

## Prevalence of Obesity and its Relation with Eating Habits and Lifestyle among Male Primary Schoolchildren in Al-Madinah City, Saudi Arabia

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### Abstract

**Objective:** To investigate lifestyle and dietary habits associated with development of obesity among male primary school children in Al-Madinah City, Saudi Arabia.

**Methods:** A cross sectional study was conducted in Al-Madinah City that included 201 male primary school students aged above 8 years. The researcher used a study questionnaire that comprised socio-demographic variables and the HABITS questionnaire. Anthropometric measurements were also recorded to calculate the Body Mass Index (BMI).

**Results:** The mean age of participants (SD) was 11.22 ( $\pm 1.1$ ) years. Prevalence of obesity among participants was 19.4%, 59.7% of male primary schoolchildren ate three meals daily. Only 16.9% ate fruits daily, 17.9% ate vegetables daily, while 88.1% ate snacks between meals and 20.4% consumed soft and energy drinks once daily, while 10.4% consumed soft and energy drinks twice or several times daily. One third of male primary schoolchildren watched TV for 3 hours or more, while during weekends, 66.2% watched TV for 3 hours or more. Regarding outdoor activity, 29.9% practiced it once a day, while 18.9% practiced it more than once a day.

Consumption of soft and energy drinks was significantly higher among obese participants than non-obese ones ( $p=0.035$ ), and outdoor activity was significantly higher among non-obese participants than obese ones ( $p=0.027$ ).

**Conclusions:** Bad nutritional habits are common among male primary schoolchildren. Prevalence of obesity among male primary school children is high and increases with their age. Consumption of soft and energy drinks and lack of physical activity are associated with obesity among children. Therefore, there is a pressing need for the development of effective obesity prevention programs for schoolchildren.

**Key Words:** Obesity – Schoolchildren – Food habits – Body mass index – Physical activity.

### Introduction

**THE** Centers for Disease Control and Prevention (CDC) defined overweight as at or above the 95<sup>th</sup> percentile of Body Mass Index (BMI) for age and "at risk for overweight" as between 85<sup>th</sup> to 95<sup>th</sup> percentile of BMI for age [1].

The World Health Organization (WHO) estimated that by the year 2020, non-communicable diseases will become the principal global cause for morbidity and mortality, and considered obesity as a global epidemic for both adults and children [2]. Obesity is a major risk factor for illness and death. It is associated with diabetes, hypertension, hyperlipidemia, obstructive sleep apnea, and osteoarthritis [3]. With the increase in life expectancy, obesity is causing more years of disability [4].

Childhood obesity has become a new challenge for healthcare providers. Its prevalence is increasing worldwide. The causes of obesity are poorly understood and continue to be debated and studied. The increased consumption of more energy-dense, nutrient-poor foods with high levels of sugar and saturated fats, combined with reduced physical activity, have led to high obesity rates among children [5].

Prevalence of child obesity is increasing at an alarming rate. In 2007, an estimated 22 million children under the age of 5 years were overweight throughout the world [2].

There are multiple etiologies for childhood obesity. Genetic factors influence the susceptibility of a given child to an obesity-conducive environment. However, environmental factors, lifestyle preferences, and cultural environment seem to play major roles in the rising prevalence of obesity

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worldwide [6]. In a small number of cases, childhood obesity is due to genes such as leptin deficiency or medical causes such as hypothyroidism and growth hormone deficiency or side effects due to drugs like steroids. Most of the time, however, personal lifestyle choices and cultural environment significantly influence obesity [7].

Childhood obesity is affected by the life style behavior. The playing habits of most children are centered toward the computer, television, mobiles, tablets and other electronic devices which decrease the physical activity. The adoption of a lifestyle, characterized by decreased physical activity and high caloric intake, is contributing to an alarming epidemiological pattern in many developing societies [8,9]. Therefore, health assessments and interventions at the primary care level are greatly needed to combat the increasing rates of childhood and adolescent obesity [10].

This study aimed to investigate lifestyle and dietary habits associated with development of obesity among male primary school children in Al-Madinah City, Saudi Arabia.

### Patients and Methods

This study was conducted in 2014. A cross-sectional study design was followed at primary schools in Al-Madinah City, Saudi Arabia.

Four study schools were selected by randomly from four geographic areas that have different socioeconomic status in Al-Madinah City, using a cluster sampling method. Classrooms were selected randomly and all students in a selected classroom were invited to participate in this study. Because of the expected communication problems, children below 8 years of age were excluded. The study included 201 male primary schoolchildren.

