Adolescent Food Habits and Its Association with Overweight and Obesity among Female Students in Eastern Region of Saudi Arabia

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Abstract

Background: Adolescence is a period of extreme growth changes.Malnutrition along with the adolescence growth changes has significant effects for maternal and neonatal wellbeing. Bad sequences in the prenatal period and childbearing are the most important reason of deathsin adolescent girls aged 15–19 years. **Aim:** To assess the overall dietary "Food Habits" of adolescent girls. Also, to assess the relationship between obesity, food habits and physical activity patterns in adolescents. **Subjects and Method:** A quantitative-correlational research design was utilized. A Cluster random sampling strategy was used. The study conducted at six middle and high schools, Al Ahsa, Saudi Arabia. The three sectors covered through two schools from each sector.The survey was conducted among 593 female school students between November 2019 –January 2020. The questionnaire contained two sections. Ethical approval obtained from the Education Department of Ministry of Education after obtaining approval from the College of Applied Medical Sciences Research and Ethical Committee. **Results:** The mean of body mass index of the participants was 21.1±3.5. It was clear that (23.6%) of the participants were underweight, while (67.1%) were within normal weight and (7.9%) were overweight and (1.4%) were obese. Near to half of the participants (47.1%) did not make any daily activity.(19.2%)of the participants took supplementation medicine. Adolescent Food Habits Checklist (AFHC) Score was low between the schoolgirls. **Conclusion**: The current study reinforced that Adolescent Food Habits Checklist (AFHC) Score was at a low level among the schoolgirls. Near to half of the adolescent did not make any daily physical training. While range of the physical activity was from (15-30) minutes per day.

Keywords: *Adolescent, Exercise, Food Habits, Nutrition, Obesity.*

Background

Adolescence is a period of extreme growth changes in physical, cognitive, and social development which is marked as a critical point in the lifetime. Adolescent health is greatly affected by childhood well-being. Likewise, adolescent health provides the basis for maternal and adult health status. Adopting health behaviors during adolescence will attribute to consequences that can persist throughout the lifespan[1].

The countries in the Arabian Gulf region have been under a rapid change from a traditional semi-urban to a modern and urbanized life. These changes begun in the wake of main findings of oil ever since the 1960s [2].Hence, a simultaneous rise in overweight, and other metabolic problems has emerged [3].

Adolescence is a vital time to deepen and broaden the foundations of good health and wellbeing in adulthood. According to The World Health Organization

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(WHO), many major noncommunicable diseases are underlined by health-related behaviors and conditions that are commenced and reinforced during this period of life. Concerns have been highlighted regarding common health problems and behaviors that evolve during adolescence including diet, exercise patterns, overweight and obesity. These health problems lead to a serious impact on their wellbeing as tomorrow's adult [4].

A balanced diet put down roots for healthful growth and the development in childhood and adulthood periods. In the matter of eating, emphasis is laid on the type of foods, the technique of formulation, the amount of foods and the timebetween them. Bigger eating of high-energy nutrients, poor in nutrients and rich in fats, sweety and salty, as well as deficient exercises are issues that completely add to a considerable increase in the prevalence of overweight and obesity, along with building a base for active inequity of the whole organism [5,6]. Nutritional and dietary habits created during childhood and augmented throughout adulthood are challenging to regulate. Inappropriate diet in the growing populations may produce both age-related risks and unbalanced growth, particularly psychological aspects [7-9].

Adolescent malnutrition involves suboptimal nutritional consumption of macronutrients and micronutrients [10].Simultaneously, obesity and overweight are associated to bad nutritional quality and have an effect on one-third of adolescents worldwide [11].

Malnutrition along with adolescence growth changes also has significant effects for maternal and neonatal wellbeing. Bad sequences in prenatal period and childbearing are the most important reasons of deathsin adolescent girls aged 15–19 y[12].

Teenage years is commonly correlated with a human growth period evidenced by physical and psychological alterations that cause worries and distress. The development of sexuality and the difficulty to establish one's own health are some of the elements related to this period [13].

Aim

To assess the overall dietary "Food" habits of adolescent girls. Also, to assess the relationship between obesity, food habits and physical activity patterns in adolescents.

Subjects and Method

Research Design: A quantitative-correlational research design was utilized in the present study. Cluster random sampling strategy was used for the study using schools as the clusters.

