

Obesity among female school children in North West Riyadh in relation to affluent lifestyle

Awatif A. Alam, MSc (Toronto), ABCM.

ABSTRACT

الأهداف: تحديد مدى انتشار السمنة بين طالبات المرحلة الابتدائية، والتعرف على بعض العوامل المصاحبة للسمنة.

الطريقة: أجريت دراسة مقطعية للطالبات السليمات في المرحلة الابتدائية (الصفوف 4-6)، خلال العام الدراسي 2006م وحتى 2007م. تم إختيار أربع مدارس ابتدائية أهلية تقع جميعها في شمال غرب مدينة الرياض - المملكة العربية السعودية، والتي التحق بها بنات الأسر من ذوي الدخل المرتفع. شملت الدراسة 1200 طالبة، وصمم لها استبياناً موحد تم التأكد من مصداقيته لجمع البيانات. وتم بعد ذلك تحديد معدل كتلة الجسم (BMI) للطالبات بعد قياس أطوالهن وأوزانهن. كما تم تصنيف الطالبات إلى "سمنيات" و"غير سمنيات" اعتماداً على مقياس معدل كتلة الجسم (BMI) بالنسبة للعمر.

النتائج: أظهرت النتائج استجابة 1072 من الطالبات بنسبة 89.3%. بلغ معدل انتشار السمنة بين الطالبات 14.9%. كما تزايد معدل السمنة طردياً مع العمر و الصف الدراسي بدلالة إحصائية يعتد بها ($p < 0.001$). كانت غالبية الطالبات السمنيات يسكن في فلل أو بيوت كبيرة ويشمل ذلك 95% من الطالبات السمنيات. أكدت نسبة 89.2% من الطالبات مزاوتهن لنوع من أنواع الرياضة البدنية، ومع ذلك تبين أن 13.8% من الطالبات كن من السمنيات. كان استهلاك الوجبات السريعة والمشروبات الغازية شائعاً بين الطالبات السمنيات، إضافة إلى مشاهدة التلفاز بشكل منتظم بين 97.5% منهن.

خاتمة: إن وجود العوامل المعيشية المهيمنة للسمنة تدعو إلى تنسيق التدخلات على مستوى الأسرة والمدرسة لتتوافق مع التغيرات الاجتماعية والثقافية. كما أن هناك حاجة لزيادة التوعية للنهوض بنمط الحياة الصحية.

Objectives: To estimate the prevalence of obesity among elementary school female students and to identify some obesity-associated risk factors.

Methods: This cross-sectional study surveyed healthy female school students (grades 4-6) during 2006-2007. Four private schools in North West Riyadh, Kingdom of Saudi Arabia were selected where the majority of high income families enrolled their daughters. One thousand and two hundred students were included. A pre-designed validated questionnaire was used for data collection. Weights and heights were measured, and the body mass index (BMI) was calculated. Students were categorized into "obese" and "non-obese" according to BMI by age scale.

Results: A total of 1072 students participated in the study with a response rate of 89.3%. Obesity was prevalent among 14.9% of students. We observed that the proportion of "obese" students inversely increased by age and schooling grade ($p < 0.001$). Ninety-five percent of the students living in villas or big houses were obese. Approximately 89.2% admitted that they are performing some exercises; however, 13.8% of them were obese. Consuming fast food and soft drinks were common practiced among obese students. Watching television on daily basis was prevalent among 97.5% of obese students.

Conclusions: The existence of obesity promoting factors, calls for integrating interventions at family and school level to match changes in social and cultural context. Awareness is needed to enhance healthy lifestyle.

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From the Department of Family & Community Medicine College of Medicine, King Saud University, Riyadh, Kingdom of Saudi Arabia.

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Address correspondence and reprint request to: Dr. Awatif A. Alam, Associate Professor of Community Medicine, Department of Family & Community Medicine College of Medicine, King Saud University, PO Box 2925, Riyadh 11461, Kingdom of Saudi Arabia. Tel. +966 (1) 4670836. Mobile. +966 0505459972. Fax. +966 (1) 4671967. E-mail: awatif.alam@gmail.com

