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Prevalence of obesity among 10–11-year-old Maltese children using four established standards

A. Decelis[1,2], K. Fox[3] and R. Jago[3]

[1]Institute for PE and Sport, University of Malta, Msida, Malta; [2]Centre for Exercise, Nutrition and Health Sciences, School for Policy Studies, University of Bristol, Bristol, UK; [3]University of Bristol, Bristol, UK

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What is already known about this subject

- Obesity rates in children are particularly high in European countries.
- Based on self-report data in the Health Behaviour in School-age Children study, obesity in 11-year-old Maltese children is second only to children in the United States.

What this study adds

- This is the first study on obesity in 10–11-year-old Maltese children using objective measures with a nationally representative sample that confirms very high levels of overweight and obesity.
- Prevalence appears to be high with no strong social or geographical patterning.

Summary

Objective: The objective of this study was to establish, through measured height and weight, the prevalence of overweight and obesity in a representative sample of Maltese children aged 10–11 years.

Methods: Height and weight were measured in a sample, stratified by sex, region and type of school, of 874 year 6 children and their body mass index classified as normal weight, overweight, and obese using International Obesity Task Force (IOTF), World Health Organization (WHO), US Centre for Disease Control and UK Department of Health standards.

Results: IOTF standards indicated 20.4% overweight and 14.2% obese, while WHO standards indicated 23.1% overweight and 20.9% obese. All four standards reported significant sex differences, classifying more boys in the overweight and obesity categories.

Conclusions: The prevalence of overweight and obesity among 10–11-year-old Maltese children are higher than previously estimated through self-reported height and weight and all other countries in the world except Greece. These high rates confirm the urgent need to identify causes and tackle childhood obesity in Malta.

Keywords: Obesity, overweight, sex differences.

Introduction

The prevalence of overweight and obesity has been estimated through self-reported height and weight to be high in Maltese children. For example, the Health Behaviour in School-aged Children (HBSC) study (1), using the International Obesity Task Force (IOTF) criteria rank Maltese children second in the world in overweight and obesity at ages 11 (27.5% overweight or obese) and 13 (31%), after children from the United States, and first at age 15 (30%). The reason for this particularly high prevalence is not known. Malta is a relatively isolated island in the Mediterranean Sea, with a small population (416 055 overall and 66 447 children under 16). This makes intensive study of the causes and consequences at

Address for correspondence: Mr A Decelis, Institute for PE and Sport, Rm.202, University of Malta, Msida, MSD 2080, Malta; Centre for Exercise, Nutrition and Health Sciences, School for Policy Studies, University of Bristol, 8, Priory Road, Bristol, UK. E-mail: andrew.decelis@um.edu.mt; andrew.decelis@bristol.ac.uk

a national level feasible. Self-reported weight data suffers from bias as it is under-reported, particularly by overweight and obese children (2). Measured data in Maltese children are currently only available for 5–8-year-olds (3). This study set out to establish the prevalence of obesity through measured height and weight of Maltese 10–11-year-old boys and girls and to provide comparisons with other countries using the key international reference criteria.

Methods

A nationally representative sample of year 6 children was selected by the Maltese National Statistics Office using a stratified random approach with school type (state, church and independent), region (six regions) and sex of children as stratification variables. Fifty-six schools were chosen, and one or two classes were randomly selected from every school, inviting all children attending a total of 60 classes. A total of 1126 children (607 boys and 519 girls) from a population of 3890 (28.9%) were included in the study which was conducted between January and May 2012. From these children, 901 returned parental consent forms and were included in the study (80%), which was approved by a University of Malta ethics committee.

Height and weight were recorded with the child in bare feet and in light clothing using a SECA 813 Digital Scale and a SECA 213 Leicester Stadiometer (SECA, Hamburg, Germany). Body mass index (BMI) was calculated (kg m^{-2}), followed by classification into normal weight, overweight or obese groups using the IOTF (4), the World Health Organization (WHO) (5), the US Centre for Disease Control (CDC) (6) and the UK Department of Health (UK) criteria (7).

The prevalence (%) of overweight and obesity was calculated for each BMI standard. Independent sample *t*-tests were used to examine any sex differences in mean age, height, weight and BMI. Chi-square tests were used to explore sex differences in weight status, type of school and region. Alpha was set at $P < 0.05$.

