and then dropped again. There were no significant differences in the proportions of boys and girls who were overweight or obese within any age group. There were no significant age trends in the proportions of boys or girls who were overweight or obese ($P = 0.2$ and 0.4, respectively, for boys and girls). However, such differences may have been difficult to find because of the small numbers of cases in some subgroups.

Discussion

The results obtained in this study are the most recent and indeed only available data on overweight and obesity in children in Gibraltar. Similar levels of overweight and obesity were seen in boys and girls. The lack of agreed criteria for defining overweight and obesity in children poses the most significant problem when comparing data from different countries. However, prevalence data in British children aged 4–11 years using the cut-offs proposed by Cole *et al.* are available from 1994[7].

Table 1 Proportion of children who were overweight or obese according to age

	Age group (years)									
	4	5	6	7	8	9	10	11	12	Total
Boys	$n = 88$	$n = 208$	$n = 225$	$n = 200$	$n = 194$	$n = 182$	$n = 185$	$n = 170$	$n = 88$	$n = 1540$
Overweight, *n* (%)	14 (15.9)	39 (18.8)	33 (14.7)	40 (20)	34 (17.5)	37 (20.3)	43 (23.2)	40 (23.5)	24 (27.3)	304
Obese, *n* (%)	2 (2.3)	9 (4.3)	23 (10.2)	23 (11.5)	23 (11.9)	29 (15.9)	27 (14.6)	20 (11.8)	10 (11.4)	166
Girls	$n = 88$	$n = 193$	$n = 215$	$n = 179$	$n = 169$	$n = 174$	$n = 174$	$n = 167$	$n = 95$	$n = 1454$
Overweight, *n* (%)	20 (22.7)	29 (15.0)	41 (19.1)	35 (19.6)	34 (20.1)	45 (25.9)	45 (25.9)	40 (24.0)	22 (23.2)	311
Obese, *n* (%)	9 (10.2)	16 (8.3)	24 (11.2)	16 (8.9)	25 (14.8)	16 (9.2)	19 (10.9)	21 (12.6)	8 (8.4)	154

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From these data, the prevalence of overweight was 9% (English boys), 10% (Scottish boys), 13.5% (English girls) and 15.8% (Scottish girls), while the prevalence of obesity was 1.7% (English boys), 2.1% (Scottish boys), 2.6% (English girls) and 3.2% (Scottish girls). Thus, in this present study, the prevalence of overweight in Gibraltarian boys was almost double that of British boys only four years previously, with obesity prevalence over four times higher. Prevalence of overweight in Gibraltarian girls was around one-and-a-half times higher than in British girls, with obesity prevalence being around four times higher. It could be argued that these data are not comparable since there were four years between the two sets of data collection. However, the findings do suggest greater prevalences of overweight and obesity in children living in Gibraltar than in the UK. Figures for 1998 in the UK, using the same cut-offs, found an overweight prevalence of 11.9% for boys and 10.3% for girls and an obesity prevalence of 2.4% for boys and 2.8% for girls in children aged 7–11 years (P. Sahota, personal communication)[8]. These prevalence rates are also lower, although the age range was narrower for this cohort. To our knowledge, there are no published data available from Spain using these new BMI cut-offs. However, in 1999, Rios *et al.* published data on the prevalence of childhood overweight in older children (aged 6–15 years) from Northwest Spain, using BMI at or above the 85th percentile for weight as their cut-off for overweight[9]. Their two-stage cross-sectional survey showed an increasing prevalence of overweight in children of both sexes over a 10-year period, from 11.7% in 1985 to 18.1% in 1995.

No data are available on the prevalence of obesity in adults in Gibraltar, although coronary heart disease (CHD) is the single most common cause of death[10]. Obesity is a known risk factor for CHD and if levels of obesity in children are reflected in the adult population, this has serious implications for future public health in Gibraltar. Because this was the first study of overweight and obesity prevalences in children in Gibraltar, it is not known whether or how prevalences have changed. Further studies will need to be done on this population to track any changes in prevalence. The study did not investigate other variables such as dietary intake, physical activity or family history of obesity, making it inappropriate to discuss possible causes of overweight and obesity in this population. Further research on the impact of the typical Gibraltarian diet on childhood obesity prevalence would therefore be useful. In addition, anthropometric measures such as waist circumference or skinfold thickness would also allow the prevalences of overweight and obesity to be calculated more accurately, as recommended by the European Childhood Obesity Group[11].

Conclusion

This was the first time that the prevalences of overweight and obesity have been estimated in children from Gibraltar. This cross-sectional survey will form the basis for future monitoring of levels of overweight and obesity within this population. The use of such a large sample of children with a high completion rate also makes this study unique. These data provide further information on prevalence rates of overweight and obesity, using defined cut-offs for comparison with data from other countries.

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