Prevalence and risk factors of obesity in children aged 2–12 years in the Abu Dhabi Islands

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Abstract

Background: The prevalence of childhood obesity has grown at an alarming rate worldwide over the last few decades. The negative health outcomes of obesity, including the increased risk of non-communicable disease, morbidity, mortality, and the cost of health services, make this condition a major public health problem.

Aim: To measure the prevalence and risk factors of obesity in children aged 2–12 years in the Abu Dhabi Islands, United Arab Emirates.

Methods: A questionnaire was submitted to 274 mothers with children aged 2–12 years at 2 governmental ambulatory health care centers in Abu Dhabi. This cross-sectional study was conducted between February 2014 and January 2015.

Results: The prevalence of overweight and obesity among the study population was found to be 32.8% overall (15.3% and 17.5%, respectively). In the study population, 59.1% were of normal weight and 8% were underweight. The prevalence of childhood obesity was found to be higher among UAE nationals than non-UAE-nationals (22.2% vs. 10.4%; p = 0.016). We observed a statistically significant relationship between obesity and child age (p = 0.001), with 6.2% of children aged 2–4 years being obese compared to 29.2% of children aged 11–12 years. Parents of the obese children underestimated the problem. We found that in 84% of normal

weight children, their parents perceived them as having a normal weight. By comparison, only 16% of obese children were perceived by their parents as obese. This difference is statistically significant (p < 0.001).

Conclusion: The prevalence of overweight and obesity among children is increasing in the UAE, especially among UAE nationals. Moreover, obesity increases with age, and children who are obese in the first years of their life will stay obese in their late childhood. Most parents of obese children fail to perceive their children as obese.

Key words: obesity, children, Abu Dhabi

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Introduction

The prevalence of obesity is rapidly growing worldwide. The World Health Organization estimates that 42 million children under the age of five are obese (WHO, 2015). Based on available data, overweight and obese children are more likely to remain obese into adulthood. With the increased incidence of obesity in children, more health problems are expected in the next generation of adults. Cardiovascular diseases, diabetes, joint diseases, endocrine disorders, respiratory problems, several types of cancer, psychological stresses, and other obesityrelated conditions will be found in the next young adult populations. The negative impact of obesity on morbidity, mortality, and healthcare costs make this condition a major public health problem.

High rates of childhood overweight have been reported in many developing countries, including the Middle Eastern countries. The UAE is one of the developing countries that has gone through a rapid socioeconomic transition over the past four decades, leading to fundamental changes in the population's lifestyle, dietary habits, and physical activities.

A genetic predisposition is a significant risk factor for childhood obesity and overweight, but the global rise in the prevalence of childhood obesity suggests that factors other than genes are involved. Changes in the world food economy and the trend toward a sedentary lifestyle are considered the main reasons for this public health problem (T. Lobstein, 2004). Increased energy-dense diets that are high in fat, particularly saturated fat, and low in unrefined carbohydrates, in addition to motorized transport, labor saving devices at home, and physically undemanding leisure activities are examples of obesity risk factors today.

Many people believe that dealing with overweight and obesity is a personal responsibility. To some degree they are right, but it is also a community responsibility. The community has a responsibility to provide safe, accessible places for children to play or ride a bike. Schools should have daily physical education and provide healthy food choices. Mothers should be educated by their doctors about the benefits of breast-feeding and how to prevent childhood obesity. All these measures are examples of how the community can assume some responsibility in addressing the problem of childhood obesity.

For children aged 2–19 years, the WHO defines overweight as a BMI at or above the 85th percentile and lower than the 95th percentile and obesity as a BMI at or above the 95th percentile for children of the same age and sex. The calculated BMI can be plotted on a BMI-for-age growth chart to obtain a percentile ranking. These percentiles are the most commonly used indicators for assessing the size and growth patterns of individual children (WHO, 2015). This study aims to determine the prevalence and risk factors for obesity in children aged 2–12 years in the Abu Dhabi Islands, UAE.

