Original Article

Association of junk food consumption with overweight-obesity among preclinical medical students of Shahid Beheshti University of Medical Sciences

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Abstract

Background: The consumption of high energy and low nutritional content foods, which are known as junk foods, is considered as one of the main causes of obesity particularly in adolescents. The aim of this study was to determine the association of junk food consumption with overweight-obesity among preclinical medical students of Shahid Beheshti University of Medical Sciences (SBMU).

Methods: In this cross-sectional study, preclinical students of SBMU were recruited by simple randomized sampling. Study participants included 18-23 years old male and female. Demographic and socio-economic data were collected by a questionnaire. Information relating to the consumption of junk foods was provided by a 24-items self-administered semi-quantitative food frequency questioner (F.F.Q). The relationship between the consumption of fast food and overweight-obesity (O.O) was analyzed using IBM SPSS Statistics for Windows, Version 21.0. through binary logistic regression method.

Results: A total of 186 students participated in this study. Overweight-obese students (BMI≥25) accounted for 63 (34%) of the total participants. A total of 58 (31.1%) students consumed fast foods more than 1.52 serving/week. Students who were at the highest tertile of fast food consumption, had a higher chance of O.O (OR=2.42, 95% CI=1.17-4.99, *P*=0.01) in comparison with those in the lowest tertile (OR=2.21, 95% CI=1.01-4.84, *P*=0.04). After adjustment for age and socioeconomic factors, this chance was increased (OR=3.824, 95% CI=1.66-8.811, *P*=0.002); but, after adjusting lifestyle variables (physical activity) this relationship was not significant anymore (OR=2.247, 95% CI=0.998-5.058, *P*=0.05).

Conclusion: The findings of this study represent a positive association between fast-food consumption and O.O in medical students.

Keywords: Fast foods; Obesity; Overweight; Students

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Introduction

Obesity is a universal health problem, which is not only a recognized disease in its own right but also a major risk factor for a large number of diseases including cardiovascular disease (CVD), type 2 diabetes, certain cancers, gall bladder disease and hypertension (1).

Based on a global evaluation by world health organization (WHO) in 2014, the number of overweight and obese individuals throughout the world reached 1.9 billion and 600 million respectively (2, 3). The increase in the number of obese is notably more, among regions with rapidly growing economies, especially in the developing countries (1). In 2014, it was estimated that the range of overweight and obesity prevalence among Iranian adults was 27-38.5% and 12.6-25.9% respectively (4).

While the etiology of the high prevalence of overweight and obesity may be multifactorial, exceeding dietary energy requirements was seen as one of the most important contributors to increasing body weight, especially through junk food consumption due to their widespread availability and accessibility. Junk foods generally contribute few micronutrients to the diet, contain substantial amounts of fat and/or sugar and are high in energy. Examples of junk foods include the majority of foods sold at fast food outlets, chocolates, sweets, beverages, puffs, cakes, biscuits, and etc. (5).

Much of the studies to date have been carried out on the effects of junk foods consumption behaviors singularly. Further investigation considering other factors such as socioeconomic status (SES), lifestyle and their combined effects with junk food consumption on obesity may reveal valuable information on how to control or reduce the risk of obesity.

Few studies have been conducted among medical students about the prevalence of obesity in Malaysia, the prevalence of overweight and obesity is measured as about 20% among medical student (6). Another study has been conducted among students of a Medical University in Karachi showed a high prevalence of poor dietary habits in the overweight study population and association between junk food and soft-drink consumption with being overweight. Eating whole-grain food and doing exercise in this study showed a protective association against overweight (7). Food choices among medical students depend on many social factors such as culture, environmental factors, income and time devoted to studying, as well as on energy and nutrient needs. The modern sedentary lifestyle, the growing number of fast food and restaurant and all recently noted item can be associated with common obesity in medical students; so this group of participants is good candidates for assessing risk factors of obesity.

In this study, we targeted medical students of Shahid Beheshti University of Medical Sciences (SBMU) in the level of preclinic due to their resourceful knowledge, about influences of high dietary intake on obesity and its consequences and serious health outcomes.

The aim of this study was to determine the association of junk food consumption with overweight-obesity among preclinical medical students of Shahid Beheshti University of Medical Sciences.

