

# Obesity and Related Behaviors among Adolescent School Boys in Abha City, Southwestern Saudi Arabia

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## Summary

Using stratified sampling technique 2696 adolescent school boys (aged 11–19 years) in Abha City, Southwestern Saudi Arabia were interviewed and examined for weight and height using standardized techniques. The overall prevalence of obesity and overweight in the present study amounted to 16%. Using logistic regression analysis, lack of exercise practice in the previous week in general [aOR = 1.352, 95% confidence interval (CI) = 1.066–1.941] or in the class (aOR = 1.446, 95% CI = 1.083–1.931) were significantly associated with obesity. The present study showed that obesity among adolescent school boys in Abha City is a public health problem. There is a need for a national program in the country to prevent and control obesity among adolescents. The program should incorporate: dietary management of obesity, promotion of physical activity, health education campaigns and consideration of the possibility of providing facilities for practicing physical activity and exercise in the community.

**Key words:** obesity, adolescents, Saudi Arabia, prevalence, risk factors.

## Introduction

Adolescence is the transitional stage of development between childhood and full adulthood. World Health Organization (WHO) defines adolescence as the period of life between 11 and less than 20 years of age [1]. Adolescence is a formative period during which many life patterns are learned and established or acquired. During adolescence many changes take place; biological, physiological, psychological, cognitive, sexual and emotional changes [2].

Obesity is a public health problem worldwide with significant adverse health outcomes. The prevalence of obesity has doubled over the last decades in several developing countries as well as in the USA and most Western countries. Its increasing prevalence has compelled the WHO to include obesity on the list of the essential health problems in the world [3].

Development of obesity in childhood is associated with a simultaneous increase in the chronic diseases risk profile [4]. Excess weight in childhood is the leading cause of pediatric hypertension. Overweight children are at higher risk for developing long-term chronic conditions including adult onset diabetes

mellitus, coronary heart diseases, orthopedic disorders and respiratory diseases. Many studies have demonstrated that overweight children tend to become overweight adults. Also, overweight and obesity in childhood appears to increase subsequent morbidity whether or not obesity persists in adulthood [5].

Economic development in Saudi Arabia during the last 30 years has changed nutritional and lifestyle habits. Even though these changes have influenced the quality and the quantity of food intake and predisposed people to a sedentary life [6, 7].

The Aseer region (population of 1 200 000) is located in the southwest of Saudi Arabia covering an area of more than 80 000 km<sup>2</sup>. The region extends from the high mountains of Sarawat (with an altitude of 3200 m above the sea level) to the Red Sea, and lies few kilometers from the northern border of the neighboring Yemen. The region is divided into 15 health districts. Abha is the capital of Aseer. The objective of the present work is to study obesity and related behaviors among adolescent school aged boys in Abha city, Saudi Arabia.

## Materials and Methods

The last available Saudi population census, in the year 2004 indicated that Abha city, the capital of Aseer region in the Kingdom of Saudi Arabia has a total population of 220 000. Data from Ministry of Education show that the city has a total of

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12 secondary schools for boys and a total of 21 intermediate schools for boys (governmental and private).

Using WHO manual for sample size determination in Health Studies [8], with an anticipated population proportion of 20%, and with an absolute precision of 2% at 95% confidence interval (CI), the minimal sample size required for the study was calculated to be 1537 cases. To avoid loss of cases, a total of 1800 cases was planned to be included in the study.

A sample of 21 schools for boys was selected using stratified sampling technique with proportional allocation to type of school (government or private) and educational level (intermediate or secondary). Two classes from each educational level were randomly chosen in the selected schools. All students in the selected class present during the study period were considered. Approval for the conduct of the field survey was obtained from the Ministry of Education and School Health Unit in Aseer region. These letters of approval were given to each school principal to ensure full cooperation. Prior to the study, confidential letters were sent to parents of the study sample from researchers and Abha school health units explaining in detail the purpose of the study and asking for their consent. The letters included questionnaires inquiring about socio-demographic conditions of the family.

Data were collected during late 2005 by Group 29 Male Fourth-year Medical Students trained in interviewing skills, and directly supervised by the Family and Community Medicine staff. The structured questionnaire used in the present study is the Arabic version of CDC Adolescent Health Survey adopted by Abalkhail *et al.* [9] in Jeddah study.

The structured questionnaire included information on socio-demographic conditions, food choices, perception of body weight, weight management goals and weight management practices, physical activities and related behaviors.

Anthropological measures of weight and height were taken during the interview. Each subject was measured barefooted, wearing only light clothes. Weight was measured using standardized calibrated scales to the nearest 0.1 kg and height was taken to the nearest 0.1 cm using the standardized wall-mounted height boards with a sliding head piece according to the following protocol: no shoes, heels together, child's heels, buttocks, shoulders and head touching the vertical wall surface with line of sight aligned horizontally. Body mass index (BMI) was calculated as the measured weight in squared kilograms (measured height in meters). The measured BMIs were classified into four categories according to age: underweight (<15th percentile), normal weight (15th–<85th percentile), overweight (85th–<95th percentile), obese (>95th percentile). This classification is in accordance with the recommendation of the expert committee on clinical

guidelines for overweight in adolescence and WHO expert committee in overweight [1]. Overweight and obese categories were combined in the analysis.