Limitations

The percentage of children aged 6–11 years in the United States who were obese increased from 7% in 1980 to nearly 18% in 2012. Similarly, the percentage of adolescents aged 12–19 years who were obese increased from 5% to nearly 21% over the same period (CDC, 2015). In 2012, more than one-third of children and adolescents in the US were overweight or obese (CDC, 2015).

Significant changes in UAE society over the last 30 years have brought about profound increases in the number of overweight individuals (Al-Hourani HM, 2003). The prevalence of childhood obesity in the UAE is surpassing the international standards of obesity among children and adolescents (A.A. Bin Zaal, 2011). A sample of UAE school children found 1.8 times more obese children than in the US (Al-Haddad FH, 2000). In the year 2000, obesity and overweight among UAE children was estimated at 8.3% using data from a UAE National Survey of school-aged individuals (Cole TJ, 2000). Another study published in 2012 specifically in the Emirate of Abu Dhabi showed that 14.7% of school-aged children are overweight and 18.9% are obese. Further analysis restricted to UAE nationals showed that 14.2% were overweight and 19.8% were obese (A Al Junaibi, 2012).

Comparing the UAE to other Gulf countries, the prevalence of overweight was found to be nearly 2–3 times higher in both sexes compared to their Bahraini counterparts; compared to their Kuwaiti counterparts aged 12–14 years, the prevalence of obesity amongst Dubai adolescents was 1.5–2 times higher (A.A. Bin Zaal, 2011).

Overweight children are at increased risk of being obese in adolescence. A study conducted by Al Haddad in 2005 showed that overweight UAE males increased in frequency from 16.4% at age 10 to more than 29% at age 18, and obesity increased from 6.1% at age 10 to 18% at age 18. UAE female children exhibited a different pattern: 22.8% were overweight at age 10 years, and more than 27% were overweight at 18 years. Obesity among UAE females increased from 7.8% at 10 years of age to 9.6% at 18 years of age (Al-Haddad FH, 2005).

Al Junaibi identified several independent determinants of obesity, including older age, male sex, lack of dairy consumption, and higher parental BMI. The same study showed no associations with exercise, perhaps due to the inaccurate self-reported nature of this variable (AAI Junaibi, 2012). Another study by Al-Junaibi found that 33.8% of the parents of overweight/obese children misclassified their child's weight status, either by underestimation (27.4%) or overestimation (6.3%). Misclassification was highest among parents of overweight/obese children (63.5%) and underweight (55.1%) children (Abdulla Aljunaibi, 2013).

Multiple factors underlie childhood obesity, including diet and lack of exercise. Nepper and Chai showed that 40% of the food consumed by children and adolescents is high in calories and fat, including sugar-sweetened beverages, junk food, and desserts. In a study in which students, parents, and teachers were interviewed, all subjects confirmed that there are barriers to accessing healthy foods in the school and community (Kelly Stott, 2012).

A study of children in the UAE cited cultural and weather restrictions as the main reasons for their lack of physical activity (Al-Hourani HM, 2003). The study found that although there was less watching of television on school days (less than 2 hours a day) compared to weekends (3 hours), there was no significant difference in energy expenditure between school days and weekends. Al-Hourani attributed this observation to the high temperatures during daylight hours. In addition, Al-Hourani stated that female children find it difficult to wear clothes suitable for exercise, which may impede their interest in physical activity (Al-Hourani HM, 2003). As children grow older, they tend to spend less time sleeping and more time doing physical activities. However, the same study found that this general trend is not true for adolescent females living in the UAE, as the time spent sleeping and engaging in physical activity were similar between girls aged 11-13 years and 14-16 years. In fact, the number of hours spent sleeping was high in both groups (Al-Hourani HM, 2003)

Methodology

Study design

This cross-sectional, questionnaire-based study was conducted at 2 randomly-chosen ambulatory health care centers on the Abu Dhabi Islands: the Al Bateen clinic and the Zaafarana clinic.