Setting: The study conducted at six middle and high schools, Al Ahsa, Saudi Arabia, which cover the three sectors in Al Ahsa (Hafouf, Mubarraz, Villages). Two schools were selected from each sector.

Sample size and sampling: Based on the information collected from the Ministry of Education, female students' number in middle and high school (N= 46,900 students). The study sample covered (N = 593 students) with confidence interval level 95%, margin of error 4% to ensure the recruitment of adequate subjects. The survey was conducted among 593 middle and high female school students. The research was conducted in randomly chosen classes in schools (only governmental) in Al Ahsa, Eastern region, Saudi Arabia. The response rate was 93.7% (556 girls gave complete response).

Tools: The questionnaire contained two sections. *The first section* was for the general study participants' features as age, height, weight, body mass index, activities per minutes per day, taking supplementary medicine and income. *The second section* was for questions about dietary habits the researchers adopted The Adolescent Food Habits Checklist (AFHC) from Johnson, F, Wardle, J & Griffith, J [14]. The questionnaire contains 23 questions about food and nutritional habits like " lunch food, fruits, vegetables, fried foods, sugar and fast food. The scoring system for calculating Food Habits Checklist (AFHC) was to count the number of healthy responses x (23/no of items completed).

For validity and reliability testing, pilot study was conducted on 30 students and also for introduction of modification of the questionnaire. The questionnaire was translated into Arabic and back into English to be sure of the accuracy of the translation. Two evaluators checked the questionnaire and gave their opinions about the translation also. The preliminary sample was excluded from the main sample.

Ethics approval and consent to participate: The researchers obtained approval from the Education Department from of Ministry of Education after obtaining approval from the College of Applied Medical Sciences Research and Ethical Committee. Due to the chronological age of the participants the data collectors gave both participants and parents their informed written consent for the study and gave for the school admin the approved protocol. Adolescent's assenting agreement to participate in research was obtained.

Data Collection

Data collection was conducted between November 2019 till end of January 2020. The researchers conducted the interviews in Arabic Language during the suitable time for students (during activity class), with assist of Admin staff from each school. The questionnaire was used to assess student's food intake and dietary habits, the researchers consumed approximately 30 to 40 minutes with each student/class.

One of the researchers used commercial scale to measure student's weight. Clear instruction given to each student to keep minimal clothes and remove footwear during checking their weight. Regarding the height was measured using standing body height, recalibrated were done after each measurement. Body mass index (BMI) was calculated for each participant in a standard way.

Results

Table (1): Characteristics of the Study Population

		Al Hafouf District	Al Mubarraz	Villages	Total
		329(59.2%)	**174(31.3%)**	**53(9.5%)**	**556 (100%)**
Age	Range Mean ± SD	(14-19)a 16.3±1	(14-18)b 15.9±0.9	(13-19) 16.3±1.6	(13-19) 16.2±1.1
Height	Range Mean ± SD	(140-182) 158.8±6.7	(145-198) 159.6±6.9	(140-170) 157.3±6.2	(140-198) 158.9±6.7
Weight	Range Mean ± SD	(20-91) 53.1±9.4	(35-90) 54.1±9.7	(30-80) 51.7±8.6	(20-91) 53.3±9.4
BMI	Range Mean ± SD	(10.2-36.1) 21.1±3.5	(12.9-37.5) 21.2±3.5	(12.8-28.3) 20.8±3	(10.2-37.5) 21.1±3.5
	Underweight Normal weight Overweight Obese	78(23.7%) 220(66.9%) 26(7.9%) 5(1.5%)	40(23%) 116(66.7%) 15(8.6%) 3(1.7%)	13(24.5%) 37(69.8%) 3(5.7%) 0(0%)	131(23.6%) 373(67.1%) 44(7.9%) 8(1.4%)
Activity	Yes No	172(52.3%) 157(47.7%)	92(52.9%) 82(47.1%)	30(56.6%) 23(43.4%)	294(52.9%) 262(47.1%)
Minutes/day	Median IQR	20 (15-30)	15 (15-30)	30 (15-34)	15 (15-30)
Chronic disease	Yes No	22(6.7%)a 307(93.3%)	8(4.6%)a 166(95.4%)	11(20.8%)b 42(79.2%)	41(7.4%) 515(92.6%)
Supplementation	Yes No	62(18.8%) 267(81.2%)	37(21.3%) 137(78.7%)	8(15.1%) 45(84.9%)	107(19.2%) 449(80.8%)