Data were coded, validated and analyzed using SPSS PC+ software package. Univariate analysis methods were used at 5% level of significance. Kappa statistics were used to measure degree of agreement. Multivariate logistic regression analysis was used to identify potential risk factors.

## Results

The present study included 2696 adolescent school boys (1597 from intermediate schools and 1099 from secondary schools with a response rate of 96.7 and 97.1%, respectively). Their age ranged from 11–19 years.

### *Socio-demographic profile*

Results showed the most frequent level of education among fathers was university education (36.6%) followed by secondary (19.8%). On the other hand, the most frequent mothers' education level was illiterate (29.9%). The most frequent fathers' occupation of the studied sample were retired (22.2%) followed by governmental employee (20%). On the other hand, most mothers were not working, being just housewife (81.6). A total 1012 students had a house maid at home, representing 37.5% of the total student count. The most frequent family sizes were eight members (17.5%). The mean family size was calculated to be 8.37. Out of 2696 students, 1961 students (62.7%) had their own houses while 1005 students (37.3%) lived in rented houses. The average number of rooms was 8.46 + 4.68. Results shows that 20.5% of student's families had a monthly income between 10 000 SR and 15 000 SR, while only 5.6% of these students' family income was less than 2000 SR per month.

### *Body weight perception*

Regarding perception of body weight the study showed that 50% of the students were about the right weight, while 25% of them think that they overweight and obese. Regarding family history of obesity it was reported in 19.8% among their fathers, 17.2% among mothers and 29.1% among their brothers.

### *Body weight management goals and behaviors*

As for weight management goals and intentions, 33.6% of the students want to loose weight, 32.1% of the students want to keep their weight.

As for weight management behaviors and practices, 67.5% did nothing at all, 16.8% tried to loose weight by practicing more exercise and 10.2% tried to loose weight by eating less food.

TABLE 1  
Food choices (%) of adolescent school boys in Abha city

Food choices	Frequency in the previous week					
	Never	1–3 times weekly	4–5 times weekly	Once daily	2 times daily	3 times daily
Fresh juices	26.2	17.6	8.0	29.7	12.5	5.9
Fresh fruits	20.7	14.8	10.7	31.1	15.1	7.6
Fresh vegetables	13.9	10.5	13.2	36.8	16.2	9.4
Soft drinks cans	16.8	14.2	15.1	24.3	14.6	15.1
Rice	2.6	9.2	16.9	50.1	15.4	5.9
Bread	1.9	5.6	13.5	29.5	28.0	21.5
Meat	10.2	21.6	13.6	35.5	13.7	5.3
Chicken	4.2	15.7	18.7	42.1	14.1	5.2
Fish	50.4	24.9	6.4	13.6	3.0	1.7
Nuts	38.5	18.5	9.8	19.0	8.5	5.7
Fast food	23.5	31.5	14.7	19.5	7.1	3.7

### Food choices and physical activities

Regarding food choices during the previous week (Table 1), the study showed that 20.7 and 13.9% never consume any fresh fruits or fresh vegetables during the previous week. More than half (54%) of adolescent boys are accustomed to drink at least one Pepsi or any other Soda cans/day (15.1% three times/day, 14.6% twice/day and 24.3% once/day). As for sea foods and fishes, 50% of adolescent boys never consumed any during last week. Almost one-third (30.3%) of adolescent boys are accustomed to eating fast foods at least once daily.

As for physical activity and related behavior, more than one-third of the students (38%) are spending more than 3 h daily watching TV. On the other hand, 25% of secondary school students don't practice exercise at all. Although the schedule of the ministry of education is a one session/week, 11.6% of intermediate school students and 20.7% of secondary school students do not practice it. However, about two-third of students (61–66%) did this class in the last week.

### Obesity and its determinants

The overall prevalence of obesity and overweight in the present study amounted to 16% (5% are considered obese, while 11% overweight). The prevalence rates were not significantly different among different adolescent age groups ( $\chi^2=1.695$ ,  $p<0.05$ ). They were 16.9% for age group 11–13 years, 15.2% for age group 13–16 and 14.9% for age group 17–19 years.

Using logistic regression analysis to identify risk factors associated with obesity (Table 2) the following significant risk factors were identified; lack of exercise practice in the previous week in general (aOR = 1.352, 95% CI = 1.066–1.941) or in the class (aOR = 1.446, 95% CI = 1.083–1.931). On the other hand, socio-demographic variables (parental

education, maternal occupation and monthly family income), consanguinity of parents, other physical activities related behaviors and rest of food choices were found to be of no significant value in developing obesity.

