

Dietary Patterns, Prevalence and Predictors of Obesity among Medical Students in Cairo University

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Abstract

Background: Non Communicable Diseases is intensely linked with overweight and obesity. The shifting disease pattern has been attributed to nutrition transition and poor exercise. This study was conducted to identify the dietary consumption patterns, assessing obesity among medical students and its predictors. **Methods:** A cross-sectional study was conducted with 350 fourth year medical students in a university setting. Dietary patterns were assessed using self administered questionnaire based on United States Department of Health and Human Services and United States Department of Agriculture dietary guidelines for Americans 2015-2020. Body mass index (BMI) was calculated by the researchers. **Results:** The prevalence of overweight and obesity was 32% and 9% respectively, among the participants. Unfortunately, 29.1% of the studied group were found to have low level of exercise. Intakes of fruits, and vegetables were low, while intakes of sweets and carbonated drinks were high. There was a significant higher percent of obesity among students who practice low level of physical activity ($P < 0.05$). Also the study revealed by logistic regression analysis that male students were more than 2 times more likely to be obese than female students (Odd's Ratio = 2.16). **Conclusion** The prevalence of obesity was 9% among the studied group. Students were found to practice unhealthy dietary and lifestyle habits which had significant effects on their Body Mass Index levels.

Keywords: Dietary Patterns; Medical students; Body Mass Index (BMI); Obesity; Physical Activity; Food Frequency.

Introduction

Importance of studying relationships between dietary habits and health has imposed its-self on the research fields owing to the vital role that nutrition and diet play a role in prevention and treatment of acute and chronic diseases. In addition to that, the growing burden caused by unhealthy lifestyle related-diseases on health sectors. [WHO 2009 - Vibhute et al., 2018]

Poor eating habits contribute to the occurrence of a group illnesses known as metabolic syndrome and to increase the risk of developing a number of non-communicable diseases which in return negatively affects one's wellbeing and reduce the ability to lead a healthy life [Alberti et al., 2005- Grundy et al., 2005- Agyei and de-Graft, 2010]. A significant impact of rapid changes in diets and lifestyles on health and nutrition status of populations, particularly in developing countries is now very much observed [WHO 2003]. Generally speaking college students are more likely to demonstrate many unhealthy lifestyle practices especially with those related to dieting [Rao et al., 2012- Likus et al., 2013]. Some studies in university students have shown the presence of unhealthy lifestyles and

unbefitting health behaviors [Azadbakht and Esmailzadeh, 2012- Senekal et al., 2016- Turhan et al., 2016].

On the other hand, medical students expected to have better information about the proper dietary habits and healthy lifestyle when compared with non-medical students. Out of those medical students (future physicians) the ones who embrace a healthy lifestyle including diet and physical activities, will definitely have a positive influence on their patients and hence the significance of them adopting a healthy lifestyle. Yet, studies showed that medical and paramedical students sometimes are at risk of irregular dietary habits and lack of exercise [Gupta et al., 2009- Sajwani et al., 2009]. However, the growing problem of obesity has been detected in many lower-income countries in the last decades. Egyptian adults, unfortunately, were recognized as one of the highest levels of obesity in the Eastern Mediterranean Region, according to World Health Organization (WHO). [WHO EMRO, 2019] Available detailed information on the eating habits of health sector professionals is very limited, especially in Egypt.

Aim of the study is to evaluate dietary consumption patterns and to assess prevalence of obesity and it's predictors among fourth year medical students of Cairo University.

Materials and Methods

Study design:

An analytical cross-sectional study was conducted. A convenient sample of medical students was selected, where participants were recruited voluntary after explaining the study procedures and goal. Questionnaires were anonymous to ensure confidentiality of the study's data.

Study setting & population

This study was implemented at Public health and community medicine department, Faculty of Medicine, Cairo University, Egypt among fourth year medical students (N=350) during the academic year 2018-2019. After finishing a detailed nutrition science module at the Public Health specialty round, the subjects were allowed to decide to participate or not, as the investigators explain the study.

Sample size:

The total number of fourth year medical students attending nutrition science module was 1200 students. The sample size was calculated to recruit 350 participants. The calculation of the sample size goes according to "Sampsize.sourceforge.net" software program. Assuming precision 5%, confidence level 95%, prevalence of obesity 15% [Gopalakrishnan et al., 2012].

