

OBESITY: IS IT A PROBLEM IN ADOLESCENT FEMALE STUDENTS IN ONIZAH SCHOOLS?

UPENDRA LELE¹, SARA ALI AL-TOWAIRIB² & VARSHA SHAHANE³

¹College of Business and Economics, Qassim University, KSA

^{2,3}College of Applied Medical Sciences, Qassim University, KSA

ABSTRACT

Objectives

Obesity contributes significantly to morbidity and mortality rates worldwide. It is also a known health concern in Saudi Arabia, as frequently reported in various media. This study aimed at assessing the prevalence of obesity in the Al Qassim province, and to examine the effect of lifestyle factors on obesity.

Study Design

Cross sectional study

Methods

Multi-stage proportionate random sampling was used for data collection (questionnaire) obtained through random selection of female children in the age group 12 to 18 years, studying in the intermediate and secondary school of Onaizah region (January 2015 and May 2015). The Body Mass Index (BMI) of the subjects was calculated, which is an indicator of obesity. The questionnaire also covered various parameters such as food habits, frequency and duration of exercise, sleep duration etc. Prevalence of obesity was estimated using descriptive statistics, and the influence of various factors on obesity was examined using Chi Square test.

Results

Data of 100 students from 10 schools (5 primary and 5 secondary schools) in Onaizah city indicated that 23% of the students were obese. Chi square analysis showed that factors such as meal preference, frequency of meals, and frequency of exercise and duration of sleep appear to have significant influence on obesity. However, sleep pattern (whether sound or disturbed sleep) does not seem to affect obesity.

Conclusions

From the study, it appears that obesity is significantly prevalent among adolescent female students of Onaizah region. Certain lifestyle factors have significant influence on obesity. There is a need for increased awareness in the region, about obesity.

KEYWORDS: Prevalence, Obesity, Lifestyle Factors

INTRODUCTION

Obesity is defined by World Health Organization (WHO) as: “abnormal or excessive fat accumulation that may

impair health". According to the WHO, the condition of overweight and obesity are among the five leading causes of deaths globally. They are the fifth leading risk for global deaths¹.

Maintaining a healthy weight is an extremely important part of overall health. Being overweight or obese leads to numerous health issues like cardiovascular disease or diabetes that adversely affect the quality and length of life. Due to improper lifestyle patterns such as inadequate sleeping duration, abnormal eating habits, lack of physical activities, consumption of drugs and excessive use of electronic gadgets, the risk of developing obesity increases.

In Kingdom of Saudi Arabia (KSA) we often see many obese children, which prompted us to conduct this study. Onaizah - a large town in Al Qassim province was chosen for this study.

Available evidences showed that one of the effective ways to prevent obesity in the adult life is prevention and management of adolescent overweight and obesity. A fundamental step in the prevention and control of obesity is the identification of risk factors contributing to the rapid increase of obesity¹. Hence we also took into account the various life style factors which influence obesity. Through this study, we hope to spread awareness among the adolescent students about the risk of obesity, so that they will change and improve their lifestyle at a very young age.

METHODOLOGY

Study Design

This was a cross sectional study conducted during January 2015 to May 2015. Multi-stage proportionate random sampling was used for data collection (questionnaire) obtained through random selection of female children in the age group 12 to 18 years, studying in the intermediate and secondary school of Onaizah region. 10 schools (5 intermediate schools and 5 secondary schools) were randomly chosen. 10 percent students from each school were randomly selected from all different levels. Thus the sample size was 100 students.

The Body Mass Index (BMI) of the subjects was calculated, which is an indicator of obesity. It is defined as the weight in kilograms divided by the square of the height in metres (kg/m^2). As per WHO guidelines, individuals having BMI $28 \text{ kg}/\text{m}^2$ or more are considered as "Obese".

The height and weight of the students were measured for computing the BMI (Body Mass Index), using measuring tape and calibrated weighing scale, respectively.

The data was collected using structured questionnaire- interview by schedule, which had some close-ended questions. The questionnaire included demographical data such as name of the school, school code, level of study, student's age, height(in meters), weight(in kilograms), and lifestyle variables such as sleeping duration, eating habits, physical activities and use of electronic gadgets.

The purpose of study and the procedure that was to be followed was explained to the participants. Written consent from the schools, the participants of the survey and their parents was obtained at the time of data collection.

