



eISSN 2330-7250

JOURNAL HOME PAGE AT WWW.VEDICJOURNALS.COM

VRI Press

BIOLOGICAL MEDICINAL CHEMISTRY

RESEARCH ARTICLE

DOI: <http://dx.doi.org/10.14259/bmc.v3i2.175>

Association Between Body Mass Index and Dietary Habits and Socio-Demographic Characteristics of Female Adolescent Students in Holy Makkah

MOHAMMAD ABD ELMONEIM ELMADBOULY*

*Department of Clinical Nutrition, Faculty of Applied Medical Sciences, Umm Al-Qura University, Saudi Arabia***Article Info:** Received: May 14th, 2015; Accepted: June 1st, 2015

ABSTRACT

Introduction: Nutritional needs during adolescence are increased because of the increased growth rate and changes in body composition associated with puberty. Eating habits vary widely between individual adolescents. Poor eating habits formed during adolescence can lead to obesity and diet-related diseases in later years. The aim of the study was to determine the socio-demographic factors, dietary habits and mean physical characteristics of the subjects associated with BMI. **Subjects and methods:** A descriptive approach, cross-sectional design was used to assess the dietary intake of adolescent girls with respect to healthy diets. 100 female students with age range of 16-19 years were included in the study. The study questionnaires was used to collect data about Socio-demographic factor, dietary habits,. Anthropometric measurements were done including weight, height, body mass index (BMI) and fat percent. Data analysis was carried out using the Statistical Package of the Social Science (SPSS) version 20. **Result and discussion:** These results indicated that there is a statistical significant association between BMI and vitamin/mineral supplementation ($P < 0.05$), 28% who were consuming them. In addition the findings showed that 41% of the female students who skipped breakfast meal had normal BMI. Our study revealed that there is no statistically significant relationship between BMI and physical exercise ($P > 0.05$) in 37% of adolescent girls who practiced physical exercise more than one time weekly. Also the data revealed that there is no statistically significant relationship ($P > 0.05$) between BMI and breakfast, main meals and snacking. **Conclusion:** Our results show that almost half of the subjects have normal BMI. But there is not statistical significance relationship between BMI and socio-demographic characteristics, and dietary habits except for vitamin and mineral supplementation. Implementing educational programs which regarding the weight management and maintains adequate nutrient. To improve the dietary pattern and the nutritional status of female adolescents is recommended.

Keywords: Dietary habits, socio-demographic, adolescents, body mass index

Introduction

Nutritional needs during adolescence are increased because of the increased growth rate and changes in body composition associated with puberty [1]. Sound nutrition can play a role in the prevention of several chronic diseases, including obesity, coronary heart disease, certain types of cancer, stroke, and type 2 diabetes [2]. It is generally accepted that socio-economic status

influences dietary habits as well as human health. Three main parameters have been most often used to define socio-economic status, i.e. occupation, education and income. Education is considered to be related to health outcomes through its influence on lifestyle behaviors (e.g., exercise, diet), problem-solving capacity and values (e.g. importance of preventive health behaviors) [3]. According to the World Health Organization Report 2002 [4], the most important risks of non-communicable diseases included high blood pressure, high concentrations of cholesterol in the blood, inadequate intake of fruit and vegetables, being overweight or obese, physical inactivity and tobacco use. There is a relation between healthy dietary pattern and lifestyle factors.

*Corresponding Author

Mohammad Abd Elmoneim Elmadbouly

*Department of Clinical Nutrition, Faculty of Applied Medical Sciences, Umm Al-Qura University, Saudi Arabia*Email: elmadbouly@gmail.com

Being more physically active is associated with lower BMI and an improved diet profile, consuming a higher percent of energy from dietary fiber, protein and micronutrients such as folate, calcium, vitamin A, vitamin C and vitamin E [5]. The aim of the study was to determine the socio-demographic factors, dietary habits and mean physical characteristics of the subjects associated with BMI.

Materials and Methods

A descriptive approach, cross-sectional design was used to assess the dietary intake of adolescent girls with respect to healthy diets. 100 female students with age range of 16-19 years of high school at holy Makkah were included in the study. Questionnaire was used to gather information from student's sample, which includes demographic, social, anthropometric information's and physical activity as well as information on dietary habits, main meals and their food & beverage intake every day.