Data collection tools:

A modified self-administered questionnaire - based on the questionnaire developed by United States (U.S.) Department of Health and Human Services and U.S. Department of Agriculture Services and U.S. Department of Agriculture [Dietary Guidelines for Americans, 2015] -was used in collecting the data and it included the following sections:

- a) Section for the socio- demographic characteristics (for an example; age, sex, residence, level of parents' education and professions', height, weight)
- b) Section for the practicing physical activities (pattern of daily exercise and sedentary activities practicing)
- c) Section for dietary consumption patterns (Frequency consumption for selected food items)

Food frequency questionnaire (FFQ) was used to assess nutritional intake of some selected food items during the last 30 days. Responses were recorded by the students themselves according to their consumption patterns. Each food item consumption frequency options were either; its daily consumed or weekly consumed or never consumed in the past month. Body mass index (BMI) was calculated after accurate assessment of weight and height of students by the researchers at nutritional laboratory practical session. When measuring the height of each participant, he/she was asked to stand up straight on the stadiometer, look straight ahead, rest the L board on top of the head and record the measurement to the nearest ½ centimeter. While when measuring the weight of each participant, he/she was asked to remove heavy outer clothing and his/her shoes, after making sure that the mechanical bathroom scale reads zero, he/she was asked to stand on the scale without moving and record the measurement to the nearest ½ kilo.

Pilot test:

The questionnaire was tested on 10 students to check the validity and clarity of the questions and to estimate the time needed to complete the questionnaire. The questionnaires of pilot study were not included in the analysis.

Data collection:

The questionnaires were distributed by the researchers after the students have attended the nutritional laboratory session where their weight and height were recorded and their BMI were calculated. The students were recruited to fulfill the modified self-administrated questionnaire after explaining the aim of work.

Data management and analysis:

All collected questionnaires were revised for completeness and logical consistency. Pre coded data was entered on Microsoft office excel program for windows, 2010. Data transferred to the statistical package for social science version 15 (SPSS- V 15) for quantitative data analysis. Socio-demographic data was analyzed in accordance with the social scoring system suggested by Park and Park 1979. This system is based on the assumption that the level of parents' education and occupation can determine the social standard of the family. Achievable levels of education and type of occupation were appointed certain numerical values and the sum of parents' scores was used to calculate an overall social score. The social standard is based on the classification of the overall score into three levels: **[Park and Park, 1979]**

- 1- Low level if the overall score < 8
- 2- Intermediate level if the overall score ranged from 8 to 18
- 3- High level if the overall score ranged from 19 to 28

Nutrition status was assessed for each participant according to his/her anthropometric measures (weight and height). Body Mass Index = (weight in Kg / height in M²) was calculated according to WHO cut-off, which are classified into the following classes: **[World Health Organization, 2013]**

- 1- Underweight: ≤18.5.
- 2- Normal: 18.5-24.9.
- 3- Overweight: 25.0-29.9.
- 4- Obese: ≥ 30.0

Obesity is frequently subdivided into categories:

* Class I: BMI of 30 to < 35

* Class II: BMI of 35 to < 40

* Class III: BMI of 40 or higher. Class 3 obesity is sometimes categorized as “morbid” or “severe” obesity.

According to WHO recommendations that adults aged 18–64 years should practice at least 150 minutes of moderate-intensity physical activity throughout the week [*World Health Organization, 2010*]. Consequently physical activity level (PAL) was classified into three categories; low (if participant almost never practice exercise or practicing less than 150 minutes per week), moderate (practice exercise which is equivalent to 150 minutes per week) or high (practice exercise more than 150 minutes per week).

Regarding a sedentary lifestyle, it is a way of life with no or little physical activity. An individual adopting a sedentary lifestyle behavior is usually engaged in an activity like socializing, watching television, reading, using a mobile phone/computer or playing video games for much of the day [*Owen et al., 2020*].

Simple frequency distribution tables were used to describe the studied sample. Quantitative data was presented using mean and standard deviation. Qualitative data was presented cross tabulation presenting the number and percentage for the studied sample. One-Way ANOVA test with post hoc multiple comparisons was used for quantitative data. In categorical data, the Chi-squared test was used for comparison between groups. Significant factors predicting of obesity on uni-variant analysis were entered into multivariate logistic regression analysis to find out the independent predictors of obesity. Odds ratio and 95% confidence interval was calculated. Differences were considered significant at P value ≤ 0.05 .

Ethical Consideration:

The study was revised and approved by Ethical committees at public health & community medicine department at Kasr-Al-Aini Hospital with code (S-9-2018). Informed consent was obtained from all participants before recruitment in the study after explaining the objectives of the work. Confidentiality was guaranteed on handling the data base and questionnaire forms according to revised Helsinki declaration of biomedical ethics [*World Medical Association 2001*].

Results

Baseline population characteristics

A total of 350 medical students, 112 (32%) males and 238 (68%) females, participated in the study. Their age ranged from 20 to 25 years with mean and standard deviation of 21.33 ± 0.7 years. General socio-demographic characteristics of students under study are demonstrated in Table (1).