*A study questionnaire was designed by the researcher. It included the following:*

- Sociodemographic data of participants.
- The 19-item HABITS Questionnaire: It includes two subscales, i.e., dietary behaviors and physical activity/sedentary behavior, based on the 1998 Obesity Expert Committee recommendations [27]. It assesses a variety of behaviors: e.g., eating regular meals, frequency of fruit and vegetable consumption, the consumption of beverages, (e.g., soft and energy drinks, time spent playing outside, watching television, and outdoor activity) during the last month.

Moreover, participants were physically examined and their anthropometric measurements were

recorded. The BMI was calculated using the standard formula  $BMI = [\text{Weight (in kg)}]/[\text{height (in meter)}]^2$ . BMI measurements were plotted on the 2000 CDC Growth Charts [11].

Data were analyzed using the Statistical Package for Social Sciences (SPSS Version 17). Descriptive statistics for all variables were reported. Categorical data has been presented as frequency and percentage. All categorical variables were compared using the chi-square test. *p*-values less than 0.05 were considered as statistically significant.

### Results

Age of participant schoolchildren ranged from 9 to 14 years, with a mean  $\pm$  SD of  $11.2 \pm 1.1$  years. Fig. (1) shows that about two thirds of primary schoolchildren (62.2%) were 11-12 years old, 27.4% were 9-10 old, and 10.4% were 13-14 years old Fig. (1).

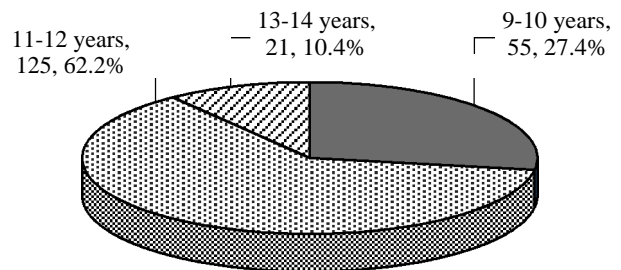


Fig. (1): Distribution of participants' age groups.

Prevalence of obesity among primary schoolchildren was 19.4%. It was also found that 52.2% of participants showed normal weight and 9.5% of study participants were underweight, while 18.9% were overweight Fig. (2).

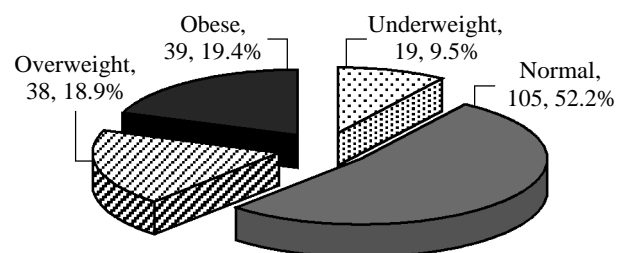


Fig. (2): Prevalence of obesity among participants.

Table (1) shows that during the last month, 59.7% of male primary schoolchildren ate three meals daily, 36.3% sometimes did that, while 4% did not eat three meals daily. Only 16.9% ate fruits daily, 79.1% sometimes ate fruits and 4% did not eat fruits. Regarding eating vegetables, only 17.9% ate vegetables daily, 71.1% sometimes ate vegetables and 10.9% did not eat vegetables. Most primary

schoolchildren (88.1%) ate snacks between meals. Regarding consuming soft and energy drinks, 42.3% consumed soft and energy drinks once a week or less, 26.9% consumed soft and energy drinks several times a week, 20.4% consumed soft and energy drinks once daily while 10.4% consumed soft and energy drinks twice or several times daily.

Table (1): Eating habits of male primary schoolchildren.

Habits	No.	%
<i>Eating three meals a day:</i>		
Once a week or less	8	4.0
Sometimes	73	36.3
Daily	120	59.7
<i>Eating fruits:</i>		
Once a week or less	8	4.0
Sometimes	159	79.1
Daily	34	16.9
<i>Eating vegetables:</i>		
Once a week or less	22	10.9
Sometimes	143	71.1
Daily	36	17.9
<i>Eating snacks between meals:</i>		
Yes	177	88.1
No	34	16.9
<i>Consuming soft and energy drinks:</i>		
Once a week or less	85	42.3
Several times a week	54	26.9
Once a day	41	20.4
More than once a day	21	10.4

Table (2) shows that during the last month, one third of male primary schoolchildren (33.3%) watched TV for 3 hours or more, while during weekends, 66.2% watched TV for 3 hours or more. Regarding their outdoor activity, 19.4% practiced it once a week or less, 31.8% practiced it several times a week, 29.9% practiced it once a day, while 18.9% practiced it more than once a day.