Inclusion Criteria: female school students from the age group 12-18 years in Onizah city.

Exclusion Criteria: female school students with any known disability or disease and those not willing to participate.

General Objective

To determine the prevalence of obesity in the adolescent female students in the schools of Onizah and to identify the lifestyle factors affecting obesity in these children.

Specific Objectives

- To find out body mass index (BMI) of students, and to assess prevalence of obesity among these female school children.
- To determine lifestyle factors (sleeping duration, eating habits, physical activities, electronic gadgets' use) of these students.
- To study the association of lifestyle factors with obesity in the students.
- To educate the students about obesity and its associated risks.

Data Analysis

The data was analyzed using Microsoft Excel 2007 software.

The questionnaire covered various parameters such as food habits, frequency and duration of exercise, sleep duration etc which influence obesity. Descriptive statistics was presented for demographic characteristics (age, standard and school code, BMI). Prevalence of obesity was estimated using descriptive statistics, and the influence of various factors on obesity was examined using Chi Square test. Dependent variable is prevalence of obesity, and independent variables are dietary habits, age, sleep duration, drugs, exercise and use of electronic gadgets.

So, this study was designed to examine both exposure (lifestyle factors) and disease outcome (obesity) simultaneously for each subject.

Research Hypotheses

Following hypotheses were formulated to examine the impact of different lifestyle factors on obesity.

H0₁: There is no relation between meal preference and prevalence of obesity

H0₂: There is no relation between number of meals per day and prevalence of obesity

H0₃: There is no relation between frequency of eating out and prevalence of obesity

H0₄: There is no relation between sleep pattern and prevalence of obesity

H0₅: There is no relation between sleep duration and prevalence of obesity

H0₆: There is no relation between exercise frequency and prevalence of obesity

H0₇: There is no relation between exercise duration and prevalence of obesity

H0₈: There is no relation between use of e-gadgets and prevalence of obesity

RESULTS

The study sample indicated that ninety percent of the students were from the age group of 14 to 18 years. The

BMI calculation showed that 23 children out of 100 had a Body Mass Index greater than or equal to 28 kg/m^2 , i.e. they were obese. This means 23% of the students were obese, which appears to be quite a high percentage. Further analysis of the impact of each lifestyle factor on obesity is presented below:

The results of the hypotheses tests are tabulated below.

Table 1: Impact of Meal Preference on Obesity

Meal Preference	Obesity			
	No	Yes	Total	%Obese
Vegetarian	5	0	5	0.0%
Non vegetarian	72	23	95	24.2%
Total	77	23	100	

Observed Chi Square = 5.29, p Value = 0.02; hence H_{01} is rejected. So there is a definite correlation between meal preference and obesity. Vegetarians are at a lower risk to develop obesity than non vegetarians.

Table 2: Impact of Number of Meals on Obesity

Number of Meals/Day	Obesity			
	No	Yes	Total	%Obese
1	8	4	12	33.3%
2	23	7	30	23.3%
3	38	9	47	19.1%
4	8	3	11	27.3%
Total	77	23	100	

Observed Chi Square = 10.54, df = 3, p Value = 0.01; hence H_{02} is rejected. So, the number of meals per day has an influence on obesity. It is observed that as the number of meals per day increases from 1 to 3, the obesity percentage decreases. However, it increases again if number of meals is above 3 per day. This 3 meals per day appears to be an optimal frequency for controlling obesity.

Table 3: Frequency of Eating Out and Prevalence of Obesity

Frequency of Eating Out	Obesity			
	No	Yes	Total	%Obese
Daily	6	2	8	25.0%
Weekly	48	16	64	25.0%
Monthly	23	5	28	17.9%
Total	77	23	100	

Observed Chi Square = 7.48, df = 2, p Value = 0.02; hence H_{03} is rejected. So, eating out frequently has an influence on obesity. It is observed that the prevalence of obesity is higher among those who are eating out on daily or weekly basis than those who eat out once in a month.

Table 4: Impact of Sleep Pattern on Obesity:

Sleep Pattern	Obesity			
	No	Yes	Total	%Obese
Sound sleep	46	13	59	22.0%
Disturbed sleep	31	10	41	24.4%
Total	77	23	100	

Observed Chi Square = 1.3,df = 1, p Value = 0.25; hence H_{04} is accepted. So, sleep pattern does not influence obesity.