Anthropometric measurements:

The anthropometric measurement to assess status for adults were height (cm), weight (kg), Body Mass Index, muscle and fat. The measures were then compared to reference standard to assess the risk for various diseases. All subjects were wearing light clothes and no shoes. The total body weight was measured in a body state with their arms directed forward.

Statistical analysis:

Descriptive statistics were used to present the data on demographic characters, nutritional habits and medical history. Categorical Variables were expressed as percentages and frequencies. Data analysis was carried out using the Statistical Package of the Social Science (SPSS) version 20.

Results and Discussion

1. Association between body mass index and dietary habits of the students

Breakfast's status as the most important meal of the day is more than just an old saying. Breakfast has been defined as the first meal after awakening; a meal consumed at a certain time of day, a certain type of food consumed, and includes whatever a person perceives as "breakfast" [6]. In our study we found that there was no significant correlation between BMI and taking breakfast and place of taking breakfast ($p > 0.05$) when 26 of student had their breakfast daily and 41 of them did not take it or take it rarely and all of them had normal BMI. In corroboration with data of another study the data show that there is no statically significant relationship between BMI and having breakfast at home ($p > 0.05$). It was found that 0.30 of female student who rarely take breakfast at home have normal BMI. In contrast regular consumption of breakfast cereal is associated with lower body mass index (BMI) in adults [7] and greater energy intake at breakfast is associated with lower BMI

in adolescents [8].

Also we found that there was no significant correlation between BMI and number of main meals taken /day, number of times main meal taken outside home, not taken main meals, reasons for not taken any of the main meals, the enough time to have main meals and taken main meals at regular times.

In corroboration with data of another study the data shows no statistically significant relationship between BMI and number of daily meals variable ($P > 0.05$). It was found that 47% of female students who took two meals daily had normal BMI, and the data revealed that there no statistically significant relationship between BMI and eating outside home variable ($P > 0.05$). It was found that 23% of male students and 32% of female students who eat out side home more than one time weekly had normal BMI [9].

Healthy dietary patterns are associated with healthy lifestyle factors such as being more physically active [5,10]. The result of the present study showed that a small proportion of students (8%) who practiced **physical** exercise daily and (63%) of those who did not practice did not show significant association with BMI ($P > 0.05$) [9]. Data revealed that 48% of female students who reported decreased physical activity had normal BMI.

Snacking was defined as the consumption of any food item that is not a meal [11]. The result of the present study revealed that there is no association between body mass index and snacks ($P > 0.05$). It showed that (32%) of student had their snack two times in day and (30%) of them take it rarely. Khairil *et al* [11] reported that there was also no significant difference observed between normal and overweight group with respect to healthy snack.

The result of the present study showed that (46%) of student had searched for nutritional information and (54%) of them did not do searching with no significant association with BMI. G. O'Brien *et al* [12] reported **that** there was no significant .correlation between nutrition knowledge and BMI

But only about vitamin and mineral supplementation we found that there is a significant relationship with BMI ($p < 0.05$).

2. Relationship between socio-demographic characteristics and BMI

The study results revealed there was no statistically significant relationship between BMI and socio-demographic ($P > 0.05$) factors.

There was no statistically significant relationship between BMI and age ($P > 0.05$). It was found that 20% of female students whose age is 16 years, 22% of female students whose age is 17 years, 3% of female students whose is 18 years and 20% of female students whose age is 19 years old have normal BMI.

Also there was no statistically significant relationship between BMI and marital status ($P > 0.05$). Among female students it

