

Obesity, Eating Habits and Sedentary Behaviour of Omani Young Adolescents: A Cross-Sectional Study

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Abstract

Background: Sedentary life style and bad nutritional habits are the main etiological factors for obesity-associated non-communicable diseases. Adequate physical activity practice and good nutrition are essential to support growth and development of young adolescents.

Objective: The aim of this study was to assess the physical activity and nutritional status of young Omani adults in Muscat city at the Sultanate of Oman. Seven Hundred and One Omani young adults (313 males and 388 females) with a comparable age of 17.2 ± 1.4 years were included in this cross-sectional study. All study participants were randomly recruited from four different Omani governorates, and they were all healthy and free of any chronic diseases.

Results: Personal interviews were conducted to collect physical activity and nutritional data, using a study questionnaire. Anthropometric measurements (weight, height, body mass index and waist circumference) were also evaluated for all study participants. Our results showed that there was no gender difference with regard the socio-demographic characteristics and anthropometric measurements of the study subjects, $P > 0.05$. The study participants had a high caloric intake that is associated with overweight and obesity as evidenced by the increase in BMI. The dietary intake of protein and fat was comparable for both genders and within the recommended dietary allowances.

Conclusion: The enrolled study subjects had a trend of overweight and obesity that is mainly attributed to sedentary lifestyle and unhealthy nutritional habits. There is a need to adopt physical education intervention programs to improve the life style characteristics of young Omani adults and to increase their awareness about health risks-associated with sedentary life style.

Keywords: *Physical Activity; Sedentary Lifestyle; Diet; Adolescents; Oman*

Introduction

Adequate nutrition continues to play an important role during adulthood in ensuring that young adolescents reach their full potential for growth, development, and health [1]. Over the last four decades, the Gulf countries including Oman have undergone a drastic socio-

economic transformation that was accompanied by rapid urbanization in all aspects of routine life. Numerous studies have reported an increasing trend of sedentary lifestyle and Westernization of food choices in the Gulf region [2]. Adoption of Western dietary synergizes with physical inactivity and pattern in the etiology and increasing risk of non-communicable diseases (NCDs), including coronary heart disease, stroke, and type 2 diabetes among adolescents [3,4]. In Oman, a comprehensive Oman-wide community household survey reported that there is an increase in the prevalence of NCDs among Omani adolescents; 40.3% hypertension, 12.3% type 2 diabetes, 21.4% obesity and 33.6% elevated blood cholesterol [5].

Obesity is a well-known risk factor for NCDs and sleep apnea [6,7]. The impact of life style changes on body weight gain is very considerable and these changes were thought to be responsible for the epidemic of NCDs with their observed health complications during adulthood [8]. A multi-national comparison of eleven countries in the Eastern Mediterranean Region indicated that there is a decline in the consumption of fruits and vegetables among adolescents [9]. It is now well recognized that physical inactivity and increased sedentary living habits represent a serious threat to the body and that a routine physical activity habit improves the human health and wellbeing [10]. The factors underlying the rapid increase of Western diets and fast foods consumption in Oman include; trade liberalisation of food imports from developed countries to meet the rising demand associated with the spectacular increase in income and wealth, the proliferation of hypermarkets and fast food restaurants, creative food products marketing and promotion strategies and a lack of awareness of health problems of high caloric density, mainly foods rich in saturated fat and refined sugars [11].

Although a comprehensive study has not been conducted in Oman to evaluate the frequency of fast food consumption by children and adolescents, yet anecdotal evidence and casual observations supported the notion that fast food meals are more popular among these age groups than in adults. This is consistent with the published reports from Gulf countries that share the same culture background and dietary habits as in Oman [12,13].

It has been reported that the manifestation of NCDs in later life is mediated by Western dietary habits such as consuming caloric dense foods with a high glycemic index, and rich in saturated fats and trans-fatty acids [14]. The propensity to develop Western food habits should be of concern because of the potential negative impact of such foods on growth and development, cognitive ability, and behavioural competence [15]. In Oman, there is no comprehensive published data pertaining to the critical role of a balanced diet during adolescent's stage of life in the primary prevention of NCDs, Therefore the current study was conducted to assess the lifestyle and anthropometric characteristics of Omani young adults with an ultimate goal of establishing and developing a data base for the anthropometric, nutritional and physical activity fitness in high risk group of the Omani population.