Study participants

Children aged 2–12 years (n = 274) and their parents were recruited from February 2014 to January 2015. Children with chronic diseases, children of parents who were non-Arabic and non-English speakers, and children not accompanied by their parents were excluded from the study. The total study population size was estimated to be 1,253 based on clinic visits the same months of the previous year. The sample size of 291 was calculated using a sample size calculator with 95% CI and 5% margin of error. The final sample size was 274 after the exclusion of 17 subjects because of missing medical records.

Questionnaire

The questionnaire was developed based on those used in previously reported studies. The questionnaire was divided into three parts: 1) Questions regarding family socio-demographic factors and parental factors contributing to the development of childhood obesity (8 questions); 2) Questions regarding the child's lifestyle, including dietary practices, physical activities, and sleeping hours (11 questions); 3) Questions regarding physical parameters, including the child's weight, height, and BMI. The questionnaire was prepared in 2 versions, Arabic and English.

Part 1 of the questionnaire included the ages of the parents (20–30 years, 31–40 years, 41–50 years, or above 50 years), nationality (UAE national or non-UAE national),

level of education (illiterate, primary school, secondary school, or university), family income (very low, not sufficient, sufficient, more than sufficient), whether either parent was overweight or obese (yes or no), the number of children in the family (1-2, 3-4, 5-6, or more than 7), and age of the child subject (2-4, 5-7, 8-10, or 11-12 years). Part 2 included questions regarding the consumption of healthy food and junk food (never, rare, sometimes, or always), activities including watching TV, video games, iPad use (never, 1-3, 4-6, or more than 6 h), exercise (never, 1-2, 3-4, or 5 or more times/week), and sleeping hours (less than 4, 4-6, 7-10, or more than 10 hours/day), and parent's impression of their child's weight (thin, normal, overweight, or obese). Part 3 asked about the child's weight (kg), height (cm), and BMI (number and percentile). A pilot study was conducted before finalizing the questionnaire, and modifications were made accordingly.

Data collection

All children aged 2–12 years who were accompanied by a parent, were approached by a staff nurse to request their participation in the study until the sample size was achieved. The BMIs were obtained from the medical records of all selected participants. Trained, qualified nurses working in the ambulatory health service assessed the growth characteristics of the children as part of routine health care at each clinic visit. They measured the height and weight using an electronic scale and height meter. The height was measured with the subject in a standing position without shoes, and the weight was measured while the subject wore light clothing. Growth charts and parameters, including BMIs, were recorded by the nurses using a computerized system.

Statistical analysis

The data were organized using the Excel software program and analyzed using the Statistical Package for Social Sciences (SPSS) version 18. The total and subcategory scores were compared with each other and with socio-demographic factors using the Pearson correlation coefficient (r) and chi-square coefficient (X2). A p-value <0.05 was considered indicative of statistical significance.

Ethics approval

The National Institute of Health (NIH) web-based training course "Protecting Human Research Participants," was completed to meet the ethics requirements. Approval was obtained from the SKMC Institutional Review Board/ Research Ethics Committee (IRB/REC) in February 2014.

Results

Demographic characteristics of participants

This study enrolled 274 participants, 71.9% of whom were accompanied by their mothers and 28.1% by their fathers. The majority of the parent participants were 31–40 years old (62.7% of mothers, 56.3% of fathers). The cohort comprised 61.2% UAE nationals and 38.8% non-UAE-nationals. The majority of the respondents (54.4%) were university graduates, while 1.1% were illiterate. The perceived family income was sufficient in 73.5%, sufficient

with savings in 19.8%, and insufficient in 6.7%. Most of the participants had 3–4 children (53.3%), while 17.6% had 1–2, 22.4% had 5–6, and only 6.6% had 7 or more. The age distribution of the child participants was almost uniform, with 26.6% age 2–4, 28.1% 5–7, 25.9% 8–10, and 19.3% 11–12 years. The sociodemographics of the study population are presented in Table 1.