Childhood obesity is increasing worldwide, raising alarm on future trends of cardiovascular disease, diabetes, and cancer. It is a public health problem of increasing importance in the developed and developing world also in population undergoing cultural transition. High rates of childhood obesity were reported in national as well as international studies.¹⁻⁵ Since childhood obesity, a risk factor for adulthood obesity is of an increasing global concern; all efforts should be carried out to prevent it possibly through increased education, awareness, and attention to all susceptible children. Childhood obesity gives rise to several diseases in the community which can persist to adulthood, and may constitute a predictor for adult diseases. The poor success rate of adult obesity treatment programs in the general population points to the need to develop prevention approaches aimed toward children.¹ A national study from Saudi Arabia included a sample of 12701 children and adolescents with ages ranging from 1-18 years (6281 boys and 6420 girls). The overall prevalence of obesity in total Saudi children was greater in girls (6.74%) than boys (5.98%).² A cross-sectional study in Bahrain in 2003 showed that the overall prevalence of obesity was relatively high especially in females. Approximately 21% of the males and 35% of the females were obese. The highest percentage of obesity in boys occurred at age 14 years (29%) and in girls at 16 years (42.5%).³ A study from Taiwan in 2007 reported that the prevalence of overweight and obesity among a representative sample of 1,290 boys and 1,115 girls elementary schoolchildren was 15.5 and 14.7% in boys and 14.4 and 9.1% in girls.⁶ The causes of childhood obesity are multi-factorial including: genetics, the environment, behavior, diseases, parent's psychological characteristics, television watching, parent-child relationship, physical activity, and nutritional habits.⁶⁻⁹ Furthermore, it seems that, as children age, fast food consumption increases. It was proposed that increases in body weight and increases in fast food and snack consumption are concurrent events that potentially are causally related.¹⁰ A longitudinal trial linked increased soft drink consumption with weight gain and obesity in children. Ludwig et al¹¹ in 2001 estimated an odds ratio of 1.6 of becoming obese with each additional daily serving consumption of sugar-sweetened drink. Children and adolescents who watched television most were more obese than others who watched it less. Television may contribute to childhood obesity through various ways.¹² A study in 2007 reported that almost 36% of US preschool children exceeded the American Academy of Pediatrics recommendation to limit media time (including TV watching) to 2 hours or less per day. Intervention studies to prevent and treat obesity in preschool children by reducing TV/video viewing

were warranted.¹³ Several studies found that greater maternal restriction of palatable foods, and monitoring of daughters' eating habits were related to higher energy intake and body mass index.^{14,15} Others investigated the relations between measures of physical activity and body fatness among both genders. Their findings pointed to the possibility of presence of additional factors other than physical activity influencing the size of the fat stores in girls.¹⁶ There is considerable evidence that childhoods eating and exercise habits are more easily modified than adults' habits.¹⁷⁻²¹ A multivariate stepwise conditional logistic regression analysis was applied to assess the influencing confounding factors affecting the development of obesity in 3 years old children in Japan in 1999. It was concluded that parental obesity and overweight at birth are considered as host factors, the mother's job as an environmental factor, physical inactivity, and snacking irregularity as behavioral factors all of which influenced childhood obesity.²² Another study reported that obesity was more common in mothers with less education as well as in their children. Nearly, all of the obese mothers regarded themselves as overweight. It was further concluded that childhood obesity prevention efforts are unlikely to be successful without a better understanding of how mothers perceive the problem of overweight in their preschool children.²³ Family education programs are needed to institute gradual, permanent changes in diet and activity. The objectives of this study are to estimate the prevalence of obesity among elementary school female students and to identify some associated factors for their obesity.

Methods. A cross sectional study was performed during 2006-2007. Four private elementary schools in North West Riyadh, Kingdom of Saudi Arabia were selected as the majority of high and above average income families enroll their daughters. Based on previous studies,²⁻⁴ the prevalence of obesity in school age was estimated at approximately 15%. The minimum number of subjects required to detect the prevalence of obesity among school age students is approximately 800.

$$\text{Sample size} = \frac{Z^2 \times D \times P(1-P)}{L^2}$$

where: $p=0.15$, $Z=1.96$, D (design effect) = 4, L (limit of precision) = $\pm 5\%$. Anticipating 70% response rate for the elementary school children, a sample of 1200 female students were selected randomly with equal allocation from 4 elementary schools (300 students from each). The study included only grade 4 and above to allow better understanding of the questions and to facilitate data collection. Forms of consent to participate in the study

were sent to parents of selected students. Only those who gave consent to participate constituted the study group. Students with any documented health problems were excluded. A pre-designed validated and tested questionnaire was used for data collection. The main enquired items included socio-demographic variables; pattern of intake of food items and soft drinks; pattern of physical activity and lifestyle. Weight and height measurements were undertaken using a standardized metric scale by the investigator to minimize bias. The body mass index (BMI) was calculated using the formula $BMI = \text{weight (Kg)} / \text{height (m)}^2$, and students were categorized into "obese" and "non-obese" according to BMI criteria by age scale.²⁴ Data were coded and analyzed using "Epi-Info" software version 6.04 and statistical significance level was employed if differences reached less than 0.05 values.