Cont... **Table (1): Characteristics of the Study Population**

Type	No Iron Calcium Vitamins	267(81.2%) 21(6.4%) 12(3.6%) 29(8.8%)	137(78.7%) 9(5.2%) 10(5.7%) 18(10.3%)	45(84.9%) 1(1.9%) 0(0%) 7(13.2%)	449(80.8%) 31(5.6%) 22(4%) 54(9.7%)
Marital Status	Single Married	327(99.4%)a 2(0.6%)	169(97.1%)b 5(2.9%)	50(94.3%)b 3(5.7%)	546(98.2%) 10(1.8%)
Had Children	Yes No	2(0.6%) 327(99.4%)	3(1.7%) 171(98.3%)	1(1.9%) 52(98.1%)	6(1.1%) 550(98.9%)
Income	< 5000 5000-10000 > 10000	38(11.6%)a 123(37.4%) 168(51.1%)	11(6.3%)b 50(28.7%) 113(64.9%)	24(45.3%)c 22(41.5%) 7(13.2%)	73(13.1%) 195(35.1%) 288(51.8%)

Superscripts with different small letters refers to significant difference between each two groups

Table 1 shows that, the total number of the participants was 556. The mean age, height and weight of the participants were 16.2±1.1 years, 158.9±6.7 cm, and 53.3±9.4 kg, respectively. For the mean of body mass index, it was 21.1±3.5. For being underweight it was clear that 131(23.6%) of the participants were underweight, while 373(67.1%) were within normal weight and 44(7.9%) were overweight and 8(1.4%) was obese.

Near to half of the participants 262 (47.1%) did not make any daily activity. While as the Inter Quartile Range (IQR) of the activity was from (15-30) minutes per day.Most of the participants 515(92.6%) did not have chronic disease. 107(19.2%)of the participants take supplementation medicine which include iron 31(5.6%), calcium 22(4%), multivitamins 54(9.7%).

In relation to the marital status only 10 (1.8%) of the participants were married and 6 (1.1%) had a child. Regarding the family income 288(51.8%) of the participants had high income (more than 10000 Saudi Rials per month).

Table (2) Adolescent Food Habits Checklist (AFHC) Scoring

		Al Hafouf District	**Al Mubarraz**	**Villages**	**Total**	**P value**
		329(59.2%)	**174(31.3%)**	**53(9.5%)**	**556 (100%)**	
Food Habits Score	Range Mean ± SD Median/IQR	(0-20)a 6.3±4.1 5/(3-9)	(0-16)b 4.8±3.6 4/(2-8)	(0-17)a 5.9±4.1 5/(3-8)	(0-20) 5.8±4 5/(3-8)	0.001*

- *Kruskal Wallis test non-parametric quantitative data (expressed as median) between the three groups followed by Mann Whitney test between each two groups*

- *Superscripts with different small letters refere to significant difference between each two groups*

- **: Significant level at P value < 0.05*

Table 2 reveals that Adolescent Food Habits Checklist (AFHC) Score was low between the school girls and had the mean of 5.8±4/ 23 and median of 5/(3-8). It showed also that the range of (AFHC) Score was from zero to 20 healthy responses. There was significant decrease in the (AFHC) Score in area 2 (Al Mubarraz) in compared with area 1 and 3(Al Hafouf and Villages).

Table (3) Correlation between Food Habits Checklist (AFHC) Score and General Characteristics of the Sample Population

All cases	Total score	
	r	P value
Age (P)	0.103	0.016*
Height (P)	-0.034	0.422
Weight (P)	0.088	0.037*
BMI (P)	0.111	0.009*
Minutes/day (P)	0.189	0.001*
Activity (S)	0.185	<0.001*
Chronic disease (S)	-0.031	0.466
Supplementation (S)	-0.078	0.066
Children (S)	-0.013	0.759
Marital Status (married) (S)	-0.046	0.279
Income (S)	-0.033	0.435

- (P) Pearson's correlation

- (S) Spearman's rho correlation

- *: Significant level at P value < 0.05

Table 3 demonstrates the correlation between Food Habits Checklist (AFHC) Score and other factors in all participants regardless the area; There was significant positive correlation between the (AFHC) score and age, weight, BMI, activity and minutes /day, otherwise the correlations with other factors were insignificant.