As regarding lifestyle habits of studied students showed in Table (2), about one third practiced low level of exercise (less than 150 minutes per week) while slightly above half of the participants were adopting a Sedentary lifestyle behavior .

Assessment of Body Mass Index and Life style habits:

Body mass index (BMI) as a nutrition status indicator showed a range from 17.10 to 39.7 kg/m² with mean and standard deviation of 24.3 kg/m² ± 3.9. It was found that 31 medical students had BMI more than 30kg/m² and were classified as obese, demonstrated in Table (3).

**Table (1):
Socio-demographic data of the studied sample**

Variables		Frequency		Total	
		No.	%	No.	%
1-Sex	Male	112	32	350	100
	Female	238	68		
2-Nationality	Egyptian	331	94.6	350	100
	Non-Egyptian	19	5.4		
3- Residence	Rural	44	12.6	350	100
	Urban	306	87.4		
4-Socio-demographic level	Low	8	2.3	350	100
	Middle	47	13.4		
	High	295	84.3		
5-Accommodation	With parents	278	79.4	350	100
	University hostels	36	10.3		
	Private	36	10.3		

**Table (2):
Percent distribution of the studied sample by level of exercise and sedentary life behavior**

Variables		Frequency		Total	
		No.	%	No.	%
1-Practicing exercise	Low	109	31.1	350	100
	Moderate	145	41.4		
	High	96	27.4		
2- Sedentary lifestyle behavior	More than 2 hours/ day	182	52	350	100
	Less than 2 hours/ day	168	48		

**Table (3):
Percent distribution of the studied sample by BMI categories**

BMI categories	Frequency	
	No.	%
Underweight	14	4
Normal	203	58
Overweight	102	29.1
Obese:		
Class I	31	8.8
Class II	0	0
Class III	0	0
Total	350	100

Food frequency questionnaire:

Exploring frequency of consumption of some selected food items showed that eating habits related to high risk food items are prevalent among studied youth group such as the daily consumption of poultry with skin (37.4%), fats (33%), cola (30%) and sweets (47%). The results show that about one third of studied students have excess sugar intake solely from carbonated soft drinks with daily cola consumption is recorded by 30.3% of studied group (Table 4). On the other hand, there was a low consumption of healthy foods like fruits which were consumed daily by only one third of studied students (37.7%) and vegetables which were consumed daily only by half of the participants (50.3%) (Table 4).

**Table (4):
Percent Distribution of the Studied Sample by their Frequency of Consumption of Some Selected Foods Items.**

Food items	Almost never		Weekly		Daily		Total	
	N	%	N	%	N	%	N	%
1-Cereal grains	6	1.7	297	84.9	47	13.4	350	100
2-Beans	59	16.9	73	20.9	218	62.3	350	100
3-Red meat	46	13.1	53	15.1	251	71.7	350	100
4-Fatty meat	246	70.3	15	4.3	89	25.4	350	100
5-Poultry without skin	56	16.0	65	18.6	229	65.4	350	100
6-Poultry with skin	192	54.9	27	7.7	131	37.4	350	100
7-Grilled fish	132	37.7	20	5.7	198	56.6	350	100
8-Fried fish	162	46.3	15	4.3	173	49.4	350	100
9-Boiled eggs	83	23.7	81	23.1	186	53.1	350	100
10-Fried eggs	106	30.3	76	21.7	168	48.0	350	100
11-Milk& low fat cheese	47	13.4	189	54	114	32.6	350	100
12-Fatty cheese	86	24.6	120	34.3	144	41.1	350	100
13-Fruits	22	6.3	198	56.6	130	37.1	350	100
14-vegetables	37	10.6	137	39.1	176	50.3	350	100
15-Sweets	100	28.6	85	24.3	165	47.1	350	100
16-Fats	153	43.7	81	23.1	116	33.1	350	100
17-Cola	165	47.1	79	22.6	106	30.3	350	100
18-Alcohol	345	98.6	2	0.6	3	0.9	350	100

Predictors of obesity

In univariate analysis, it was noted that level of practicing exercise is a highly significant predictor of obesity among the studied group. The non-significant independent variables were gender, nationality, residence, socioeconomic level and sedentary life style behavior (Table 5).