Table 1. Socio-demographic data

Characteristic	n (%)
Child age	
2–4 years	73 (26.6)
57 years	77 (28.1)
810 years	71 (25.9)
1112 years	53 (19.3)
Mother age	
2030 years	50 (18.7)
3140 years	168 (62.7)
4150 years	47 (17.5)
> 50 years	3 (1.1)
Father age	
20–30 years	11 (4.1)
31–40 years	151 (56.3)
41–50 years	93 (34.7)
> 50 years	13 (4.9)
Nationality	
UAE National	167 (61.2)
Non-UAE National	106 (38.8)
Education	
Illiterate	3 (1.1)
Primary school	16 (5.8)
Secondary school	88 (32.1)
University	149 (54.4)
Above university	18 (6.6)
Income	
Not sufficient	18 (6.7)
Sufficient	197 (73.5)
Sufficient and saving	53 (19.8)
Number of children	
1-2	48 (17.6)
3–4	145 (53.3)
5-6	61 (22.4)
≥7	18 (6.6)

Prevalence of overweight and obesity

The prevalence of overweight and obesity in the study population was found to be 32.8% (15.3% and 17.5%, respectively), with 59.1% of normal weight and 8% underweight (Figure 1).

Parent perception of weight

When asked about their own weight, 52.4 % of the parents perceived themselves as normal weight, while 43.6% saw themselves as overweight and 2.9% saw themselves as obese (Figure 2).

When asked about their spouse's weight, 4.1% of the parents perceived their spouse as underweight, 64.9% as normal, 28% as overweight, and 3% as obese (Figure 3). The majority of the respondents perceived their child's weight as normal (71.8%), while only 15% perceived their children as overweight and 2.9% as obese (Figure 4).

Child lifestyle

Of the child participants, 0.4 % slept less than 4 hours/day, 11% slept 4–6 hours/day, 83% slept 7–10 hours/day, and 5.5 % slept more than 10 hours/day. The majority of children spent 1–3 hours/ day watching TV (60.1%), while a minority (2.9%) watched TV for more than 6 hours/day. Most of the children exercised 1–2 times/week (45.5%), while only 11.9% exercised rarely or never (Table 2).

The prevalence of childhood obesity was found to be higher among UAE nationals than non–UAEnationals (22.2% vs. 10.4%; p = 0.016) (Figure 5). Obesity and child age correlated significantly (p = 0.001), with obesity in 6.2% of children aged 2–4 years compared to 33.3% of children aged 8–10 years (Figure 6). The parents of 84% of normal weight children perceived their child as having a normal weight, while 16% of the parents of obese children perceived their child as obese. This finding was statistically significant (p < 0.001) (Figure 7).

Most of the children slept 7–10 hours, regardless of their weight (normal weight, 81% of participants; overweight, 90%; obese, 85.4%) (Figure 8). The majority of children spent 1–3 hours/day watching TV (normal weight, 63%; obese, 54.2%) (Figure 9). Most of the obese children exercised 3–4 times/ week (37.5%), while the majority of overweight and normal weight children exercised 1–2 times per week (47.5% and 50%, respectively) (Figure 10).

Eating habits

Most children reported a good appetite (44.3%), while 11.4% reported never having a good appetite. Of the obese children, 39% always had good appetite compared to only 15.7% of normal weight and 9.1% of underweight children. This difference is statistically significant (p < 0.001) (Figure 11). The majority of children always ate home-cooked food (49.3%), while only 1.5% never ate home-cooked food. The majority of children (55%) always ate breakfast, while a minority (4.1%) never did. Fruits and vegetables were sometimes eaten by 42.3% of the children and never eaten by 1.5%. The majority of obese children always ate home-cooked food, breakfast, and vegetables and fruits (Figure 12, 13, and 14, respectively). Fast food was eaten by 53.3% of the children; only 3.7 % never ate fast food. Chocolate, chips, and soft drinks were sometimes eaten by 49.3% of the children and never eaten by 0.7% (Table 3) The majority of the overweight and obese children sometimes eat these foods (Figures 15, 16, respectively).