Table (4) Correlation between age group and (AFHC) Score

		14-16 years Preliminary School	> 16 years High School	P value
		N=333	N=223	
(AFHC) Score	Range Mean ± SD Median/IQR	(0-20) 5.4±3.8 5/(2-8)	(0-20) 6.4±4.3 5/(3-9)	0.011*
(AFHC) Score percentage	≤ 50% > 50%	309(92.8%) 24(7.2%)	196(87.9%) 27(12.1%)	0.050*

Table 4 illustrates the range of (AFHC) Score was between 0-20 for the two-age group and the mean was 5.4±3.8 out of 23 in preliminary schools, and 6.4±4.3 in high school. Most of the participants (92.8%) had (AFHC) score below 50% (11 or less out of 23) in preliminary schools and 196(87.9%) in the high school. Food habits become little bit healthier in late adolescent in high school. There was significant positive correlation between the (AFHC) score and age. It was clear that adolescent food habits improve by age.

Figure (1): Adolescent Food Habits Score with Age Group

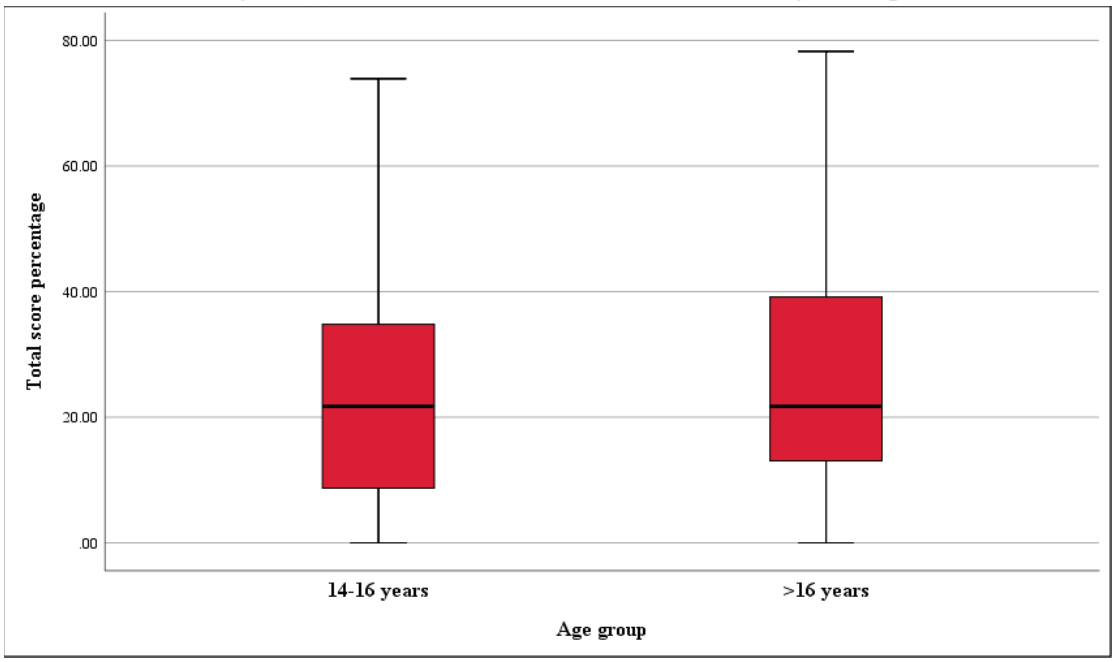

Figure (1) The box plot utilizes the median, the estimated quartiles, and the lowest possible and highest data points to express the degree, spread, and regularity of a dissemination of records values. The box plots showed that the median of food habits checklist score seems to be the same in the two-age groups. The lower quartile and the upper quartile for the 'high school' participants scores are all above the matching values for the middle school participants score.

Discussion

Our study aimed to assessing the overall dietary "Food" habits of adolescent girls. Also, to assess the relationship between obesity and food habits and physical activity patterns in adolescents.

The present study detected that the mean of body mass index between adolescents was 21.1±3.5 and overweight and obesity considered between (7,9%) and (1.4%) respectively. Compared to findings from the study in United Arab Emirates, by Ng S(b), who found that between Emirati teenagers (20.5%) of females are overweight and (19.7%) are obese. Also, the Emirati study showed that the prevalence of overweight rose among Emirati adolescent girls to rich(21%) and obesity has risen dramatically[15].These results may reflect that other Arabian Gulf countries have also observed similar or higher unhealthy food habits between teen agers.