Table 5: Impact of Sleeping Duration ON Obesity

Sleep Duration	Obesity			
	No	Yes	Total	%Obese
< 6 hours	22	5	27	18.5%
>= 6 hours	55	18	73	24.7%
Total	77	23	100	

Observed Chi Square = 5.86, df = 1, p Value = 0.02; hence H_{05} is rejected. Obesity is seen more in students who sleep for more than 6 hours than in students who sleep for less than 6 hours.

Table 6: Impact of Exercise Frequency on Obesity

Exercise frequency	Obesity			
	No	Yes	Total	%Obese
Never	49	17	66	25.8%
Daily	18	2	20	10.0%
Weekly	10	4	14	28.6%
Total	77	23	100	

Observed Chi Square = 21.36,df = 2, p Value = 0.00; hence H_{06} is rejected. Obesity is clearly seen more in individuals who do not exercise at all or do it on a weekly basis than the ones who exercise daily.

Table 7: Impact of Exercise Duration on Obesity

Exercise Duration	Obesity			
	No	Yes	Total	%Obese
No exercise	49	17	66	25.8%
Up to 15 minutes	10	0	10	0.0%
15 to 30 minutes	15	4	19	21.1%
> 30 minutes	3	2	5	40.0%
Total	77	23	100	

Observed Chi Square = 18.92,df = 3, p Value = 0.00; hence H_{07} is rejected. The duration of exercise does affect obesity. However, no specific pattern was observed in the relation of exercise duration and obesity.

Table 8: Impact of Use of E-Gadgets on Obesity

Daily Use of e-Gadgets in Hours	Obesity			
	No	Yes	Total	%Obese
0	2	0	2	0%
1	3	1	4	25%
2	7	3	10	30%
3	2	1	3	33%
4	9	2	11	18%
5	5	3	8	38%
6	15	3	18	17%
7	1	0	1	0%
8	2	1	3	33%
9	2	0	2	0%

10	21	8	29	28%
11	4	1	5	20%
12	1	0	1	0%
15	3	0	3	0%
Total	77	23	100	

Observed Chi Square = 12.82, df = 13, p Value = 0.46; hence H_0 is accepted. There is no correlation between the use of electronic gadgets and obesity.

DISCUSSIONS

The results indicate that 23% of the subjects in our study were obese.

Our study also indicates that barring sleep pattern and duration of use of e-gadgets, all other lifestyle factors have an influence on obesity.

Lifestyle and behavior choices are important factors in influencing weight status. Unhealthy diets and physical inactivity are major risk factors for overweight and obesity as well as a number of chronic health conditions including cardiovascular disease, diabetes, some cancers and high blood pressure.

Physical activity includes all forms of activity, such as walking or cycling for everyday journeys, active play, work-related activity, active recreation (such as working out in a gym), dancing, swimming, gardening or playing games as well as competitive and non-competitive sport.

Physical activity is a key determinant of energy expenditure and a fundamental part of energy balance and weight control. Regular physical activity can reduce the risk of obesity, as well as many chronic conditions including coronary heart disease, stroke, type 2 diabetes, cancer, mental health problems and musculoskeletal conditions¹².

Obesity develops when energy intake from food and drink consumption is greater than energy expenditure through the body's metabolism and physical activity. A person's own biological and psychological makeup, along with societal and environmental influences contributes to this complex process. Adults are more likely to maintain a healthy weight if they reduce consumption of high energy-dense foods and drinks and consume a lower-fat, high fibre diet, consisting of fruit, wholegrain, vegetables, lean meat and fish. Healthy eating is associated with decreased risk of overweight and obesity and chronic diseases²⁰.

In a study conducted by Al Dossary in the eastern region of Saudi Arabia adolescents aged 14-18 years have the highest rates of overweight and obesity²¹. This is similar to the age group of obesity in our study.

Also a study conducted by Al Almaie's during 2001 in the eastern region of Saudi Arabia found a similar age group affected by obesity²². However, the average overweight was 14.75% and average obesity was 14.5%. This is much less than the obesity level among the teenagers in our study (14.6% to 31.4%) which is a considerably high percentage. In 2008, Amin et al studied schoolboys aged 10-14 years for the prevalence of overweight and obesity in the eastern region of Saudi Arabia. They found that 14% were overweight and 9.7% were obese²³. The prevalence of overweight and obesity in adolescents in the eastern region has reached approximately 29%¹³.