Results. A total of 1072 elementary school female students participated in the study with a response rate of 89.3%. Table 1 shows that 160 were obese, and 912 were non-obese. It was found that the

proportion of "obese" students inversely increased by age. When obesity status was investigated by schooling grade a similar trend was noticed where χ^2 for linear trend =12.581, and $p=0.00039$. The vast majority of participating students (95%) were found to be living in villas or big houses with same proportion among obese and non-obese students. The working status of students' mothers was also enquired and approximately 60% of them were found to be housewives. Working status of mothers did not correlate to students' obesity where $\chi^2=0.01$ and $p=0.933$. The majority of students (89.2%) admitted performing one kind or another form of exercises as shown in Table 2. However, the frequency of not-exercising was statistically significantly higher among obese than non-obese students in Table 2. Other lifestyle correlates included enquiries about eating fast food, snacks intake, and drinking soft drinks (sodas). Among the 3 items, only consuming soft drinks was significantly more frequent among obese students compared to non-obese students, Table 2. The most common given reasons for having snacks between meals

Table 1 - Prevalence of obesity among elementary school female students according to age.

Age	Obese (n=160)	Non-obese (n=912)	Total (n=1072)	Tests of significance
8 years	-	16 (100)	16 (1.5)	
9 years	12 (7.7)	144 (92.3)	156 (14.5)	
10 years	48 (11.8)	356 (88.1)	404 (37.7)	$\chi^2 = 25.305$ $p < 0.001$
11 years	60 (18.3)	268 (81.7)	328 (30.6)	
12 years	40 (23.8)	128 (76.2)	168 (15.7)	
Total	160 (14.9)	912 (85.1)	1072 (100)	

Data are expressed as number and (percentage), χ^2 for linear trend

Table 2 - Correlates of certain lifestyle items and obesity status among elementary school female students.

Lifestyle items	Obese (n=160)	Non-obese (n=912)	Total (n=1072)	Tests of significance
<i>Exercise status</i>				
Yes	132 (82.5)	824 (90.4)	956 (89.2)	$\chi^2 = 8.69$ $p = 0.003$
No	28 (17.5)	88 (9.6)	116 (10.8)	
<i>Eating fast food</i>				
Yes	140 (87.5)	792 (86.8)	932 (86.9)	$\chi^2 = 0.052$ $p = 0.82$
No	20 (12.5)	120 (13.2)	140 (13.1)	
<i>Snack intake</i>				
Yes	128 (80.0)	720 (78.9)	848 (79.1)	$\chi^2 = 0.09$ $p = 0.76$
No	32 (20.0)	192 (21.1)	224 (20.9)	
<i>Drinking Sodas</i>				
Yes	148 (92.5)	664 (72.8)	812 (75.7)	$\chi^2 = 28.73$ $p < 0.0001$
No	12 (7.5)	248 (27.2)	260 (24.3)	

Data are expressed as number and (percentage)

Table 3 - Frequency of fast food intake among elementary school female students by obesity status.

Frequency of intake	Obese	Non-obese	Total	Tests of significance
Daily	8 (5.7)	56 (7.1)	64 (6.87)	$\chi^2 = 15.29$ $p=0.0041$
2-3 times/week	28 (20.0)	168 (21.2)	196 (21.03)	
Once/week	44 (31.4)	212 (26.8)	256 (27.47)	
Twice/month	40 (28.6)	144 (18.2)	184 (19.74)	
Once/month	20 (14.3)	212 (26.8)	232 (24.89)	
Total	140 (15.0)	792 (85.0)	932 (100)	

Data are expressed as number and (percentage)

Table 4 - Duration of watching television among elementary school female students by obesity status.

Duration	Obese (n=160)	Non-obese (n=912)	Total (n=1072)	Tests of significance
More than 3 hours/day	44 (27.5)	240 (26.3)	284 (26.5)	$\chi^2 = 12.98^*$ $p=0.011$
3 hours/day	32 (20.0)	104 (11.4)	136 (12.7)	
2 hours/day	32 (20.0)	172 (18.9)	204 (19.0)	
One hour/day	48 (30.0)	344 (37.7)	392 (36.6)	
Do not watch TV on regular daily basis	4 (2.5)	52 (5.7)	56 (5.2)	
Total	160 (14.9)	912 (85.1)	1072 (100)	

Data are expressed as number and (percentage)

were feeling hungry, being bored and having free time. Concerning the frequency of fast food consumption in this study, Table 3 shows that 516/932 (55.4%) had such meals at least once on weekly basis. Statistically significant difference was found between the frequency of fast food consumption among both non-obese and obese students (Table 3). The vast majority of students were fond of watching television on a regular daily basis 1016/1072 (94.8%). Watching television 2-hours or more was significantly higher among obese students than non-obese, Table 4. Moreover, 696/1072 (64.9%) of the studied students were not using the internet or playing video games on regular basis.