The present study showed that (47.1%) of the adolescent did not make any daily physical activity. While range of the activity was from (15-30) minutes per day. It was supported by the study conducted by Ng S (b), which reported that physical activity levels are low among Emiratis, especially among females[15]. The study found that only 41% of Emirati women carry out mild or high-level of exercise, contrasted with 82% of U.S. females [16]. In the same line, the study of Kherkheulidze M, who stated that the school age students play active games only 20-30 minutes per day[17]. These results were in contrast with Al Hazaaet al, study, who found that 65% of Saudi women had a daily base of physical activity and conclude that the frequency of inadequate exercise amongst Saudis matured adults is quite high[18]. These results also supported by Kumar S, et al., who mentioned in their study that only 29% of the adolescent was engaged in regular exercise[19].These results may be affected by many factors like, individual, community, societal, economic and environmental factors also obstacles for sport participation, which impacted on range of physical activity per day.

Our study presented that (19.2%) of the participants take supplementation medicine which include iron (5.6%), calcium (4%), multivitamins (9.7%). It was strengthened by Musaiger A, who found that (32.3%) of participants use supplements between Saudi schoolgirls[20]. In another study in Saudi Arabia by Mousa O, who found that using of supplementary drug between young female was (37.8%) of them[21].This may reflect that adolescent in Saudi Arabia use supplements with low level of worry.

The current study confirmed that Adolescent Food Habits Checklist (AFHC) Score was low between the schoolgirls and had the mean of 5.8±4/ 23. This result supported by the results of Noronha D, study which showed that the adolescent athletes showed low levels of nutrition knowledge[22].This will has many effects on adolescent life and health.

It was shown from the present study that (92.8%) of the participants had (AFHC) score below 50% (11 or less out of 23) in preliminary schools and (87.9%) in the high school. It was clear that adolescent food habits improve by age. These styles towards unhealthy diets in Saudi Arabia have also been reported in the study of Musaiger A,who found that the girls in general practiced unhealthy dietary and lifestyle habits[20]. On the same line, Alessandro V. etal, who reported the difference in knowledge was higher in the high schools than in the middle schools about nutrition[23].

In the same line the study of Alavi M, which mentioned that the most school children (54.4 %) had mild accurate nutritional behavior, as well as the rate of students with exceedingly inaccurate nutritional performance were lowest possible (2.6 %)[24].Another study of Kherkheulidze M found that the general level of understanding associatedwith rich resources of nutrients was inadequate between school students[17]. Certainly, the individual level factors such as age and educational level affect the nutritional habits.

The present study revealed that there was significant positive correlation between the (AFHC) score and age, weight, BMI, activity and its duration /day otherwise the correlations with other factors were insignificant. This result was supported byMusaiger A,who mentioned in another study that the significant differences were found between eating habits and physical activity[25]. Conversely, Muammar MN, cited that there were no significant differences between BMI category and adolescent dietary pattern or lifestyle[26]. These results may reflect that Saudi Arabian female adolescents don't

have enough knowledge level about healthy nutritional habits.

The current study showed that the median of food habits checklist score seems to be the same in the two-age groups. The lower quartile and the upper quartile for the 'high school' participants' scores are all above the matching values for the middle school participants score. These results were in the same line with Skagegård, etal, who reported that the changes in nutritional habits between the age 15 and 17 were smaller than between age 17 and 21[27].

The study results may be affected by difficulties to involve in sport activities, spending a lot of time indoors, and snacking on unhealthy foods and unaware of healthy food habits.

Conclusion

The Arabian Gulf countries have undergone a speedy shift from an old-fashioned semi-urbanized life to a new modern living with linked increase in the occurrence of overweight, and additional metabolic complications. The current study reinforced that Adolescent Food Habits Checklist (AFHC) Score was at a low level among the schoolgirls. Near to half of the adolescent did not make any daily activity. While range of the activity was from (15-30) minutes per day.

List of abbreviations

AFHC: Adolescent Food Habits Checklist

BMI: Body Mass Index

IQR: Inter Quartile Range

WHO: World Health Organization

Consent for Publication

Approval from the College of Applied Medical Sciences Research and Ethical Committee.

Availability of data and material

The data utilized to support the results of the research are accessible with the corresponding author upon request.

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