No agreement between perception of body weight and prevalence of obesity was found. Among obese adolescents, only 7.4% thought that they are obese. Kappa statistics (Kappa = 0.015,  $p=0.323$ ) showed no agreement between perception of body weight and presence of overweight and obesity as revealed by BMI.

### Discussion

The present study showed that obesity among adolescent school boys in Abha city is a public health problem. Negative life style behaviors that might precipitate the condition were revealed.

Obesity is the consequence of an overall positive energy balance maintained over time, i.e the metabolizable energy intake exceeds the energy expenditure for basal metabolic requirements, thermoregulation and thermogenetic effects of feeding, physical activity and growth. Several studies related basal energy expenditure to the metabolically active lean body mass and found no basal energy expenditure difference between obese children and children of normal weight. However, meal-induced thermogenesis may be slightly smaller in obese than in normal weight children. Thus, the major determinants of obesity development are energy expenditures induced by physical activity and energy intake from foods [10].

Lack of physical exercise among the studied sample was found as the most important significant risk factor. The degree of a person's physical activity markedly affects total energy expenditure and thus energy balance. Low physical activity levels are associated with obesity in children and adolescents

TABLE 2  
*Multivariate analysis, aOR and antecedent 95% CIs of potential risk factors determining obesity among adolescent school boys in Abha City*

Variable	aOR	95% CI	
		Lower	Upper
Father's education: Illiterate vs. Educated.	0.814	0.540	1.228
Mother's education: Illiterate vs. Educated.	0.801	0.620	1.036
Mother's occupation: Not working vs. working.	1.004	0.754	1.338
Monthly family income: 5000+ SR vs. <5000 SR	0.912	0.721	1.238
Consanguinity of parent: Consanguineous vs. None	0.933	0.754	1.155
TV watching: 2+ hours daily vs. <2 hrs daily	0.894	0.713	1.121
Physical exercise practice last week: never vs. yes	1.352*	1.066	1.941
Class physical exercise practice last week: never vs. yes	1.446*	1.083	1.930
Intake of fresh juices last week: never vs. yes	0.975	0.757	1.254
Intake of fresh fruits last week: never vs. yes	0.837	0.629	1.114
Intake of fresh vegetables last week: never vs. yes	0.982	0.712	1.354
Intake of soft drinks cans last week: yes vs. no	1.345	0.986	1.836
Intake of rice last week: yes vs. never	1.703	0.951	3.046
Intake of bread last week: yes vs. never	1.121	0.919	2.203
Intake of meat last week: never vs. yes	1.051	0.734	1.503
Intake of chicken last week: never vs. yes	1.153	0.667	1.994
Intake of fish last week: never vs. yes	0.965	0.770	1.209
Intake of nuts last week: never vs. yes	0.847	0.672	1.069
Intake of fast foods last week: never vs. yes	0.825	0.631	1.079

\*Significant.

and may be both cause and consequence of overweight. In addition to the direct effect of increasing energy expenditure, high physical activity also enhances muscle mass and thereby resting energy expenditure and muscular fat oxidation. As a consequence of an increasingly sedentary lifestyle, the level of physical activity of children and adolescents has declined. The apparent influence of such times on obesity risk might reflect combined effects of physical inactivity, snacking behavior and specific personality and socio-economic factors [11].

The disagreement between self perception of body weight and actual status was similarly reported among Jeddah adolescents [9]. The meaning of 'obesity' differs from the medical definition for many people particularly adolescents. School-based weight reduction programs which do not take the difference into consideration are unlikely to be successful. Obese adolescents may perceive themselves as normal weight and so do nothing to lose weight.

Recommendations should focus on more health education to deal with this high risk vulnerable group to fill the gap in their behaviors and practices relevant to the nature of being growing and more prone to develop negative life style behaviors and attitudes [12]. The combination of a reduced calorie diet and increased physical activity is recommended since it produces weight loss, decreases abdominal fat and increases cardio-respiratory fitness.

Physical activity is an accepted strategy in the treatment of established obesity (tertiary prevention). The role of physical activity in the prevention of obesity (primary and secondary prevention) is less clear. However, a number of recent school-based interventions directed at either increasing physical activity and/or decreasing sedentary behaviors have shown encouraging results. On balance, increasing physical activity in children is an attractive and non-restrictive approach to obesity prevention. To adopt this approach, the support and involvement of many community sectors other than health is required [13, 14]. Behavioral therapy is a useful adjunct when incorporated into treatment for weight loss and weight maintenance. Behavior therapy strategies to promote diet and physical activity should be used routinely, as they are helpful in achieving weight loss and weight maintenance [15].

There is a need for a national program in the country to prevent and control obesity among adolescents. Such a program should be part of a national plan to prevent diet-related chronic disease. An obesity control program should incorporate: dietary management of obesity, promotion of physical activity, health education campaigns, training courses for health workers, the drawing up of regulations and legislation to control advertising of prescription drugs and equipment that claim to reduce obesity and consideration of the possibility of

providing facilities for practicing physical activity and exercise in the community [16].

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