Methods

The study population of this cross-sectional study was selected from preclinical students of Shahid Beheshti University of medical sciences. Study participants included 18-23 years old male and female. The students were recruited by simple random sampling. According to the prevalence of obesity among medical students of Malaysia (6) and Cochrane sample size formula with 95% confidence interval and 5% desired level of precision, we performed this study on 186 participants data. With this design, individuals from each class during March 2017 to April

2017, were randomly requested to complete the questionnaire.

Demographic, socioeconomic (financial status), stress, depression, and lifestyle (physical activity) data were obtained by use of a questionnaire. Information regarding junk food consumption was provided by a 24-item self-administered semi-quantitative food free questionnaire (F.F.Q). The content validity of the questionnaire was approved by a nutrition expert panel with 5 nutritionists in faculty of nutrition, Shahid Beheshti University of Medical Sciences.

The questionnaire included detailed questions about diverse junk foods. The junk foods were divided into 8 groups including sweets, chocolates, beverages, puffs, cakes, biscuits, fast foods, and sour confectionaries. The frequency of junk food intake was asked from participants on daily, weekly and monthly basis considering a portion size for each item. Then all answers were transformed from daily, weekly and monthly unit intake to average unit of intake per week. Total servings of junk food or fast food consumption were categorized into tertiles (high, medium, low). The relationship between the consumption of fast food and the chance of overweight and obesity was assessed using binary logistic regression.

To measure body mass index of participants, height and weight were asked in the questionnaire and Body Mass Index (BMI) was calculated by the following formula:

(Weight/$Height$ to the power of two $BMI = \frac{\text{Weight}}{Height^2}$)

Overweight-obesity was defined as BMI≥25.

Participants were asked to sign an informed consent. Although no individual data was published separately, with this consent, little concern about the participant's reluctance to use their information in analysis, has been resolved.

Data were analyzed by IBM SPSS Statistics for Windows, Version 21.0.

To use binary logistic regression analysis BMI was divided into greater than or equal to 25, which was considered as +1 and lesser than 25, which was considered as 0.

The first tertile (low) was considered as a reference to compare the probability of an increase in BMI as the result of the increase in junk food consumption in the role of an independent variable.

Data were adjusted with covariates, which can affect on outcomes in 3 models including model l, age and psychological and socio-economic factors (financial status, stress, and depression), model 2, variables related to lifestyle (more physical activity) and model 3 that adjusted with covariates in two previous models simultaneously.

This method was applied to each junk food group and confidence intervals were calculated.

Results

A total of 186 students participated in this study. The mean age of participants was 20.13 years old. Among participants, 34% were from Tehran and 23% from other metropolitan areas like Isfahan, Tabriz, Mashhad and others were from other cities. 75% of the participants were from families with high average income (more than 20 million Iranian Rials per month) and the others were from low or moderate family income.

Table 1 illustrates the mean BMI by age and gender of medical students of 18–23-years-old participated in the study. The mean BMI was significantly higher in male than female students (P=0.01). The Pearson correlation between BMI and age was not statistically significant (P=0.77).

Measuring the prevalence of overweight and obesity among participants showed that the majority of our study population was considered as normal. The prevalence of underweight, normal, overweight and obese students were 3.2%, 62.9%, 31.7%, and 2.2% respectively.

Figure 1 shows average intake of each group of junk foods as units per week.

Table 1. Mean BMI by age and sex in 18–23-year-old SBMU medical students.

	Male	Female	Total	*P*
Age	Mean (SD)	Mean (SD)	Mean (SD)	
18	25.4 (1.44)	24.11 (3.53)	24.38 (3.20)	0.93*
19	24.3 (3.11)	23.07 (2.66)	23.74 (2.94)	0.21#
20	23.9 (3.10)	22.61 (3.07)	23.27 (3.14)	0.05#
21	25.2 (2.58)	24.47 (2.94)	24.96 (2.72)	0.35#
22	25.5 (2.16)	24.41 (2.97)	24.90 (2.54)	0.41*
23	21.8 (4.30)	22.35 (1.96)	22.09 (3.11)	0.88*
Total	24.4 (2.98)	23.29 (3.03)	23.87 (3.05)	0.01#