Table 1: Association between body mass index and dietary habits of the students

Variables	BMI Mean $\pm$ SD	F-value	p-value
Breakfast			
Taking breakfast			
Daily (n=26)	22.58 $\pm$ 4.48	0.152	0.928
3-4 times/week (n=28)	23.14 $\pm$ 5.25		
<2 times/week (n=5)	23.08 $\pm$ 3.66		
No/rarely (n=41)	23.50 $\pm$ 6.16		
Place of taking breakfast			
Home (n=37)	22.69 $\pm$ 4.81	0.139	0.870
Car (n=6)	22.67 $\pm$ 4.21		
School (n=16)	23.43 $\pm$ 5.01		
Main meals			
Reasons for not taking any of the main meals (n=89)			
Following a diet (n=4)	23.56 $\pm$ 5.43	0.963	0.386
No time (n=25)	24.22 $\pm$ 4.51		
Loss of appetite (n=35)	21.99 $\pm$ 5.81		
Others (n=25)	23.12 $\pm$ 5.48		
Do you take your main meals in regular times?			
Yes (n=23)	22.34 $\pm$ 4.09	0.818	0.416
No (n=77)	23.38 $\pm$ 5.67		
Do you have enough time to take your main meals?			
Yes (n=74)	22.72 $\pm$ 5.48	1.343	0.182
No (n=26)	24.35 $\pm$ 4.84		
Number of main meals taken / day			
One (n=11)	21.04 $\pm$ 4.23	1.067	0.367
Two (n=47)	23.91 $\pm$ 5.90		
Three (n=37)	23.02 $\pm$ 4.90		
>three (n=5)	21.44 $\pm$ 4.76		
Number of times you take your main meal outside home			
Almost daily (n=3)	23.77 $\pm$ 7.56	0.255	0.858
1-2 times/week (n=65)	23.35 $\pm$ 5.60		
$\geq$ 3times/week (n=23)	22.29 $\pm$ 4.88		
Never (n=9)	23.58 $\pm$ 4.46		
Not taken main meals (n=89)			
Breakfast (n=51)	23.56 $\pm$ 5.43	0.963	0.386
Dinner (n=9)	24.22 $\pm$ 4.51		
Lunch (n=29)	21.99 $\pm$ 5.81		
Physical exercise			
Practicing physical exercise			
Daily (n=8)	25.04 $\pm$ 4.29	0.696	0.596
5-7 times/week (n=5)	23.30 $\pm$ 4.77		
3-5 times/week (n=4)	19.73 $\pm$ 1.54		
1-3 times/week (n=20)	22.68 $\pm$ 4.35		
Never (n=63)	23.25 $\pm$ 5.90		
Snacking			
Number of snacks in-between meals			
Rarely (n=30)	23.08 $\pm$ 6.24	1.126	0.343
One (n=31)	24.02 $\pm$ 5.70		
Two (n=32)	23.04 $\pm$ 4.34		
<two (n=7)	19.94 $\pm$ 2.78		
Searching for nutritional information			
Searching for nutritional information			
Yes (n=46)	23.22 $\pm$ 4.44	0.129	0.897
No (n=54)	23.08 $\pm$ 6.05		
Vitamin/ mineral supplementation			
Vitamin/ mineral supplementation			
Yes (n=28)	21.58 $\pm$ 3.99	2.146	0.035
No (n=72)	23.75 $\pm$ 5.69		

was found that 45% of single students had normal BMI, 23% of single students had overweight and were obese and 19% of single students were underweight. It was found that 1% of married students had normal BMI, 2% of married students had overweight. According to Janghorbani *et al* [13] the married women were more likely to be overweight and obese than those never married. The positive relationship between marital status and overweight, obesity, or abdominal obesity can be explained by the fact that people, after marriage have less physical activities, change their dietary pattern, may be less focused on being attractive, have more social support, or may be exposed to other environmental factors. Unmarried subjects may intentionally manage their weight in an effort to be more attractive to potential marital partner.

The results of the present study revealed that there was no statistically significant relation between BMI and Family size ($P > 0.05$). 56 % of female students had normal BMI, 31% were overweight and obese and 12% had underweight in families, which contained 4-5 members. While in family which contained >5 members it was found 44% had normal BMI, 37% were overweight and obese and 19% were underweight. Other study found that families having more siblings are associated with lower rates of obesity. Additional siblings may decrease the availability of food for each child thus lowering BMI, particularly for families living in poverty [14].

Many studies have shown that educational achievement of parents to be associated with their children's nutritional status [15]. The educational attainment of parents could lead to higher income and may imply a higher availability of food and household resources [16]. On the other hand, it might be positively associated with higher nutritional awareness as well as better caring of

Table 2: Association between body mass index and socio-demographic characteristics of the students