Table (2): Participants' practices regarding watching TV and outdoor activity during last month.

Practices during last month	No.	%
<i>Watching TV during weekdays:</i>		
< One hour	21	10.4
1 hours	37	18.4
2 hours	76	37.8
3 hours or more	67	33.3
<i>Watching TV during weekends:</i>		
< One hour	8	4.0
1 hour	12	6.0
2 hours	48	23.9
3 hours or more	133	66.2
<i>Outdoor activity:</i>		
Once a week or less	39	19.4
Several times a week	64	31.8
Once a day	60	29.9
More than once a day	38	18.9

Fig. (3) shows that prevalence of obesity among primary schoolchildren was 14.5% among those aged 9-10 years, 19.2% among those aged 11-12 years and 33.3% among those aged 13-14 years. Differences between age groups was statistically significant ( $p < 0.001$ ).

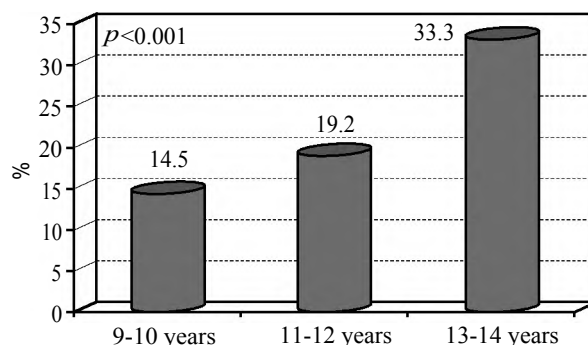


Fig. (3): Prevalence of obesity among primary schoolchildren according to their age groups.

Table (3) shows that consumption of soft and energy drinks was significantly higher among obese participants than non-obese ones ( $p = 0.035$ ), with 20.5% of obese participants consuming soft and energy drinks more than once a day compared with only 8% of non-obese participants. However, all other studied eating habits did not differ significantly among participants according to their obesity status.

Table (3): Eating habits of study participants according to their obesity status.

Habits	Obesity status		p-value
	Not Obese (n=162)	Obese (n=39)	
<i>Eating three times a day:</i>			
Once a week or less	6 (3.7%)	2 (5.1%)	0.920
Sometimes	59 (36.4%)	14 (35.9%)	
Daily	97 (59.9%)	23 (59%)	
<i>Eating fruits:</i>			
Once a week or less	6 (3.7%)	2 (5.1%)	0.896
Sometimes	129 (79.6%)	30 (76.9%)	
Daily	27 (16.7%)	7 (17.9%)	
<i>Eating vegetables:</i>			
Once a week or less	18 (11.1%)	4 (10.3%)	0.988
Sometimes	115 (71.0%)	28 (71.8%)	
Daily	29 (17.9%)	7 (17.9%)	
<i>Eating snacks between meals:</i>			
Yes	143 (88.3%)	34 (87.2%)	0.517
No	19 (11.7%)	5 (12.8%)	
<i>Consumption of soft and energy drinks:</i>			
Once a week or less	75 (46.3%)	10 (25.6%)	0.035
Several times a week	41 (25.3%)	13 (33.3%)	
Once a day	33 (20.4%)	8 (20.5%)	
More than once a day	13 (8.0%)	8 (20.5%)	

Table (4) shows that outdoor activity was significantly higher among non-obese participants than obese ones ( $p=0.027$ ), with 15.4% of non-obese participants practicing outdoor activity once a week or less compared with 35.9% of obese participants; and 20.4% of non-obese participants practicing outdoor activity more than once a day compared with only 12.8% of obese participants. However, watching TV during weekdays or weekends did not differ significantly among participants according to their obesity status.

Table (4): Participants' watching TV and outdoor activity according to their obesity status.