Independent t-test
* Mann-Whitney U test

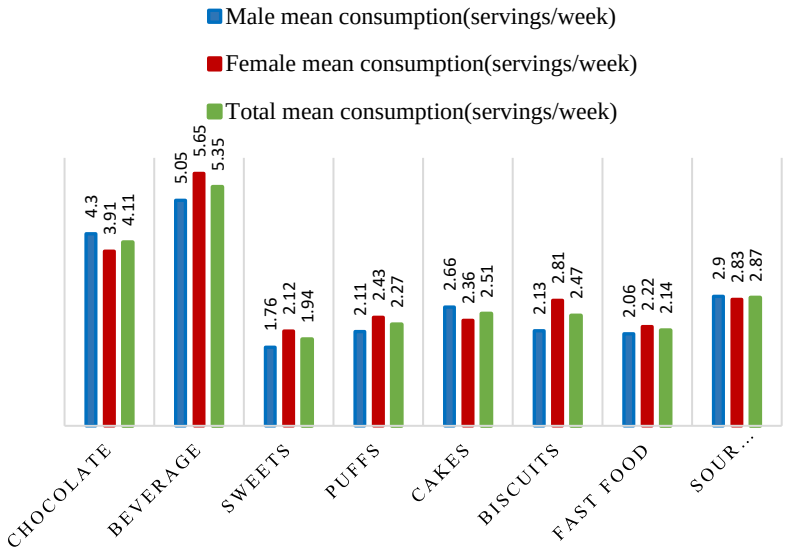

Figure 1. Mean junk food consumption by sex

The highest average consumption of these groups was for beverages and the lowest was for sweets. In beverages, sweets, puffs, biscuits, and fast foods, the female consumption was more than male. Only sweets and biscuits consumption was significantly higher in women than in men (*P*=0.02 and 0.04 respectively). There were no significant sex differences for mean consumption in other groups of junk foods (*P*>0.05).

Junk food consumption patterns of the 18–23 year-old medical students by sex are shown in Table 2. Fast food consumption in most of the participants was low in frequency. This pattern was similar in both sexes, which means that the majority of participants in both sexes were in the low consumption group (Table 2 and Table 3).

Table 3 presents the odds ratios of overweight and obesity associated with various levels of fast food consumption and other aspects of the diet compared to their respective reference level. Based on the results obtained by implementation of binary logistic regression, out of all groups of junk foods, the crude odds for overweight and obesity were increased significantly only in subjects who consumed fast food between 1.26-1.5 servings per week (OR=2.21, 95% CI=1.01-4.84, *P*=0.04) and consumed more than 1.5 servings per week (OR=2.42, 95% CI=1.17-4.99, *P*=0.01). Students in the

Table 2. Junk food consumption patterns by sex in 18-23 year-old SBMU medical students

	Male N(%)	Female N(%)	Total N(%)
Fast food			
≤1.25	40(43)	44(47.3)	84(45.2)
1.26-1.50	23(24.7)	21(22.5)	44(23.6)
1.51<	30(32.3)	28(30.2)	58(31.2)
Beverages			
≤2.00	30(32.3)	33(35.5)	63(33.9)
2.01-6.50	35(37.6)	33(35.5)	68(36.6)
6.51<	28(30.1)	27(29.0)	55(29.5)
Sweets			
≤0.75	40(43.0)	24(25.8)	64(34.4)
0.76-1.50	35(37.6)	39(41.9)	74(39.8)
1.51<	18(19.4)	30(32.3)	48(25.8)
Cakes			
≤1.50	39(41.9)	50(53.8)	89(47.8)
1.51-2.25	28(30.2)	17(18.3)	45(24.3)
2.26<	26(27.9)	26(27.5)	52(27.9)
Biscuits			
≤1.25	38(40.8)	33(35.5)	71(38.2)
1.26-2.50	35(37.7)	25(26.9)	60(32.2)
2.51<	20(21.5)	35(37.6)	55(29.6)
Chocolate			
≤1.50	34(36.5)	40(43.0)	74(39.8)
1.51-4.75	29(31.2)	21(22.6)	50(26.9)
4.76<	30(32.3)	32(34.4)	62(33.3)
puffs			
≤1.25	30(32.2)	34(36.6)	64(34.4)
1.26-2.00	43(46.2)	38(40.8)	81(43.5)
2.01<	20(21.6)	21(22.6)	41(22.1)
Sour confectionary			
≤1.25	41(44.1)	37(39.8)	78(41.9)
1.26-2.25	29(31.2)	24(25.8)	53(28.5)
2.26<	23(24.7)	32(34.4)	55(29.6)

highest tertile fast food consumption in comparison with those in the lowest tertile had a higher chance of developing overweight and obesity.