Subjects and Methods

Study Subjects and Setting: Across-sectional study was conducted Muscat Governorate in the Sultanate of Oman. The study included 701 young Omani high school students, males (n = 313) and females (n = 388), randomly recruited from different governorates in Oman (Musandam, Al Batina North, Al Batina South, and Al Dhahera governorates). All study subjects were recruited on voluntary basis, and they were all healthy, non-smokers, and free of endocrine disorders, eating disorders, gastrointestinal diseases, or any non-communicable diseases (cardiovascular diseases, diabetes, and hypertension). None of the study participants were consuming any multivitamins supplementation.

Socio-demographic Characteristics: These characteristics include; age, gender, residential status, medical family history, vitamins or nutritional supplements, monthly income, educational level, and physical activity. The data was collected during personal interviews with all study participants.

Anthropometric Assessment: Measurements of weight, height, and percentage body fat and waist circumference were taken by highly research assistants. The subject's height was measured with socks and shoes removed, standing upright with feet together in the center of the base plate. Height (m) was measured to the nearest 0.1 cm. Weight was measured to the nearest 100g using a TANITA scale,

with subject in light clothing without shoes. Waist circumference was measured using a flexible and inelastic tape measure. The waist was circumference was measured on the horizontal plane 4 cm above the umbilicus with the abdominal muscle relaxed and the subject breathing shallowly.

Nutritional Assessment: Dietary assessment was estimated for all study participants. The retrospective dietary intake of each study participant was estimated using a semi-quantitative food frequency questionnaire (FFQ), to assess their usual dietary intake over the previous 6 months [16]. The portion sizes were determined according to the commonly used household serving units/measures in Oman. The FFQ was tested for its validity, reliability and reproducibility before conducting the study. The FFQ included 9 different food groups (breads/cereals, vegetables, fruits, meat/meat substitutes, milk/dairy products, deserts, beverages, sandwiches, and traditional Omani dishes). The collected dietary intake data was categorized into: (i) frequency of food consumption: the number of daily servings of food groups, based on the frequency of consumption for all the respondents was subsequently grouped according to Food Guide Pyramid [17], and (ii) the daily intake of macronutrients. The Food Processor software version 10.2 (ESHA Research, Salem, OR, USA) was used to calculate the means of daily macronutrients intake (carbohydrates, protein, fats, and total energy intake).

Statistical Analysis: Data is expressed as mean ± SD (standard deviation) and was analyzed using Graphpad Prism version 5. Chi-square (χ^2) test was used for comparing the categorical variables. One way analysis of variance (ANOVA) followed by Tukey’s test, Student’s unpaired t-test, and the stepwise logistic regression analysis were used for comparing the continuous variables. Probability value of < 0.05 was considered statistically significant.

Results

The enrolled subjects neither had any NCDs nor consumed nutritional supplements. The age of both genders was comparable with no statistical significant differences, 17.2 ± 1.4years for males (n = 313) 17.3 ± 1.1 and females (n = 388) 17.2 ± 1.2, P > 0.05. Table 1 shows that and there was no significant differences for all the measured indices (weight, height, and waist circumference), P > 0.05. BMI analysis indicated that the majority of the study subjects of both genders were within normal weight. Females had a higher (20.7%) underweight BMI as compared to males, P < 0.05. The obesity among the enrolled study subjects (males and females) was 23.8%, and there was no significant gender differences, P > 0.05 (Table 2).

Characteristics	Males (N = 313)	Females (N = 388)	P-value
	means ± SD	means ± SD	
Weight (kg)	61.11 (14.65)	55.89 (14.28)	P > 0.05
Height (cm)	168.46 (6.54)	155.47 (6.18)	P > 0.05
Waist circumference (cm)	75.38 (11.02)	72.15 (11.72)	P > 0.05

Table 1: Anthropometric measurements of the study subjects. Results are expressed as means (± SD).

Characteristics	Males (N = 313)	Females (N = 388)
	%	%
Underweight	17.4	29.3
Normal weight	60.1	48.3
Overweight	8.7	10.9
Obesity	13.8	11.5

Table 2: Distribution of the study subjects in accordance to Body Mass Index (BMI).