Figure 1. Prevalence of childhood obesity (2–12-year-olds) in the Abu Dhabi Islands (n = 274)









Figure 4: Parent perception of child's weight



Table 2: Child lifestyle

Hours spent sleeping/day				
<4 hours	0.4%			
4–6 hours	11%			
7–10 hours	83%			
> 10 hours	5.5%			
Hours/day spent watching TV				
Never or < 1 hour	14.7 %			
1–3 hours	60.1%			
4–6 hours	22.3%			
>6 hours	2.9%			
Exercise per week				
Never, rarely	11.9%			
1–2 times	45.5%			
3–4 times	29.5%			
5 times or more	13.1%			

Figure 5. Obesity prevalence among UAE nationals vs. non-nationals (n = 274)







Figure 7: Parent perception of their obese child's weight status





Figure 8: Association between hours slept/day and child weight







Figure 10. Association between exercise hours/week and child weight

Figure 11: Association between appetite and child weight





Figure 12: Association between eating home-cooked food and child weight

Figure 13: Association between eating breakfast and child weight





Figure 14. Association between eating vegetables and fruits and child weight

Table 3: Child eating habits

	Never	Rarely	Sometimes	Always
Does your child have a big appetite?	11.4%	22.1%	44.3%	22.1%
Does your child like home-cooked food?	1.5%	10.6%	38.7%	49.3%
Does your child eat breakfast?	4.1%	14%	26.9%	55%
Does your child eat vegetables and fruits?	1.5%	14.7%	42.3%	41.5%
Does your child eat fast food?	3.7%	33.3%	53.3%	9.6%
Does your child eat chocolate, chips, or soft drinks?	0.7%	23.9%	49.3%	26.1%



Figure 15. Association between eating fast food and child weight



Figure 16. Association between eating chocolate, chips, and soft drinks and child weight

Discussion

Our results show that the prevalence of overweight and obesity among children in the Abu Dhabi Islands is 15.3% and 17.5%, respectively. Similar results were found in another Abu Dhabi study published in 2012, reporting that 14.7% of children were overweight and 18.9% were obese. That study reported that obesity among UAE nationals was 19.8% compared to 22.2% in this study, conducted 3 years later. This indicates that the problem is increasing.

We observed a statistically significant relationship between obesity and child age in our study (p = 0.001). The same conclusion was reached by Al-Haddad, as discussed in the literature review. A similar finding was seen in a CDC report that showed the prevalence of obesity in children (6–12 years old) in the United States was 18% in 2012, indicating that obesity is a global public health issue.

Parental participation is a key factor in the prevention and management of childhood obesity. Parental perception of their children's weight status was measured in our study, and the majority of parents of overweight/obese children (84%) underestimated their child's weight status. In 2013, Al-Junaibi found that 63% of parents of overweight/obese children underestimated their weight and perceived their child as having a normal weight.

Previous studies have shown that the level of education, income, sedentary lifestyle, less physical activity, and a tendency toward high-calorie diets are factors contributing to obesity. These factors were not identified as significant in our study, limiting our ability to formulate clear intervention guidelines. However, differences between our study and other studies, including methodology, sample selection, sample size, and design, may limit their comparability.

Our findings provide a warning signal that obesity in children has become a major health problem in our country and may have further negative consequences in the future. Further research is needed to understand the underlying causes of this problem and to devise appropriate recommendations for its prevention.

Limitations

The questionnaire used in this study was not validated, which may be a limitation of this study. In addition, the lack of previous similar research limits the scope of our analysis. Furthermore, the study population we chose (children aged 2–12 years) is younger than that of most previous studies, making comparisons difficult.

Conclusion and Recommendations

The prevalence of overweight and obesity among children is increasing in the UAE, especially among UAE nationals and in late childhood. Most parents of obese children fail to perceive their children as obese. Parents should understand the huge problem of obesity and its impact on society. Our recommendation is to focus more attention on UAE nationals and children during early childhood by means of a robust awareness campaign and a health education program to prevent obesity. In addition, schools and health authorities should work together to improve the sports curriculum and find a solution to this problem.

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