Discussion. The study reported that almost 15% of the sample was obese. Higher prevalence rates were reported from Bahrain and Kuwait.^{3,4} The prevalence of obesity in children has changed dramatically over the last century in the Kingdom of Saudi Arabia.^{2,4} This is not surprising since Saudi Arabia has witnessed a tremendous and an unpredictable economic boom in several sectors. Al-Hazmi and Warsy² in 2002 referred the changes in the dietary intake and lifestyle of the Saudi population to the evolution of obesity as a medical

problem. If this trend continues it can be alarming to the general health status. However, the limited numbers included in this report should be cautiously interpreted. The response rate of students was 89.3%. In age group 8-12 years, young girls probably become more sensitive and conscious on personal matters particularly if related to their appearance. Health would not yet be a concern for youngsters. That might explain the reservation of some students to participate in the study. However, the overall response and willingness to be part of the study were promising. As children grow older, their self-esteem and self-image become more dependent on peer pressure, explaining why for 8-12 years old children, general self-worth, popularity, and one's abilities are not totally independent of each other. Although the working status of mothers in this study did not correlate to students' obesity, an equal proportion of obese students had worked and non-working mothers. The lack of knowledge and education among parents regarding obesity may disturb their healthy food choices where they would allow their children unlimited accessibility to high caloric food items without respect to their nutritional value. A study reported from Al-Khobar, KSA in 2007 showed that the prevalence of overweight was higher among school children with fathers working

in private sector and the prevalence of overweight and obesity was higher among children with highly educated mothers.²⁵ These 2 factors are not exactly the classical causes of obesity that would be thought of but they are definitely important results of the modern life changes that are shaping the Saudi society and possibly affecting it in many ways. Although the majority of students admitted that they ever exercised, the results indirectly refer to the low impact of structured physical education and training in their schools which is also emphasized by the fact that 116 (10.82%) students never exercised. This finding may be an underestimate of the real situation as the reliability of the responses may be questioned. While eating fast food achieved the most common practice among school children in this study, followed by snack intake, and consumption of soda drinks, only consuming soft drinks was significantly more frequent among obese students. Soft drinks are not allowed to be sold on school premises in Saudi Arabia; however, students were frequently drinking them after schools and preferably with meals. As children get older, they might refuse having breakfast and lunch prepared at home. Their peer's effect gets stronger, and many feel embarrassed to carry lunch boxes to school. Statistically significant difference was found between the frequency of fast food consumption among both non-obese and obese students. Students can adopt new habits at schools where they spend most of their active daily hours. Many physiological changes are expected around the onset of puberty, and many young female students can face growing stresses by eating junk/fast food and consuming high calorie soda drinks. The results of this study followed this trend, where the most common reasons for faulty eating habits were feeling hungry, being bored and having free time. The lack of structured physical and entertainment activities is a drawback which adds up to the boom of obesity.²⁶ An issue that is often neglected is "weight stigma" which can generally refer to negative attitudes that affect the interpersonal interactions and activities in a detrimental way.²⁷ As would be expected in a community with limited entertainment facilities for females as it is the case in Saudi Arabia, many students were found to spend hours daily in watching television which is not the only harm. The possible accompanying habit of eating and nibbling while watching broadcasting programs adds up to the habituation of adopting sedentary lifestyle at an early age. Eating in front of the television or computer was reported as one of the biggest problems of overeating because viewers are too distracted to notice when they are full, and the risk of obesity is correlated directly with the amount of television watched.¹³ The television commercials promote new high calorie food brands and soft drinks, which are intended to influence viewers. It

seems that the invasion of western lifestyle had access to the Saudi community as it affects other aspects of living. This is shown by the increasing number of franchised fast food restaurants and attractive high calorie snacks found in supermarkets all over the country. The affluent living style definitely has its advantages and disadvantages which should be faced by increasing the awareness of the public to counteract the hazards that can hamper their health and well being. This increases the urge for applying awareness to all aspects including lifestyle and investing in beneficial leisure time.

In conclusion, based on the available evidence from this study, the prevalence of obesity among the studied population is alarming. In order to promote healthier eating habits, and consequently, decrease the rates of obesity, knowledge on food, and nutrition is believed to be important. However, other strategies to control obesity among Saudi children in general should include the promotion of physical activity possibly through a national policy to encourage active living. Home is an important place to learn on the importance of physical activity and proper nutrition. Attitudes, habits, and beliefs on food selection and how to spend spare time are critical factors to forming a healthy relationship with food.

The prevention and control of obesity promoting environmental factors, calls for integrating corresponding strategies to deal with it. Interventions at the family and school levels will need to be matched by changes in the social and cultural context so that the benefits can be sustained and enhanced. However, future national longitudinal studies which would include representative samples are needed.

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