Results

Of 901 children who returned parental consent, 27 were absent for data collection, leaving a total sample of 874 participants. There were no significant differences between girls ($n = 427$) and boys ($n = 447$) for weight, height or BMI. There was a small difference in boys and girls ages (10.70 and 10.75 years, respectively, $P = 0.013$). No significant differences emerged for type of school ($P = 0.167$) and region ($P = 0.103$), but prevalence tended to be higher in the more urban south east regions.

Table 1 shows the prevalence of overweight and obesity using each BMI standard. CDC and IOTF standards produced similar estimates of prevalence of overweight or obese combined (35.1–95.0% confidence interval [CI] 32.0–38.4; and 34.6–95.0% CI 31.5–37.8). The UK standards produced a higher overall prevalence of 40.6% (95% CI 37.4–43.9) of overweight or obese children, with considerably more obese (28.4–95.0% CI 25.2–31.4) than overweight (12.3–95.0% CI 10.0–14.4). The highest prevalence resulted from the WHO standards, classifying almost half the children (44.1–95.0% CI 40.8–47.4) as overweight (23.2–95.0% CI 20.4–25.9) or obese (21–95% CI 18.2–23.7). Obesity prevalence was higher than overweight using the UK and CDC standards. Sex differences were significant when applying each of the four standards, with a higher percentage of boys classified in the overweight and obese categories.

Table 2 shows how the prevalence of overweight and obesity in children in this study compared with children of similar age from other countries, using the most comparable available national data sets. Compared with English children (using UK standards) (8), higher total estimates were observed for Maltese children, particularly in boys (35.0 vs. 46.5%), while the difference in girls is smaller (31.6 vs. 34.4% of English girls). Rates for Norwegian 11-year olds (13% for girls and 12% for boys) (9) are much lower than those of Maltese children. Data for 11-year-old children in the United States are not fully compatible, but for comparison, figures for a wider age-group are presented (6–11 years). Overall, Maltese children have higher rates of overweight or obesity (using CDC standards), similar rates for girls (30.5 vs. 30.4%), and higher rates in boys (39.5 vs. 33.0%) (10). Higher prevalence is only seen in Greek children.

Discussion

This study has confirmed a very high prevalence of overweight and obesity in Maltese 10–11-year-old children, irrespective of the standards used. Comparisons revealed that prevalence is higher than all other countries with the exception of Greece and similar to Italy (for children aged 8–9 years), which is culturally and geographically close to Malta, suggesting a strong southern Mediterranean trend.

Rates reported in the present study are higher than those obtained in the HBSC study 2005–2006, which relied on self-report data (34.0 vs. 27.5%),

Table 1 Prevalence of overweight and obesity by gender using CDC, WHO, IOTF and UK age-related BMI thresholds

	Weight status	Sexes combined $n = 874$	95% CI	Girls $n = 427$	95% CI	Boys $n = 446$	95% CI	Sex differences	*P*-value
									ANOVA
Mean age (years; SD)		10.72 (0.34)	10.70–10.74	10.70 (0.33)	10.66–10.73	10.75 (0.36)	10.72–10.79	0.05	0.05*
Mean BMI (kg m^{-2}; SD)		19.67 (1.26)	19.37–19.96	19.56 (4.39)	19.16–20.01	19.77 (4.27)	19.37–20.16	0.21	0.484
									(chi-square)
CDC (%)	Normal weight	64.9	61.8–68.0	69.6	65.0–73.7	60.5	55.8–65.2	9.0	
	Overweight	16.7	14.3–19.3	13.4	10.3–16.7	20.0	16.1–23.8	–6.6	
	Obese	18.3	15.6–21.0	17.1	13.4–20.9	19.5	16.1–23.3	–2.4	
									0.01*
	Overweight or obese	35.1	32.0–38.4	30.5	26.3–35.0	39.5	35.0–44.1	–9.0	
IOTF (%)	Normal weight	65.4	62.2–68.3	70.0	65.7–74.2	61.1	56.8–65.5	8.9	
	Overweight	20.4	17.7–23.3	16.4	12.9–20.0	24.2	20.4–28.2	–7.7	
	Obese	14.2	11.8–16.6	13.6	10.3–16.9	14.8	11.4–18.1	–1.2	
									0.01*
	Overweight or obese	34.6	31.5–37.8	30.1	26.1–34.7	38.9	34.4–43.4	–8.8	
WHO (%)	Normal weight	55.8	52.5–59.1	61.7	57.3–66.2	50.2	45.5–54.9	11.5	
	Overweight	23.2	20.4–25.9	19.7	16.0–23.5	26.5	22.4–30.7	–6.8	
	Obese	21.0	18.2–23.7	18.5	14.6–22.3	23.3	19.5–27.4	–4.8	
									0.003*
	Overweight or obese	44.1	40.8–47.4	38.3	33.9–43.1	49.6	44.9–54.2	–11.3	
UK (%)	Normal weight	59.3	55.7–62.6	65.5	61.3–70.0	53.4	48.9–58.1	12.1	
	Overweight	12.3	10.0–14.4	10.3	7.5–13.4	14.1	10.8–17.5	–3.8	
	Obese	28.4	25.2–31.4	24.2	19.7–28.2	32.5	28.3–37.0	–8.3	
									0.01*
	Overweight or obese	40.6	37.4–43.9	34.4	30.1–39.1	46.5	41.8–51.0	–12.1	