Body mass index (BMI) for every subject was calculated as weight in kilograms divided by height in meters squared (kg/m²) and was categorized as normal, 18.50~24.99, overweight, 25.00~29.99, and obese, ≥ 30.00

Dietary Pattern: Table 3 presented the daily servings from different food groups by the study subjects, according to USDA Food Guide Pyramid, and data showed no significant (P > 0.05) differences with regard the consumption of foods from whole grains, fruits, dairy products, and meat alternates. Meanwhile, the fruits and vegetables consumption were significantly different, P < 0.05.

Food group (servings/ day)	Males (N = 313)	Females (N = 388)	P-value
	(%)	(%)	
Bread, Cereal, Rice and Pasta			P > 0.05
<6	29	25	
6-11	32.6	39.2	
≥11	38.4	35.8	
Vegetables			P < 0.05*
<3	52.23	57.4	
3-5	24.6	33.0	
≥5	23.17	9.6	
Fruits			P < 0.05*
<2	37.0	32.4	
2-4	43.5	44.4	
>4	19.5	23.2	
Milk, Yogurt and Cheese			P > 0.05
<2	76.1	82.9	
2-3	18.1	14.9	
≥3	5.8	2.2	
Meat, Poultry, Fish			P > 0.05
< 2	10.2	13	
2-3	11.6	19	
≥3	78.2	68	

Table 3: Food consumption frequency of study subjects.

*Significant difference: P < 0.05 versus baseline.

Daily Intake of Macronutrients: It was observed that, although males had consumed higher daily intake of carbohydrates and total calories as compared to females, $P < 0.05$. On the other hand there was no significant difference, between males and females regarding their daily intake of protein and fat which was also adequate to their corresponding RDA, $P > 0.05$ (Table 4). The model presented in Table 5 shows the positive association between the intake of various food items and the risk of overweight and obesity among the study subjects. These associations were determined using the stepwise logistic regression analysis, where the dependent variables were either obesity or overweight. The results indicated that the whole grains, ready-made sandwiches, sweets and cakes, red meat, fish, green leafy vegetables, and dairy products were positively associated with overweight and obesity.

Nutrient	Males (N = 313)	Females (N = 388)	P-value
	Mean (SD)	Mean (SD)	
Protein (g/day)	66.3 (22.7)	62.3 (30.6)	0.16
Total Fat (g/day)	92.64(18.2)	84.16(17.03)	0.06
Carbohydrates (g/day)	239.8 (118.6)	200.7 (92.6)	0.001*
Energy intake (Kcal)	2058.2 (663.8)	1809.4 (597.6)	0.001*

Table 4: Average daily macronutrients intake of study subjects.

Results are expressed as means \pm SD, *significantly different: $P < 0.05$. Caloric requirements per gender (Males and Females: 2100.00 and 1900.00 kcal/day, respectively), Protein requirements per gender (Males and Females: 40-50 and 38-47.5 g/day, respectively), Carbohydrate requirements per gender (Males and Females: 275-375 and 261.3-356.3 g/day, respectively), Fat requirements per gender (Males and Females: 46.15 and 41.43 g/day, respectively)

Independent predictors	Adjusted OR	95% CI	P-value
Whole grains	1.46	(1.15, 1.84)	0.02*
Ready-made sandwiches	2.66	(1.83, 3.88)	0.01*
Sweets and cakes	2.33	(1.67, 3.25)	0.01*
Red Meat	1.80	(1.26, 2.58)	0.01*
Fish	1.77	(1.18, 2.66)	0.06*
Green leafy vegetable	0.99	(0.99, 1.00)	0.02*
Vegetables	0.99	(0.99, 0.99)	0.01*
Dairy products	0.89	(0.84, 0.94)	0.01*

Table 5: The association of study subjects with different categories of food.

*Significant difference: $P < 0.05$ versus baseline.

Discussion

Meeting energy and nutrients needs, and preventing nutritional-related disorders while establishing healthy eating habits among pre-adolescents is the main challenge in Oman. Adequate intake and the establishment of healthy eating behavior are essential to reduce the risk to develop NCDs. The results of this study were considered in the context of the current dietary guidelines developed by Centers for Disease Control and Prevention which were directed specifically to preadolescent children’s health and well-being [17-19]. Such framework was not fulfilled in Oman, and our study revealed that the enrolled study subjects have a high daily intake of the total caloric intake which might be a trigger for obesity and overweight. The purpose of this study was to assess the prevalence of overweight and obesity and examine eating habits among Omani young adults.