(p-value)	X ² -value	BMI				Variables
		Obese N (%)	Overweight N (%)	Normal N (%)	Underweight N (%)	
Age (years)						
(0.836)	4.98	3 (7.1)	12 (38.6)	20 (47.6)	7 (16.7)	16 (n=42)
		5 (10.9)	11 (23.9)	22 (47.8)	8 (17.4)	17 (n=46)
		2 (22.2)	2 (22.2)	3 (33.3)	2 (22.2)	18 (n=9)
		1 (33.3)	0 (0.0)	1 (33.3)	1 (33.3)	≥19 (n=3)
Marital status						
(0.392)	6.29	11 (11.5)	22 (22.9)	45 (46.9)	18 (18.8)	Single (96)
		0 (0.0)	2 (66.7)	1 (33.3)	0 (0.0)	Married (3)
		0 (0.0)	0 (0.0)	1 (100)	0 (0.0)	Divorced (1)
Family size						
(0.779)	1.09	2 (12.5)	3 (18.8)	9 (56.3)	2 (12.5)	4-5 (16)
		9 (10.7)	22 (26.2)	37 (44.0)	16 (19.0)	>5 (84)
Maternal education						
(0.664)	12.20	0 (0.0)	1 (50.0)	0 (0.0)	1 (50.0)	Illiterate (2)
		0 (0.0)	2 (22.2)	5 (55.6)	2 (22.2)	Primary (9)
		4 (21.1)	3 (15.8)	6 (31.6)	6 (31.6)	Intermediate (19)
		3 (12.5)	5 (20.8)	12 (50.0)	4 (16.7)	Secondary (24)
		3 (7.7)	12 (30.8)	20 (51.3)	4 (10.3)	University (39)
		1 (14.3)	2 (28.6)	3 (42.9)	1 (14.3)	Postgraduate (7)
Paternal education						
(0.820)	9.99	0 (0.0)	1 (33.3)	1 (33.3)	1 (33.3)	Illiterate (3)
		2 (25.0)	1 (12.5)	4 (50.0)	1 (12.5)	Primary (8)
		1 (12.5)	1 (12.5)	6 (75.0)	0 (0.0)	Intermediate (8)
		3 (9.1)	9 (27.3)	14 (42.2)	7 (21.2)	Secondary (33)
		3 (9.4)	11 (34.4)	12 (37.5)	6 (18.8)	University (32)
		2 (12.5)	2 (12.5)	9 (56.3)	3 (18.8)	Postgraduate (16)
						Maternal work
(0.551)	2.11	3 (10.3)	7 (24.1)	16 (55.2)	3 (10.3)	Yes (29)
		8 (11.3)	18 (25.4)	30 (42.3)	15 (21.1)	No (71)
Family income (SR/month)						
(0.579)	4.73	1 (33.3)	0 (0.0)	2 (66.7)	0 (0.0)	<2000 (3)
		2 (7.7)	9 (34.6)	10 (38.5)	5 (19.2)	2000-<5000 (26)
		8 (11.3)	16 (22.5)	34 (47.9)	13 (18.3)	≥5000 (71)

children [17].

In the present study, however, we found that there is no statistically significant relationship between BMI and mother's educational level ($P>0.05$). It was found that there were no female students whose mother's educational level is Illiterate, 5% of female students had mother's educational level as primary level, 6% of female students had mother's educational level as Intermediate level, 12% of female students had mother's educational level as secondary level, 20% of female students had mother's educational level as university level and 3% of female students had mother's educational level as Postgraduate level. All groups had similar BMI status.

Similarly there was no statistically significant relationship between BMI and father's educational level ($P>0.05$). It was found that 1% of female students father's educational levels are Illiterate level, 4% of female students father's educational levels are Primary level, 6% of female students father's educational levels are Intermediate level, 14% of female students father's

educational levels are secondary level, 12% of female students father's educational levels are university level and 9% of female students father's educational levels are Postgraduate level have normal BMI. However Stea *et al.*, [18] stated that high paternal educational level was associated with a lower BMI and a better lipid profile among young adult men.

The results of the present study revealed that 16% of female students who have working mother had normal BMI. On similarity 30% of female students whose mother's didn't have any working status have normal BMI. The majority of the mothers were housewives or was unemployed and there was no statistically significant relationship between maternal work and BMI status, similar to the findings reported by Lamerz *et al.*, [19].

The present study shows

the economical status of the girl students. It was found that 2% of the female students with income rate less than 2000 SAR monthly, 10% of the female students were with income rate 2000-<5000 SAR monthly and 34% of the female students were with income rate ≥5000 SAR monthly, had normal body weight. However the majority of the sample population have monthly income rate more than 5000 SAR and didn't reveal a statistically significant relationship between BMI and income level ($P>0.05$), similar to the findings reported by Tawfik *et al* [9].

Conclusion and Recommendations

Our results show that almost half of the subjects have normal BMI. But there is not statistical significance relationship between BMI and socio-demographic characteristics, and dietary habits except for vitamin and mineral supplementation. Implementing educational programs which regarding the weight management and maintains adequate nutrient. to improve the dietary pattern and the nutritional status of female adolescents is recommended.