In 2010, a study was conducted by Sabaté J and Wien M, in urbanized areas of developing countries where they studied the association of vegetarian diet and obesity. Their epidemiologic studies indicate that vegetarian diets are

associated with a lower body mass index (BMI) and a lower prevalence of obesity in adults and children¹⁴. This is similar to our study, where obesity is less in vegetarians (0.0%) compare with non-vegetarians (24.2%) (Table 1).

In 2008, a study was conducted by Patel SR and Hu FB, in which they studied the association of sleep duration and weight gain. Findings in both cross-sectional and cohort studies of children suggested short sleep duration is strongly and consistently associated with concurrent and future obesity. Physiologic studies suggest sleep deprivation may influence weight through effects on appetite, physical activity, and/or thermoregulation¹⁵. Unlike this study, we found that obesity was less in the case of individuals who slept for less than 6 hours as compared to others who slept more. (Table 5)

In 2011, a study was conducted by Epstein et al to find association of regular exercise in reducing obesity in children and adolescents. They found that regular exercise in combination with proper diet helped in reducing child and adolescent obesity¹⁶. This is in agreement with our study where children who exercised regularly were found to be less obese than the ones who exercised weekly or who did not exercise at all. (Table 6)

In 2003, during a 5-month period, September 2001-January 2002. Across sectional study was conducted in intermediate and secondary schools in Riyadh, Saudi Arabia by Al-Rukban MO to study obesity in these children. A sample of 894 Saudi male adolescents (age 12-20 years) was selected through the multi-stage sampling technique. The prevalence of obesity was 20.5% and lack of physical activity was associated with adolescent obesity¹⁷. This prevalence is similar to ours. Lack of physical activity is also consistent with our findings.

In a research study conducted by Nasser Al-Salem Al-Qahtani, as a Ph.D. thesis at an Australian university, has focused on causes of obesity among intermediate and secondary school students in Riyadh. According to the findings, obesity has increased by 50.6 percent among teenagers in both rural and urban areas, with urban areas accounting for 59.4 percent and rural 36.9 percent. The researcher cited a number of factors linked to obesity and over-weight, including the presence of a driver with family, daily consumption of soft drinks, watching TV and using computers and other electronic devices. The study shows that obesity among children is growing at an alarming rate in the Kingdom, with the figure reaching over 50 percent in 2010 as against 11 percent in 1988¹⁸.

The obesity in female students in the schools of Onizah is a serious public health problem. Lack of exercise and eating frequently outside are found to be mainly associated with obesity. So it is necessary to educate the students about the right and healthy food choices and encouraging physical exercise among all age groups. The engagement of adolescents in physical activity and sports is a fundamental goal of obesity prevention. A national prevention program with involvement of schools is recommended to avoid obesity-related morbidity in adulthood. For further studies research into the prevention of childhood and adolescent obesity should be supported.

If proper and timely steps are not taken to reduce obesity, seventy-five percent of Saudi population will be obese by 2020 !!!¹⁸.

CONCLUSIONS

- Obesity seems to be significantly prevalent among adolescent female students of Onizah schools. The study indicates that around 23% students are obese .At 95% confidence level; it would mean that the obesity level among the teenagers in the Onaizah region will be in the range 14.6% to 31.4%, which is a considerably high percentage.

- Meal preference appears to have a significant impact on obesity. In vegetarians, the prevalence of obesity is lower than non vegetarians.
- Prevalence of obesity seems to be less in children consuming 3 meals a day, as compared to those consuming either less or more number of meals per day.
- Obesity seems to be less in the case of individuals who eat out once in a month as compared to those who eat out more frequently.
- Sleep pattern does not seem to have any relation with obesity.
- The duration of sleep has an impact on obesity. It was found to be less in students who slept for less than 6 hours than students who slept more.
- Obesity was found to be significantly less in students who exercised daily than those who exercised weekly or who did not exercise at all.

ACKNOWLEDGEMENT

The authors wish to thank the participants, their parents and schools of Onaizah for their contribution to this research.

Ethical Approval

The purpose of study and the procedure that was to be followed was explained to the participants. Written consent from the schools, the participants of the survey and their parents was obtained at the time of data collection.

Competing Interests

We declare that we have no competing financial, professional or personal interests that might have influenced the performance or presentation of the work described in this manuscript.