**Table (5):
Univariate Analysis of Predictors of Obesity among Students.**

	Obese n = 31		Normal n = 203		Total		OR (95% CI)	P value
	No	(%)	No	(%)	No	(%)		
1-Gender								
a)Male	13	16.7%	65	83.3%	78	100%	1.53 (0.71 -3.32)	0.3
b)Female	18	11.5%	138	88.5%	156	100%	Ref	
2-Nationality								
a)Egyptian	30	13.6%	190	86.4%	220	100%	1.96 (0.25 -15.5)	0.2
b)Non-Egyptian	1	7.7%	12	92.3%	13	100%	Ref	
3-Residence								
a)Urban	29	14.0%	178	86.0%	207	100%	2.04 (0.46 -9.06)	0.5
b)Rural	2	7.4%	25	92.6%	27	100%	Ref	
4-Socioeconomic level								
a)High	29	14.8%	167	85.2%	196	100%	3.00 (0.13 -9.81)	0.4
b)Middle	2	6.3%	30	93.7%	32	100%	1.12 (0.23 -9.81)	
c)Low	0	0.0%	6	100%	6	100%	Ref	
5-Practicing exercise								
a)Low	12	18.5%	53	81.5%	65	100%	2.07 (0.76-5.63)	0.02*
b)Moderate	13	13.3%	85	86.7%	98	100%	1.36 (0.58 - 3.16)	
c)High	6	8.5%	65	91.5%	71	100%	Ref	
6-Sedentary lifestyle behavior								
a)> 2 hours/ day	21	16.3%	108	83.7%	129	100%	1.85 (0.83 – 4.12)	0.1
b)< 2 hours/ day	10	9.5%	95	90.5%	105	100%	Ref	

OR = odds ratio; CI = confidence interval; Ref = reference group.

* Significant association ($P \leq 0.05$)

The independent predictors of obesity as revealed by logistic regression analysis are presented in Table 6. Male students were more than two times more likely to be obese than female students (OR = 2.16).

**Table (6):
Logistic Regression Analysis of Independent Predictors of Obesity among Students**

Predictors		Coefficient B	P value	OR (95% CI)
1-Gender	a)Male	0.77	0.05*	2.16 (0.99 – 4.70)
	b)Female	-		Ref
2-Nationality	a)Egyptian	1.05	0.33	2.86 (0.34 – 24.02)
	b)Non-Egyptian	-		Ref
3-Residence	a)Urban	0.28	0.67	1.32 (0.36 - 4.88)
	b)Rural	-		Ref
4-Socioeconomic level	a)High	1.17	0.39	3.21 (0.23 - 10.40)
	b)Middle	0.25	0.83	1.28 (0.14 – 45.14)
	c)Low	-		Ref
5-Practicing exercise	a)Low	0.84	0.11	2.32 (0.83 – 6.49)
	b)Moderate	0.34	0.44	1.41 (0.59 – 3.38)
	c)High	-		Ref
	Constant	0.56	0.65	
Correctly predicted (%)				85.9

OR = odds ratio; CI = confidence interval; Ref = reference group.

* Significant association ($P \leq 0.05$)

Frequency of consumption of some food items effect on Students' BMI:

The study revealed that there was no significant difference regarding dietary consumption of high risk foods among study group and the prevalence of obesity with the P-value more than 0.05 (Table 7).

**Table (7):
Effect of Frequency of Dietary Consumption of high risk foods on BMI among study group**

Food items	Frequency of Consumption	Obese n = 31		Normal n = 203		Total No. %	P value
		No.	%	No.	%		
1-Fatty meat	a)Almost never	22	13.6%	140	86.4%	162 100%	0.45
	b) Weekly	3	23.1%	10	76.9%	13 100%	
	c) Daily	6	10.2%	53	89.8%	59 100%	
2-Poultry with skin	a)Almost never	19	15.2%	106	84.8%	125 100%	0.46
	b) Weekly	3	16.7%	15	83.3%	18 100%	
	c) Daily	9	9.9%	82	90.1%	91 100%	
3-Fried fish	a)Almost never	13	12.5%	91	87.5%	104 100%	0.89
	b) Weekly	1	10.0%	9	90.0%	10 100%	
	c) Daily	17	14.2%	103	85.8%	120 100%	
4-Fried eggs	a)Almost never	9	13.4%	58	86.6%	67 100%	0.61
	b) Weekly	5	9.4%	48	90.6%	53 100%	
	c) Daily	17	14.9%	97	85.1%	114 100%	
5-Fatty cheese	a)Almost never	6	10.5%	51	89.5%	57 100%	0.32
	b) Weekly	10	10.9%	82	89.1%	92 100%	
	c) Daily	15	17.6%	70	82.4%	85 100%	
6-Sweets	a)Almost never	10	16.7%	50	83.3%	60 100%	0.27
	b) Weekly	5	7.7%	60	92.3%	65 100%	
	c) Daily	16	14.7%	93	85.3%	109 100%	
7-Fats	a)Almost never	10	10.1%	89	89.9%	99 100%	0.20
	b) Weekly	6	10.9%	49	89.1%	55 100%	
	c) Daily	15	18.8%	65	81.3%	80 100%	
8-Cola	a)Almost never	10	9.3%	98	90.7%	108 100%	0.23
	b) Weekly	8	15.1%	45	84.9%	53 100%	
	c) Daily	13	17.8%	60	82.2%	73 100%	