References

1. Spear BA: **Adolescent growth and development.** *Journal of the American Dietetic Association* 2002, **102**:S23-S29.
2. McNaughton SA: **Understanding the eating behaviors of adolescents: application of dietary patterns methodology to behavioral nutrition research.** *Journal of the American Dietetic Association* 2011, **111**:226-229.
3. Vlismas K, Stavrinou V, Panagiotakos DB: **Socio-economic status, dietary habits and health-related outcomes in various parts of the world: a review.** *Cent Eur J Public Health* 2009, **17**:55-63.
4. Organization WH: **The world health report 2002: reducing risks, promoting healthy life:** World Health Organization; 2002.
5. Brodney S, Mcpherson RS, Carpenter R, Welten D, Blair SN: **Nutrient intake of physically fit and unfit men and women.** *Medicine and science in sports and exercise* 2001, **33**:459-467.
6. Boston RC, Moate PJ, Allison KC, Lundgren JD, Stunkard AJ: **Modeling circadian rhythms of food intake by means of parametric deconvolution: results from studies of the night eating syndrome.** *The American journal of clinical nutrition* 2008, **87**:1672-1677.
7. Cho S, Dietrich M, Brown CJ, Clark CA, Block G: **The effect of breakfast type on total daily energy intake and body mass index: results from the Third National Health and Nutrition Examination Survey (NHANES III).** *Journal of the American College of Nutrition* 2003, **22**:296-302.
8. Summerbell C, Moody R, Shanks J, Stock M, Geissler C: **Relationship between feeding pattern and body mass index in 220 free-living people in four age groups.** *European Journal of Clinical Nutrition* 1996, **50**:513-519.
9. Tawfik S L: **Food Consumption Patterns and Dietary Habits Associated with Weight Status in Healthy Young Adult Students.** Al-Azhar University – Gaza. Edited by: Al-Azhar University – Gaza; 2011.
10. Sjöberg A, Hallberg L, Höglund D, Hulthén L: **Meal pattern, food choice, nutrient intake and lifestyle factors in The Göteborg Adolescence Study.** *European journal of clinical nutrition* 2003, **57**:1569-1578.
11. Isa KAM, Masuri MG: **The association of breakfast consumption habit, snacking behavior and body mass index among university students.** *American Journal of Food and Nutrition* 2011, **1**:55-60.
12. O'Brien G, Davies M: **Nutrition knowledge and body mass index.** *Health education research* 2007, **22**:571-575.
13. Amini M, Rezvanian H, Gouya M-M, Delavari A, Alikhani S, Mahdavi A: **Association of body mass index and abdominal obesity with marital status in adults.** *Archives of Iranian medicine* 2008, **11**:274-281.
14. Chen AY, Escarce JJ: **Peer Reviewed: Family Structure and Childhood Obesity, Early Childhood Longitudinal Study—Kindergarten Cohort.** *Preventing chronic disease* 2010, **7**.
15. Wang Y: **Cross-national comparison of childhood obesity: the epidemic and the relationship between obesity and socioeconomic status.** *International journal of epidemiology* 2001, **30**:1129-1136.
16. Giugliano R, Carneiro EC: **Factors associated with obesity in school children.** *Jornal de pediatria* 2004, **80**:17-22.
17. Crockett SJ, Sims LS: **Environmental influences on children's eating.** *Journal of Nutrition Education* 1995, **27**:235-249.
18. Stea TH, Wandel M, Mansoor MA, Uglem S, Frølich W: **BMI, lipid profile, physical fitness and smoking habits of young male adults and the association with parental education.** *European journal of public health* 2009, **19**:46-51.
19. Lamerz A, Kuepper-Nybelen J, Bruning N, Wehle C, Trost-Brinkhues G, Brenner H, Hebebrand J, Herpertz-Dahlmann B: **Prevalence of obesity, binge eating, and night eating in a cross-sectional field survey of 6-year-old children and their parents in a German urban population.** *Journal of Child Psychology and Psychiatry* 2005, **46**:385-393.

Note: VRI Press, Vedic Research Inc. is not responsible for any data in the present article including, but not limited to, writeup, figures, tables. If you have any questions, directly contact authors.

Visit us @ www.vedicjournals.com : DOI: <http://dx.doi.org/10.14259/bmc.v3i2.175>

Copyright © 2013-2015 VRI Press. All rights reserved.


Authors Column