Based on BMI classification of weight status, findings of this study indicate that the majority of study subjects were of normal weight. Normal weight was more prevalent among males (60.1%) as compared to males (48.3%), whereas, overweight and obesity were equally proportional among males and females. A total of 22.5% of the males were obese compared to 22.4% of the females. The lower rate of obesity among males and female subjects was attributed to their caution about weight status, this assumption was supported by the fact that 17.4% of males were underweight as compared to 29.3% of females in this studied sample, this is consistent with another findings of prevalence of obesity among male university students were reported in recent studies [20,21]. Although high prevalence rate of overweight and obesity was also reported in a study conducted in Kuwait University among 842 students [22], at 32% and 8.9%, respectively. In the United Arab Emirates, a cross-sectional survey conducted among 300 male students reported that the prevalence rate of obesity was 35.7% in males and this figure was higher than the rate in females [23]. Adolescents often select fast food due to its palatability, availability and convenience, and the American Dietetic Association indicated that obesity, or being severely overweight, is a fast-food related issue [24].

The Healthy people 2010 objectives include a focus on nutrition and obesity prevention, and data analyses of eating habits in our study revealed that the majority of study subjects eat meals regularly in accordance to the guidance of food guide pyramids in terms of daily and weekly servings' numbers. The majority of study subjects (males and females) believe that it is important to eat a variety of foods to have a balanced and nutritious diet. Healthful diet was classified as a diet that included more fruits and vegetables, and less fat [25]. In the contrary, daily intake of snacks and fried food were reported by the majority of students, and this frequent snacking and eating fried food (four times or higher per week) is a direct cause for obesity as it is considered as an energy and fat dense food.

Development of effective nutrition-education programs is required to increase the nutrition knowledge of young Omani adults as the nutrition education will positively change their dietary behaviors. A systemic review suggested that the relationship between greater nutrition knowledge and better dietary intake is limited [26]. A recent study conducted among college students reported that increased knowledge of dietary guidance, Dietary Guidelines for Americans 2005, appeared to be positively related to more healthy eating patterns thus the better eaters had a higher level of knowledge about nutrition [27]. Therefore, developing nutrition education programs that promote healthy eating habits for young adults should be adopted.

Despite the low prevalence of overweight and obesity in the studied subject and the sample study limitation, the findings of the present study provides a baseline information about obesity and eating habits among a representative sample of young adults in different governorates in Oman. In conclusion, the results of this study acted as an attempt to establish a base line data for the role of diet in relation to health and wellbeing of young adolescents as a high risk group among the Omani population. Our results indicate that nutrition counseling is recommended to improve eating habits and to combat the overweight and obesity prevalence.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

Authors' Contributions

Kashef Zayed conducted the field work, data collection, and data analysis. Other authors conceptualized the study and supervised the whole research activity. All authors have made equal contribution in developing, revising and editing the manuscript.