REFERENCES

1. Tesfalem T, Singh P, Debebe M. Prevalence and associated factors of overweight and obesity among high school adolescents in urban communities of Hawassa, Southern Ethiopia. *Curr Res Nutr Food Sci* 2013;1(1):23-36.
2. Dehghan M, Akhtar-Danesh N, Merchant AT. Childhood obesity, prevalence and prevention. *Nutrition Journal* 2005, 4:24.
3. Yunsheng Ma, Bertone ER, Edward J. Stanek III, Reed GW, Hebert JR, Cohen NL, Merriam PA, Ockene IS. Association between Eating Patterns and Obesity in a Free-living US Adult Population. *OXFORD J, Am. J. Epidemiol.* (2003) 158 (1): 85-92.
4. Schoenfeld BJ, Aragon AA, Krieger JW. Effects of meal frequency on weight loss and body composition: a meta-analysis. *oxford J.* 2015. 69-82.
5. JiCY, Chen TJ, "Empirical changes in the prevalence of overweight and obesity among Chinese students from 1985 To 2010 and corresponding preventive strategies," *Biomedical and Environmental Sciences*, vol. 26, no. 1, pp. 1-12, 2013.

6. Kain J, Uauy R, Albala F, Vio R, Cerda, Leyton B, "School-based obesity prevention in Chilean primary school children: methodology and evaluation of a controlled study," *International Journal of Obesity*, vol. 28, no. 4, pp. 483–493, 2004.
7. Sallis JF, McKenzie TL, Conway TL. "Environmental interventions for eating and physical activity: a randomized controlled trial in middle schools," *American Journal of Preventive Medicine*, vol. 24, no. 3, pp. 209–217, 2003.
8. Zeleke A: Prevalence of childhood and adolescent overweight and obesity among elementary school students in Addis Ababa: Double burden of malnutrition in Ethiopia. Msc. Thesis, Addis Abeba University. Addis Abeba, 2007.
9. Gillman MW, Ludwig DS. How Early Should Obesity Prevention Start?. *N Engl J Med* 2013; 369:2173-2175.
10. Seltzer CC, Mayer J. An effective weight control program in a public school system. *Am J Pub Health* 1970; **60**: 679–689.
11. Caballero B. Obesity prevention in children: opportunities and challenges. *International Journal of Obesity* (2004) **28**, S90–S95.
12. Obesity Prevention Strategies website: <http://www.cdc.gov/obesity/strategies/index.html>
13. Al Shehri A, Al Fattani A, Al Alwan I. Obesity among Saudi children. *Saudi J Obesity* 2013;1:3-9.
14. Sabaté J, Wien M. Vegetarian diets and childhood obesity prevention. 2010 May;91(5):1525S-1529S.
15. Patel SR, Hu FB. Short sleep duration and weight gain. *Obesity (Silver Spring)*. 2008; 16:643-53.
16. Epstein LH, Coleman KJ, Myers MD. Exercise in treating obesity in children and adolescents. *Med Sci Sports Exerc*. 1996 Apr;28(4):428-35.
17. Al-Rukban MO. Obesity among Saudi male adolescents in Riyadh, Saudi Arabia. *Saudi Med J*. 2003 Jan;24(1):27-33.
18. Arab News website on Saturday 2nd May 2015. 75 percent Saudis will be obese by 2020: Study. - <http://www.arabnews.com/saudi-arabia/news/740736>
19. Department of Health (2011). Start Active, Stay Active: A report on physical activity for health from the four home countries' Chief Medical Officer. - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/216370/dh_128210.pdf
20. Public Health England website - http://www.noo.org.uk/NOO_about_obesity/lifestyle/nutrition
21. Al-Dossary SS, Sarkis PE, Hassan A, El Regal ME, Fouda AE. Obesity in Saudi children: a dangerous reality. *Eastern Mediterranean Health Journal* Vol. 16, No. 9, 2010.
22. Al Almaie SM. Prevalence of obesity and overweight among Saudi adolescents in Eastern Saudi Arabia. *Saudi Med J*. 2005 Apr;26(4):607-11.
23. Amin F, Fatima SS, Islam N, Gilani AH. Prevalence of obesity and overweight, its clinical markers and associated factors in a high risk South-Asian population. *BioMed Central Obesity* Published online 2015 Mar 18.