Variables	Obesity status		P-value
	Not Obese (n=162)	Obese (n=39)	
<i>Watching TV during weekdays:</i>			
< One hour	14 (8.6%)	7 (17.9%)	0.324
1 hour	30 (18.5%)	7 (17.9%)	
2 hours	61 (37.7%)	15 (38.5%)	
3 hours or more	57 (35.2%)	10 (25.6%)	
<i>Watching TV during weekend:</i>			
< One hour	6 (3.7%)	2 (5.1%)	0.226
1 hour	7 (4.3%)	5 (12.8%)	
2 hours	39 (24.1%)	9 (23.1%)	
3 hours or more	110 (67.9%)	23 (59.0%)	
<i>Outdoor activity:</i>			
Once a week or less	25 (15.4%)	14 (35.9%)	0.027
Several times a week	52 (32.1%)	12 (30.8%)	
Once a day	52 (32.1%)	8 (20.5%)	
More than once a day	33 (20.4%)	5 (12.8%)	

## Discussion

Results of the current study showed that prevalence of obesity among male primary schoolchildren in Al-Madinah City was high (19.4%), with a significantly increasing trend with their age.

The high prevalence rate for obesity among male primary schoolchildren in Al-Madinah City is in agreement with those reported in several other parts of Saudi Arabia. In Makkah, Al-Shehri [12] reported that prevalence of obesity among male school children aged 6-12 years was 20.2%, while in Tabuk, Al-Enazy [13] reported that prevalence of obesity among male school children aged 6-12 years was 17.4%. However, in USA, Gauthier et al., [14] reported that prevalence of obesity among primary schoolchildren ranges from 6% to 30%.

Steinbeck, [15] explained the increasing prevalence rates of obesity among schoolchildren with their age by the associated decrease in their physical

activity with age. Moreover, Kelishadi et al., [16] added that, the rapid progress of urbanization is associated with unhealthy lifestyles described as the "lifestyle syndrome" or the "New World syndrome". This is suggested as the most important etiology for the high rates of obesity and its consequent morbidity and mortality in developing nations. In addition, childhood obesity is still wrongly considered by most communities as a sign of healthiness and high social class.

The present study revealed that most male primary schoolchildren do not follow healthy eating habits. Only 59.7% ate three meals daily, daily consumption of fruits and vegetables have been fulfilled by only 16.9% and 17.9%, respectively, and 88.1% ate snacks between meals.

Similarly, Ku z bicka and Racho n [17] reported that most school children have improper eating behaviors. They usually consume excess amounts of energy and their diet is deficient in elements necessary for proper development. Examples of such bad eating habits comprise skipping breakfasts and drinking sugar-sweetened beverages. Such bad eating behaviors are crucial factors for the development of obesity.

Nevertheless, no statistically significant differences were observed in the present study between obese and non-obese male primary schoolchildren according to their number of daily meals, consumption of fruits or consumption of vegetables.

These results are in accordance with those of Krebs et al., [18] and Ledoux et al., [19], who concluded that evidence regarding the relation of fruit and vegetable consumption with obesity among children is inconsistent. On the other hand, some other studies reported that consumption of fruits and vegetables were related to obesity prevention in children [20-22].

The discrepancy between results reported by different studies regarding the negative association between fruits and vegetables intake and obesity among children reflects the fact that obesity is a multifactorial etiology, where weight gain can be the resultant of interactions between numerous factors [6].

Findings of the present study showed that 20.4% of participants consumed soft and energy drinks once daily while 10.4% consumed soft and energy drinks more than once daily. Moreover, consumption of soft and energy drinks was significantly higher among obese participants.

These findings are in accordance with those of Katzmarzyk et al., [23] who noted that the consumption of sugar-sweetened beverages is common among children. They also reported a positive association between obesity among schoolchildren and their consumption of sugar-sweetened beverages. Keller and Bucher Della Torre [24] added that systematic reviews showed direct associations between sugar-sweetened beverages consumption and weight gain and obesity in children and adolescents. Furthermore, several prospective studies that included repeated measures of both soft drinks and weight found that an increase in the consumption of sugary soft drinks was significantly associated with greater weight gain and greater risk of obesity over time in children [25,26].

The present study showed that, during weekdays, one third of participants watched TV for 3 hours or more, while during weekends, two thirds of participants watched TV for 3 hours or more. Moreover, only 29.9% practiced it once a day, and 18.9% practiced it more than once a day. Although duration of watching TV did not differ significantly according to presence of obesity among participants, outdoor activity was significantly higher among non-obese participants than obese ones.

Rosiek et al., [27] found that, on average, children aged 2-14 years spend 2.4 hours a day in front of a TV screen. They added that besides the fact that watching television contributes to physical inactivity, commercials and other programs also encourage children to eat more. Moreover, TV viewing takes away from the time children spend on physical activities and also leads to increased energy intake through snacking and eating meals in front of the TV. Those habits of "sit time" and "snacks", and also product advertisements on TV, influence children to make unhealthy food choices and follow bad eating habits [28,29].