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Bibliography

1. Micha R., *et al.* "Global Burden of Diseases Nutrition and Chronic Diseases Expert Group NutriCoDE. Global, regional, and national consumption levels of dietary fats and oils in 1990 and 2010: a systematic analysis including 266 country-specific nutrition surveys". *British Medical Journal* 348 (2014): 22-27.
2. Al-Lawati JA., *et al.* "Control of risk factors for cardiovascular disease among adults with previously diagnosed type 2 diabetes mellitus: a descriptive study from a Middle Eastern Arab population". *Open Cardiovascular Medical Journal* 6 (2012): 133-140.
3. Kilpi F., *et al.* "Alarming predictions for obesity and non-communicable diseases in the Middle East". *Public Health Nutrition* 17.5 (2014): 1078-1086.
4. Al-Riyami A., *et al.* "Oman world health survey: part 1 -methodology, sociodemographic profile and epidemiology of non-communicable diseases in Oman". *Oman Medical Journal* 27 (2012): 425-543.
5. Al-Haifi AR., *et al.* "Relative contribution of physical activity, sedentary behaviors, and dietary habits to the prevalence of obesity among Kuwaiti adolescents". *Food and Nutrition Bulletin* 34.1 (2013): 6-13.
6. Al-Habsi A and Kilani H. "Lifestyles of Adult Omani Women: Cross-sectional study on physical activity and sedentary behavior". *Sultan Qaboos University Medical Journal* 15.2 (2015): e257-e265.
7. Kilani H., *et al.* "Lifestyle Habits: Diet, physical activity and sleep duration among Omani adolescents". *Sultan Qaboos University Medical Journal* 13.4 (2013): 510-519.
8. Al Subhi LK., *et al.* "Prevalence of physically active and sedentary adolescents in 10 Eastern Mediterranean countries and its relation with age, sex, and body mass index". *Journal of Physical Activity and Health* 12.2 (2015): 257-265.
9. Al Ani MF., *et al.* "Consumption of fruits and vegetables among adolescents: a multi-national comparison of eleven countries in the Eastern Mediterranean Region". *British Journal of Nutrition* 115.6 (2016): 1092-1099.
10. Zayed K. "The level of self-esteem of Omani female athletes and its relationship to attitudes towards sport activities. Academic Publication Council-University of Kuwait". *The educational Journal* 25.99 (2011): 377-403.
11. Zayed K. "Sedentary Behavior and Nutritional Patterns in Relationship with Body Fat and Body Mass Index among Omani Adolescents". Paper as a keynote at the "World Congress on: Public Health and Nutrition, Madrid, Spain. *Journal of Community Medicine and Health Education* 6.1 (2016).
12. Zayed K., *et al.* "Assessment of Physical Activity and Nutritional Habits of Oman's Adolescents". Paper presented at the "Movement and Nutrition in Health and Disease". University of Regensburg, Bavaria, Germany (2015).
13. Musaiger AO. "The state of food and nutrition in the Arabian Gulf countries". *World Review of Nutrition and Dietetics* 54 (1987): 105-173.
14. Musaiger AO., *et al.* "Dietary and lifestyle habits amongst adolescents in Bahrain". *Food and Nutrition Research* 55 (2011): 7122-7125.
15. Al-Hazaa HM., *et al.* "Physical activity, sedentary behaviors and dietary habits among Saudi adolescents relative to age, gender and region". *International Journal of Behavioral Nutrition and Physical Activity* 8 (2011): 140.
16. Mikkila V., *et al.* "Longitudinal changes in diet from childhood into adulthood with respect to risk of cardiovascular diseases. The cardiovascular risk in young Finns study". *European Journal of Clinical Nutrition* 58.7 (2004): 1038-1045.
17. Block G., *et al.* "Reduced dietary questionnaire: development and validation". *Epidemiology* 1.1 (1990): 58-64.

18. US department of Agriculture, US Department of Health and Human Services. Nutrition and your Health, "Dietary Guidelines for Americans 6th Ed. Exercise therapy in type 2 diabetes: Is daily exercise required to optimize glycemic control". *Diabetic Care* 35.5 (2005): 948-954.
19. Centers for Disease Control and Prevention (CDC). "Usual sodium intakes compared with current dietary guidelines-United States, 2005-2008". *Morbidity and Mortality Weekly Report* 60.41 (2011): 1413-1417.
20. Arroyo Izaga M., *et al.* "Diet Quality, Overweight and Obesity in Universities Students". *Nutrición Hospitalaria* 21.6 (2006): 673-679.
21. Bertias G., *et al.* "Overweight and obesity in relation to cardiovascular disease risk factors among medical students in Crete, Greece". *BMC Public Health* 3 (2003): 3.
22. Al-Isa AN. "Obesity among Kuwait University students: an explorative study". *The Journal of the Royal Society for the Promotion of Health* 119.4 (1999): 223-227.
23. Musaiger AO., *et al.* "Lifestyle factors associated with obesity among male university students in the United Arab Emirates". *Nutrition and Food Science* 33.4 (2003): 145-147.
24. Galore SR., *et al.* "Brief Communication: Dietary habits of first-year medical students as determined by computer software analysis of three-day food records". *Journal of the American College of Nutrition* 12.5 (1993): 517-520.
25. Wardle J., *et al.* "Gender differences in food choice: the contribution of health beliefs and dieting". *Annals of Behavioral Medicine* 27.2 (2004): 107-116.
26. Heaney S., *et al.* "Nutrition knowledge in athletes: a systematic review". *International Journal of Sport Nutrition and Exercise Metabolism* 21.3 (2011): 248-261.
27. Kolodinsky J., *et al.* "Knowledge of Current Dietary Guidelines and Food Choice by College Students: Better Eaters Have Higher Knowledge of Dietary Guidance". *Journal of the American Dietetic Association* 107.8 (2007): 1409-1413.

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