After adjustment of confounding effects of age and psychological and socio-economic factors in model 1 this chance was strengthened (OR=3.824, 95% CI=1.66-8.811, *P*=0.002), But after adjusting variables related to lifestyle in model 2 this relationship disappeared (OR=2.247, 95% CI=0.998-5.058, *P*=0.05). After adjusting age and socio-economic factors at the same time with physical activity this chance was between two previous models (OR=3.224, 95% CI=1.291-8.054, *P*=0.01) (Table 4).

Other groups of junk food including sweets, beverages, biscuits, etc. didn't have any significant relationship with overweight-obesity. Adjusting of confounder variables did not have an effect on this insignificancy.

Discussion

This study showed that 33.9% of SBMU preclinical medical students in the age group of 18-23 years were found to be overweight-obese and, we found a significant association between fast food consumption and obesity among them. Our questionnaire was comprised of questions about 8 groups of junk foods: sweets, chocolates, beverages, puffs, cakes, biscuits, fast foods, sour confectionaries. According to our study, only fast foods among junk foods were expressed in

Table 3. Simple binary logistic regression results: Crude odds ratios for the association of junk food consumption and overweight-obesity in SBMU medical student's 18-23 year-old.

		Overweight or obesity		
Usual week consumption	No. in group	OR	95% CI	*P*
Fast food		-	-	0.33
≤1.25	84	Reference	-	-
1.26-1.50	44	2,21	1,01-4,84	0.04
1.51<	58	2,42	1.17-4.99	0.01
Beverages		-	-	0.65
≤2.00	63	Reference	-	-
2.01-6.50	68	1,18	0.56-2.47	0.65
6.51<	55	1,43	0.66-3.07	0.35
Sweets		-	-	0.13
≤0.75	64	Reference	-	-
0.76-1.50	74	1.58	0.78-3.2	0.19
1.51<	48	0.73	0.31-1.69	0.46
Cakes		-	-	0.76
≤1.50	89	Reference	-	-
1.51-2.25	45	1.32	0.62-2.8	0.46
2.26<	52	1.15	0.55-2.38	0.7
Biscuits		-	-	0.25
≤1.25	71	Reference	-	-
1.26-2.50	60	0.82	0.4-1.68	0.6
2.51<	55	0.52	0.24-1.13	0.1
Chocolate		-	-	0.76
≤1.50	74	Reference	-	-
1.51-4.75	50	1.14	0.53-2.45	0.73
4.76<	62	1.3	0.64-2.66	0.46
puffs		-	-	0.52
≤1.25	64	Reference	-	-
1.26-2.00	81	1.36	0.68-2.72	0.38
2.01<	41	0.91	0.38-2.14	0.83
Sour confectionary		-	-	0.74
≤1.25	78	Reference	-	-
1.26-2.25	53	1.21	0.58-2.51	0.6
2.26<	55	0.89	0.42-1.87	0.79

association with overweight-obesity. In this study we showed that demographic variable like age and socio-economic factors can augment, physical activity can disappear and both of them together can reinforce the association of fast food consumption with overweight-obesity.

The main causes of obesity have been identified on excessive consumption (unbalance diet), lack of physical activities, genetic predisposition, disorders that affect the normal bodily functions as metabolism and growth and several socio-demographic and lifestyle factors. Nonetheless, it remains unclear the exact mechanism of overweight and obesity since (8, 9).

A systematic review carried out by Gasser et al., in 2016 that assessed association of higher chocolate, and chocolate free confectionery consumption on children and adolescents with overweight-obesity, shows the reverse effect of confectionary

Table 4. Multiple Binary logistic regression results for overweight-obesity affected by fast-food consumption after adjusting for potential confounding factors.