Steinbeck [15] noted that lower physical activity levels and sedentary behaviors are significantly associated with a higher prevalence of obesity in children. In Saudi Arabia, Al-Hazzaa [30] stated that children and adolescents have adopted a less active lifestyle and seem to have become obese. He argued that Saudi children expend less energy in their daily activities compared with their counterparts three or four decades ago and the proportion of Saudi youth who are inactive and/or obese from childhood to early adulthood has substantially increased.

The main limitation of the present study is related to the self-reporting nature of data provided

by schoolchildren. Self-reporting of dietary intake is often "under-estimated" [31], whereas self-reporting of physical activity is often "overestimated" [32]. Moreover, the generalizability of our results is restricted to male primary school children only.

In conclusion, bad nutritional habits are common among male primary schoolchildren. Prevalence of obesity among male primary school children is high and increases with their age. Consumption of soft and energy drinks and lack of physical activity are significantly associated with obesity among children. Therefore, there is a pressing need for the development of effective obesity prevention programs for schoolchildren. Health education of schoolchildren to encourage daily practice of physical activity, proper nutritional habits encourage daily intake of fruits and vegetables and avoidance of excessive consumption of soft and energy drinks. Further studies are needed to explore lifestyle and dietary habits associated with development of obesity among female schoolchildren and those in other areas of Saudi Arabia.

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## معدل إنتشار السمنة وعلاقتها مع عادات الأكل ونمط الحياة بين تلاميذ المدارس الإبتدائية الذكور

هدف البحث: دراسة نمط الحياة والعادات الغذائية المرتبطة بالسمنة لدى أطفال المدارس الإبتدائية بالمدينة المنورة، المملكة العربية السعودية.

منهجية البحث: أجريت دراسة مقطعية بالمدينة المنورة، وشملت ٢٠١ من طلاب المدارس الإبتدائية الذكور الذين تزيد أعمارهم عن ٨ سنوات. وإستخدام الباحث إستبانة لجمع البيانات تضمنت المتغيرات الإجتماعية الديموغرافية وإستبيان العادات. كما تم تسجيل القياسات الأنثروبومترية لحساب مؤشر كتلة الجسم.

النتائج: كان متوسط عمر المشاركين (الإنحراف المعياري) هو ١١.٢٢ (±١.١) سنة. وكان معدل إنتشار السمنة بينهم هو ١٩.٤٪، وكان ٥٩.٧٪ من تلاميذ المدارس الإبتدائية الذكور يتناولون ثلاث وجبات يومية، و١٦.٩٪ يتناولون الفواكه يومية، و١٧.٩٪ يتناولون الخضروات يومية، في حين أن ٨٨.١٪ يتناولون الطعام بين الوجبات، و٢٠.٤٪ يشربون المشروبات الغازية ومشروبات الطاقة مرة يومية، في حين أن ١٠.٤٪ يشربونها مرتين أو أكثر يومياً. ويشاهد ثلث تلاميذ المدارس الإبتدائية الذكور التلفزيون لمدة ٣ ساعات أو أكثر، بينما يشاهد ٦٦.٢٪ التلفزيون خلال ثلاث مرات أو أكثر خلال نهاية الأسبوع. وفيما يتعلق بالنشاط البدني خارج المنزل، فيمارس ٢٩.٩٪ من التلاميذ ذلك مرة واحدة في اليوم، في حين أن ١٨.٩٪ يمارسونه أكثر من مرة في اليوم. وكان إستهلاك المشروبات الغازية والطاقة أعلى لدى المشاركين المصابين بالسمنة مقارنة بغير المصابين بالسمنة ( $p=0.035$ )، وكان النشاط البدني أعلى لدى المشاركين غير المصابين بالسمنة مقارنة بالمصابين بها ( $p=0.027$ ).

الإستنتاجات: إن العادات الغذائية السيئة شائعة بين تلاميذ المدارس الإبتدائية الذكور، ومعدلات إنتشار السمنة الذكور في المدارس الإبتدائية مرتفعة، وتزداد مع العمر. ويرتبط إستهلاك المشروبات الغازية والطاقة ونقص النشاط البدني بسمنة لدى الأطفال. ولذلك، فهناك حاجة ماسة إلى وضع برامج فعالة للوقاية من السمنة بين تلاميذ المدارس.