* Significant association (P ≤ 0.05)

However the study revealed a highly significant difference regarding dietary consumption of some healthy foods among study group and the prevalence of obesity, which was significantly lower among students eating Cereal grains, poultry without skin and boiled eggs with the P value ≤ 0.05 (Table 8).

Table (8):
Effect of Frequency of Dietary Consumption of healthy food on BMI among the study group

Food items	Frequency of Consumption	Obese n = 31		Normal n = 203		Total		P value
		No.	%	No.	%	No.	%	
1-Cereal grains	a)Almost never	1	50.0%	1	50.0%	2	100%	0.05
	b) Weekly	24	11.6%	183	88.4%	207	100%	
	c) Daily	6	24.0%	19	76.0%	25	100%	
2-Beans	a)Almost never	6	15.0%	34	85.0%	40	100%	0.47
	b) Weekly	9	17.6%	42	82.4%	51	100%	
	c) Daily	16	11.2%	127	88.8%	143	100%	
3-Red meat	a)Almost never	3	11.1%	24	88.9%	27	100%	0.49
	b) Weekly	3	7.9%	35	92.1%	38	100%	
	c) Daily	25	14.8%	144	85.2%	169	100%	
4-Poultry without skin	a)Almost never	1	2.5%	39	97.5%	40	100%	0.02
	b) Weekly	4	8.5%	43	91.5%	47	100%	
	c) Daily	26	17.7%	121	82.3%	147	100%	
5-Grilled fish	a)Almost never	14	18.2%	63	81.8%	77	100%	0.27
	b) Weekly	1	7.7%	12	92.3%	13	100%	
	c) Daily	16	11.1%	128	88.9%	144	100%	
6-Boiled eggs	a)Almost never	2	3.6%	54	96.4%	56	100%	0.03
	b) Weekly	7	12.3%	50	87.7%	57	100%	
	c) Daily	22	18.2%	99	81.8%	121	100%	
7-Milk& low-fat cheese	a)Almost never	2	6.7%	28	93.3%	30	100%	0.13
	b) Weekly	14	11.1%	112	88.9%	126	100%	
	c) Daily	15	19.2%	63	80.8%	78	100%	
8-Fruits	a)Almost never	1	7.1%	13	92.9%	14	100%	0.13
	b) Weekly	14	10.3%	122	89.7%	136	100%	
	c) Daily	16	19.0%	68	81.05%	84	100%	
9-Vegetables	a)Almost never	5	22.7%	17	77.3%	22	100%	0.25
	b) Weekly	9	9.8%	83	90.2%	92	100%	
	c) Daily	17	14.2%	103	85.8%	120	100%	

* Significant association ($P \leq 0.05$)

Discussion

Obesity is believed to be a global epidemic, as it is considered the most rapidly rising form of malnutrition in developed [McTigue et al., 2002] and developing countries [World Health Organization 2000]. Published data demonstrate that obesity is associated with numerous chronic diseases including hypertension, type-2 diabetes, cardiovascular disease (CVD), gallbladder diseases and various malignancies [Manson et al., 2004].

This study showed that among the participants; the obesity prevalence was found to be 8.8%, which is considered lower than the obesity prevalence of the general Egyptian population according to Egypt National STEP-wise Survey for Non-communicable Diseases Risk Factors Report [CAPMAS,

MOHP, and WHO, 2017]. This can be due to the fact that the study subjects' age and medical background make them more concerned about their body weight and healthy lifestyle.

Comparing with medical students in other studies, it was found that this prevalence was close to the results from a study conducted among students in Faculty of Medicine, Northern Border University, Ar'ar, Saudi Arabia which was 8.4% [*Mehmood et al., 2016*] and in another study conducted among Health Sciences Students in the Amazonia Region of Peru where the prevalence of obesity was 7.9% [*Rabanales-Sotos et al., 2020*]. While the prevalence of obesity among university students attending King Abdulaziz University in Saudi Arabia, was 18.6% which is higher than this present study results. [*Baig et al., 2015*] This difference can be explained by the higher percentage of physical inactivity among the King Abdulaziz University study sample (80%) than the present's study sample which was (31%).