Fast food consumption (unit/week)	Model 1			Model 2			Model 3		
	OR	95% CI	*P*	OR	95% CI	*P*	OR	95% CI	*P*
≤1.25	Reference	-	-	Reference	-	-	Reference	-	-
1.26-1.50	2.74	1.13-6.60	0.02	1.52	0.63-3.6	0.34	1.69	0.64-4.47	0.29
1.51<	3.82	1.66-8.81	0.002	2.25	0.99-5.06	0.05	3.22	1.29-8.05	0.01

Model 1. Adjusting for age, psychological and socio-economic factors (predictability=65.6%).
Model 2. Adjusting for physical activity (predictability=69.7%).
Model 3. Adjusting for age, socioeconomic factors and physical activity (predictability=75.5%).

intake on obesity. This study believes that further investigation should focus on dietary elements other than confectionary to tackle obesity (10). Therefore, high-energy foods may not have any effect if they do not come along with other dietary elements or other confounder factors.

In this study, we showed that age can augment the association of fast food consumption with overweight-obesity in assistance with socioeconomic factors. In some studies, authors assessed this effect directly on fast food consumption and most of them found a high prevalence of consumption among younger participants (1, 3, 11) and some studies found higher consumption in male than female but in our study, this correlation wasn't statistically significant (12).

As social structure and social context contribute to mental qualification, it is important to understand the relationship between social mental disorders that caused through socioeconomic status (SES) on one hand and obesity on the other. SES is usually measured by education, occupational position and/or income as financial status (13). In this study, psychological and socioeconomic status had a role in the pathogenesis of obesity and this role could be either caused by increasing fast food consumption as a consequence of mental disorders or directly affecting obesity. Similar studies carried out among the sample of 13486 Iranian children and adolescents, has shown that the frequency of junk food consumption was significantly associated with psychiatric distress (14). So it can be said that psychological diseases are one of the most probable ways through which junk food can affect obesity but there is also a direct association between psychological disorders and obesity (15). Some studies notified contribution between lower socioeconomic states with the obesity (16, 17) and some studies expressed significant relation of the high level of education and high income of the family with the obesity (18).

The increasing rate of obesity and overweight in a transition society like Iran, are essentially attributed to the rapid changing in lifestyle-related factors in recent decades: in particular nutritional transition and sedentary lifestyle such as spending more time on TV and having low physical activity (19, 20). Our study showed that having more physical activity can attenuate the effects of fast food consumption on obesity. Berkey et al found a direct relationship between screen time and gain in BMI (21) but it is currently unclear how the association of screen time and obesity compensates poor diet, such as junk food consumption (22). Physical activity seems to be an important component of lifestyle interventions for weight loss and maintenance. Although the effects of physical activity on weight loss may seem to be modest, there seems to be a dose-response relationship between physical activity and weight loss. Physical activity also seems to be a critically important factor to promote long-term weight loss and the prevention of weight regain (23). But a review reported that the majority of studies suggest that low levels of activity are associated with future weight gain, nonetheless, they are uncertain in their

conclusions about whether the increased activity will be effective in preventing obesity (24). The effect of physical activity on tending to fast food consumption had not been studied and can be a good topic for the next research.

Since this study was performed among medical students as a highly educated group with profound knowledge on obesity and junk food consumption, low prevalence of obesity was expected but the results didn't meet our expectations. The observed prevalence of overweight and obesity among SBMU medical students maybe because of the fact that the majority of the participants lived in dormitory, staying away from their families with inconvenient eating habits.

The present study had several strengths and limitations. The main strength was its sample group type that was from medical students as a highly educated group and new targeted specimen for assessing food consumption. Another one was assessing lifestyle and socioeconomic factors that led to modifying the effects of junk food consumption. Data collection was conducted with high-quality control. To the best of our knowledge, this study was among the few studies about food diet in medical students in Iran to investigate the association between junk food consumption and obesity.

The main limitation was the number of samples that cannot reflect the medical student population. Besides, cross-sectional design and lack of energy intake measurement was another limitation. So future surveys are needed to clarify the effects of unhealthy diet on obesity in medical students.

The findings of this study represent a significant correlation between fast food consumption and overweight and obesity in medical students. Also, socioeconomic factors and lifestyle have strengthening and attenuating effects on this correlation. Although our study didn't show significant association of obesity with other groups of junk foods. So further investigation should be carried out to determine their exact role in obesity.

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Conflict of interest

Authors declare no conflict of interests.

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