*Significant at the 0.05 level.
ANOVA, analysis of variance; BMI, body mass index; CDC, US Centre for Disease Control; CI, confidence interval; IOTF, International Obesity Task Force; SD, standard deviation; UK, UK Department of Health; WHO, World Health Organization.

Table 2 A comparison of prevalences of overweight and obesity (combined) with similar-aged children from other countries

	Age (years)	Standard used	Overweight or obese		
			Combined sexes	Girls	Boys
Present study	10–11	UK	40.6	34.4	46.5
England (Department of Health Obesity Team, 2012)	10–11	UK	33.4	31.6	35.0
Present study	10–11	IOTF	34.6	30.1	38.9
Ireland (Keane, Layte, Harrington, Kearney & Perry, 2012)	9	IOTF	25.0	30.0	22
Italy (Cernigliaro, Rizzo, Scondotto, Dardaroni & Milici, 2011)	8–9	IOTF	34.0		
Norway (Gydeland, Bergh, Bjellanda et al., 2012)	11	IOTF	13.0	13.0	12.0
ENERGY study (Brug, Stralen, Te Velde et al., 2012)	10–12	IOTF			
Belgium			15.2	13.5	16.9
Greece			41.1	37.7	44.4
Hungary			25.2	22.6	27.7
Netherlands			16.1	15.4	16.8
Norway			14.5	13.8	15.1
Slovenia			27.1	22.5	31.7
Spain			24.8	23.8	25.8
Present study	10–11	CDC	35.1	30.5	39.5
USA (Fryar, Gu & Ogden, 2012)	6–11	CDC	31.7	30.4	33
Present study	10–11	WHO	44.1	38.3	49.3
Canada (Roberts, Shields, De Groh, Aziz & Gilbert, 2012)	5–11	WHO	32.8	25.9	39.3

CDC, US Centre for Disease Control; IOTF, International Obesity Task Force; UK, UK Department of Health; WHO, World Health Organization.

confirming other studies that have suggested that self-report data underestimate the prevalence of obesity (2,11).

Prevalence of overweight and obesity differed by BMI categorization method. The WHO standards resulted in about 10% more children being classified as overweight or obese, compared with the CDC and IOTF references. Other studies that have used more than one reference standard, have also reported inconsistent results and these seem partly due to differences in cut-off points between overweight and obese categories (11–14).

Only minor variations in prevalence were seen across the different regions of Malta (data not shown here). Given these high prevalence rates, and the relatively small size of Malta, it is feasible to intensively investigate the causes of childhood obesity and test out different interventions at national level.

The response rate for this study was high (80%); however, a possible limitation is that we do not know the weight category of children who did not provide consent (20%). Obese children have higher school absence rates than normal weight children (15) and their parents are less willing to provide consent in studies on obesity and its determinants (16). Therefore, it is more likely that fatter children are under- rather than over- represented.

Conclusions

The prevalence of overweight and obesity in 10–11–year-old Maltese children using measured data is extremely high. This study extends the previous evidence base from children age 5–8 years to 10–11-year-olds. Results show higher prevalence than previously indicated using self-report data, and higher than in any other country except Greece. Rapid action is required to identify the underlying causes and to develop and implement prevention and treatment strategies.

Conflicts of interest statement

The authors declare that they have no competing interests.

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