The moderate level of practicing physical activity in the existent study was in consistence with most of the studies on university students. A study by *Askarian et al., 2013*, on 400 students showed that less than 10% of the participants had adequate physical activity level. Another study showed that most students had light physical activity levels, among female colleges [*Farrukh 2015*]. In contrast, a study conducted in Mansoura University by *El-Gilany et al., 2011* upon 1708 students showed that only 11.3% of participants were physically inactive. This difference from the present study may be due to larger sample size in Mansoura study and different data collection tools used for assessment of physical activity level.

The findings of the present study revealed that a higher percentage of males were obese compared to females (Male students were more than two times more likely to be obese than female students (OR = 2.16)). This result is in accordance with the reported results in some studies conducted in the Middle East; a study in the United Arab Emirates, [*Musaiger et al. 2003*], another study in Lebanon [*Yahia et al. 2008*], and one more study in Saudi Arabia [*Al-Rethaiaa et al. 2010*]. In an additional study that evaluated the prevalence of overweight and obesity among university students from 22 countries in 2014, it was reported that the prevalence of overweight and obesity were found to be significantly higher in males than females in Egypt [*Peltzer et al. 2014*]. This can be explained that males in their twenties have more muscle mass than females and muscles are heavier than fat [*Kirchengast, 2010*], therefore, Muscles can make males heavier and increase their BMI. On the other hand, females in their twenties are more aware and concerned about their weight status and body shape than males, as a result of cultural perceptions which encourage females to be slimmer. Results of the current study showed that there is a significant difference between physical activity level and BMI which was in agreement with that reported by *Alkhatani et al., 2015* who stated that association exists between BMI of the students and their physical activity level and proved that the association was significant ($p = 0.048$). On the other hand, the results of this study varies with another study conducted in Nigeria and reported that there is no relationship between physical activity level and BMI of the student [*Olariike et al., 2020*].

College students face several challenges to adopt healthy eating lifestyle habits, including learning how to buy and cook food, wanting to eat out with their peers, balancing the cost of school and other financial obligations, and navigating a new food environment. [*Gaines et al., 2014*]

The present study showed the following facts about the participants' dietary habits; among all studied students, the mean intakes of added sugar were high whereas nearly half of the group were consuming sweets daily. And even though it is recommended that the intake of added sugar should be less than 25 grams per day **World Health Organization Guidelines**, [<http://apps.who.int/iris/bitstream>] and the fact that a typical 350 milliliter can or bottle of carbonated soft drink contains around 35 grams of

sugar, accordingly half of studied students have excess sugar intake solely from carbonated soft drinks (30.3% consume cola daily). Nevertheless, results revealed no significant difference among participants regarding their dietary consumption of high risk foods and prevalence of obesity.

It is well known that fruits and vegetables play a very important role in reducing overall energy uptake, because of the high contents of its water and fibers [Julie et al., 2008]. Unluckily, most of the students consumed less than five servings of fruits and vegetables on an average day which was consistent with the findings for the general Egyptian population [CAPMAS, MOHP, and WHO, 2017], while experts recommended daily consumption of at least 400 g of fruits and vegetables [WHO 2003]. These findings were in accordance with the results published from two studies; one was conducted on university students in Hong Kong where less than half of the students ate fruits (35.2%) and vegetables (48.9%) every day [Lee and Loke, 2005] and the other study was conducted in University of Michigan which showed that among all participating students, mean intakes of fruits, and vegetables were low [Cindy et al., 2019].

As the current study revealed that the prevalence of obesity was significantly lower among medical students eating poultry without skin, boiled egg and cereal grains. This was found to be in agreement with Muñoz-Pareja et al. 2013, who classified the practice of consuming chicken with skin as an obesity related eating behavior and also in accordance with Chang et al. 2018, who stated that eating eggs with its high biological value protein has another benefit of improving satiety that perhaps will help to reduce short-term food intake later in the day. Moreover, Bonnema et al. 2016, revealed that having egg breakfasts showed a reduced postprandial glycemic response and food intake at the following meal when compared to cereal breakfasts. In addition to the confirmation that diet high in whole grain cereals and legumes is associated with lower body mass index, reduced risk of being overweight and can help reduce weight gain [Williams et al., 2008], hence further research is recommended to learn more about forms of cereal grains consumed by the students.

Limitations:

Several limitations were faced during conducting the current study that should be considered;

- 1- The participants who volunteered to answer the questionnaire were limited, accordingly the sample was considered as a convenient sample.
- 2- The participants' food frequency intake was self-reported which may lead to under- or overestimation of intake or desirability.
- 3- This study presents dietary habits of university students, which may have a better education level and being younger than a population-based sample thus embracing a suitable sample for examining dietary habits, as the variability of health status and education is minimal.

Conclusions

The prevalence of obesity was 9% among the studied group of medical students, they were found to practice unhealthy dietary habits of daily consumption of sweets, carbonated drinks and fats. Practicing low level of Physical exercise was a significant predictor of Obesity among the participants.

Recommendations:

According to the present findings of this study, it is recommend to:

- 1- Conduct a Nutrition education program targeting university students, aiming at increasing raw fruits and raw vegetables consumption and not to consume fruits at the end of meals, decreasing sweets, soft drinks and fatty foods.

2- Provide a walking track around the college fence to practice walking or jogging in the students' free time may encourage medical students to overcome the time and access barriers they may face to practice physical exercise.

3- Provide healthy snacks options in the cafeterias and canteens that are selling food items inside the universities and that vending machines contain healthy food and beverage products.

Conflict of interest:

The authors have no conflict of interest to declare.

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الأنماط الغذائية ومدى انتشار وزيادة الوزن والسمنة و مؤشراتهما بين طلاب الطب
جامعة القاهرة

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الملخص العربي

ترتبط الأمراض غير المعدية ارتباطا وثيقا بالوزن الزائد والسمنة وقد تراجعت الأمراض المعدية كأسباب رئيسية للمرض والوفيات. وهذا التحول لانماط الامراض قد عُزي إلى التحول التغذوي وقلة ممارسة التمارين الرياضية. تم إجراء هذه الدراسة لتحديد أنماط الاستهلاك الغذائي، وتقييم الوزن الزائد والسمنة، ومؤشراتهما بين طلاب الطب. **الطرق البحثية:** أجريت دراسة مستعرضة على 350 طالبا في السنة الرابعة بكلية طب بجامعة القاهرة بداخل الحرم الجامعي. وقد تم تقييم الأنماط الغذائية للمشاركين باستخدام استبيان ذاتي يستند إلى توجيهات ادارة الصحة والخدمات الإنسانية في الولايات المتحدة الأمريكية والمبادئ التوجيهية الغذائية للأمريكيين التابعة لوزارة الزراعة الأمريكية من 2015 إلى 2020. ولقد قام الباحثون بحساب مؤشر كتلة الجسم (BMI) للمشاركين. **النتائج:** بلغت نسبة الانتشار بالوزن الزائد والسمنة 29% و9% على التوالي. وبينت الدراسة أن 31.1% من المشاركين لم يمارسوا أي النشاط البدني على الإطلاق تقريبا. وكان تناول الفواكه والخضراوات بنسبة منخفضة، في حين كانت تناول الحلويات والمشروبات الغازية بنسبة مرتفعة. كان هناك نسبة أعلى ملحوظة من الوزن الزائد والسمنة بين الطلاب الذين لا يمارسون النشاط البدني ($P = 0.05$). كما كشفت الدراسة عن طريق تحليل الانحدار اللوجستي أن الطلاب الذين يمارسون مستوى منخفض من التمارين الرياضية كانوا أكثر عرضة لزيادة الوزن أو السمنة من الطلاب الذين يمارسون مستوى عال من التمارين الرياضية بالضعف ($OR = 2.33$). **الخلاصة:** وجد انتشار عالي للوزن الزائد والسمنة بين المشاركين كما وجد أن الطلاب يمارسون أنماط غير صحية للاستهلاك الغذائي والعادات الحياتية الغير صحية التي كان لها آثار كبيرة على تحديد مستوي مؤشر كتلة الجسم.

الكلمات الدالة: الأنماط الغذائية؛ طلاب الطب؛ مؤشر كتلة الجسم ؛ البدانة/السمنة ؛ النشاط البدني؛ الترددات الغذائية.

Appendix 1

من فضلك لا تكتب اسمك، بيانات هذه الاستمارة سرية و لن تستخدم في غير غرض البحث العلمي

Questionnaire for assessment of dietary habits among a group of Cairo University Medical Students towards Healthy Diet

استبيان لتقييم العادات الغذائية لدى مجموعة من طلاب الطب بجامعة القاهرة نحو اتباع نظام غذائي صحي

A) Socio-demographic data / البيانات الاجتماعية والديموغرافية :

1. **Age / السن : ----- Years/ بالسنوات**
2. **Gender / النوع: Male / ذكر (1) ----- Female/ انثى (2) -----**
3. **Residence/ محل الإقامة: (1) Urban/ الحضر (2) Rural / القرية**
4. **Nationality / الجنسية : (1) Egyptian / مصري (2) Others / غير مصري**
5. **Father education/ مستوى تعليم الاب:**
(1) Illiterate / امي (2) Read and write / يكتب ويقرأ (3) Primary / ابتدائي
(4) Preparatory / اعدادي (5) Secondary/diploma / ثانوي / دبلوم (6) University/Higher education / تعليم عالي
6. **Mother education / مستوى تعليم الام:**
(1) Illiterate / امي (2) Read and write / يكتب ويقرأ (3) Primary / ابتدائي
(4) Preparatory / اعدادي (5) Secondary/diplom / ثانوي / دبلوم (6) University/High education / تعليم عالي
9. **Father's Job / مهنة الاب :**
(1) No work لا يعمل
(2) Industrial or agricultural worker / مزارع او عامل
(3) Skilled worker (Mechanic---) / عامل مهني
(4) Semiprofessional (Typist, Clerk--) / موظف
(5) Professional (Doctor, lawyer, teacher / مهنة محترف
10. **Mother's Job / مهنة الام :**
(1) House wife لا تعمل
(2) Industrial or agricultural worker / مزارعة او عاملة
(3) Skilled worker (Mechanic---) / عاملة مهنية
(4) Semiprofessional (Typist, Clerk--) / موظفة
(5) Professional (Doctor, lawyer, teacher / مهنة محترفة
11. **You are living / مكان المعيشة :**
(1) With one/both parents مع الاهل
(2) University hostels المدينة الجامعية
(3) Private houses شقة خاصة

12. Your Height in cm ----- الطول بالسنتيمتر
13. Your Weight in kg ----- الوزن بالكيلو
14. Your BMI ----- مؤشر كتلة الجسم

B) Assessing your physical activity تقييم النشاط البدني

1. **Do you exercise** (at least 150 minutes of moderate-intensity physical activity throughout the week including Rapid or slow walking, swimming?)

بما في ذلك المشي السريع أو البطيء والسباحة) دقيقة من النشاط المستمر في الاسبوع 150- هل تمارس الرياضة (

- (1)-Almost Never or Practicing low than 150 mins/week (low) في الاغلب لا
(2) Practicing 150 mins/week (moderate) اقل من 150 دقيقة في الاسبوع.
(3) Practicing more than 150 mins/week (high) اكثر من 150 دقيقة في الاسبوع

2. **Assess your time spent in sedentary activities (ex: watching TV):**

2. قِيم الوقت الذي تقضيه في الأنشطة الخاملة (مثل: مشاهدة التلفزيون)

- (1) < than 2 hours /day. اقل من 2 ساعة يوميا
(2) > than 2 hours. /day. اكثر من 2 ساعة يوميا

C) How frequently do you eat each of the following foods? All the meals and snacks are considered

كم مرة تأكل كل من الأطعمة التالية؟ يتم اعتبار جميع الوجبات والوجبات الخفيفة

Appendix 11

Food groups and food items الاطعمة والمواد الغذائية	1-2 times a day 1 او 2 في اليوم	3 or more times a day 3 او اكثر في اليوم	1-2 times a week 1 او 2 في الاسبوع	3 or more times a week 3 او اكثر في الاسبوع	Rarely/ Never نادرا او ابدا
Energy food 1) Cereal grains اغذية الطاقة الحبوب					
Balady / white bread Rice/ macaroni الخبز البلدي او الابيض / الرز / المكرونة					
2) Sweets and refined products الحلويات والمنتجات المصنعة					
Konafa-halawa- Jam الكنافة- الحلاوة- المربي مثلا					
3) Fats and oils الدهون والزيوت butter, cream مثلا : الزبدة - الكريمة					
Tissue building food 4) Pulses الاذغية لبناء الانسجة البقول					
Beans الفاصوليا					
Lentils العدس					
Koshary الكشري					
Soy Beans					
5) High biological value protein الاذغية لنباتات الانسجة :بروتين عالي القيمة البيولوجية					
Red meat*** لحم احمر					
Fatty meat لحم دسم					
poultry with skin فراخ بالجلد					
Skinless poultry فراخ بعد نزع الجلد					
Grilled fish سمك مشوي					
Fried fish سمك مقلي					
Liver كبدة					
Boiled eggs بيض مسلوق					
Fried eggs بيض مقلي					
Milk/yoghurt/white cheese البن - زبادي - جبنة بيضاء					
Other kinds of cheese: جبنة ناستو اورومي					
6) Protective foods الاطعمة الواقية : Fruits الفاكهة					
Juice العصائر					
Cooked vegetables خضار مطبوخ					
Fresh vegetables خضار طازج					
7) Beverages المشروبات : Tea/ coffee شاي / قهوة					
Cola drinks مشروبات غازية					
Alcohol كحوليات					

(NNI, 2008)