

Dietary Patterns and Obesity among Fourth Year Medical Students Cairo University

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Abstract: Medical students have greater knowledge about healthy diet and lifestyle than their peers, however, this knowledge isn't translated into practice in their own lives placing them at risk for non communicable diseases. This study aimed at measuring overweight and obesity prevalence and exploring dietary pattern and its related factors among Cairo University fourth year medical students. This cross-sectional study included all 891 fourth year medical students of Faculty of Medicine, Cairo University for the academic year 2016-2017. Dietary pattern and physical activity level and type were collected from the students through a self-completed E-form based on United States Department of Health and Human Services and United States Department of Agriculture dietary guidelines for Americans 2015-2020 and the European Society of Cardiology guidelines for cardiovascular disease prevention in clinical practice 2012. Also, anthropometric measurements were reported by the students. Results revealed that the prevalence of obesity and overweight was about 42% among male students and 32% among female students. Only about one fourth of the students consumed fruits and vegetables or colored vegetables on a daily basis while most of them mentioned their daily consumption of high fat and sugary foods. Only 8.2 % of the students mentioned consuming 3 cups of milk equivalent or more per day. Also, they showed low activity level with significant higher level among males than females. Conclusion, the study revealed that the participating medical students had unhealthy dietary pattern and poor physical activity among both genders irrespective to their residence or frequency of eating with family. These results call for strategic intensive university-based plans for health promotion activity for the students. Further research to study dietary habits and investigate their related factors among these students is recommended over their following years to detect the trend of non communicable diseases risk factors and implement the appropriate prevention.

Key words: Dietary Pattern • Medical Students • Physical Activity • Obesity

INTRODUCTION

Adequate nutrition is crucial for physical development, energy supply and disease prevention. Inadequate diet in young people adversely affects their health, development and learning abilities [1].

Nutrition transition in the past decades had lead to a change in the eating pattern worldwide. Diet composition shifted towards high calorie consumption especially from high fat and refined carbohydrate sources [2].

Early adulthood period is critical for determining life style later in life as young people start to feel independent and adopt life lasting health behavior [3]. College life may negatively influence students' dietary habits and physical

activity due to lack of time and exposure to stress [4]. Faulty diet is a well-known risk factor for non communicable diseases (NCDs) such as obesity, type 2 diabetes and coronary heart disease [5]. Previous studies revealed that medical students have greater knowledge about healthy diet and lifestyle than their peers from other colleges. In spite of that, this knowledge does not translate into practice in their own lives as they face a lot of challenges and study demands that would adversely affect their health and life style habits [6].

It has been proven that health care providers who lead a healthy life style would be better providing patients counseling and advice about healthy habits [6]. Thus, healthy dietary habits among medical students are

essential as they are future physicians and the students who personally adopt unhealthy lifestyle are less likely to provide effective health promotion for their patients [7].

This study aimed at measuring overweight and obesity prevalence and exploring dietary pattern and its related factors among Cairo University fourth year medical students.

MATERIALS AND METHODS

Study Design and Sampling: This study is a descriptive cross-sectional study; all 891 fourth year medical students of Faculty of Medicine, Cairo University for the academic year 2016-2017 were self-surveyed as a part of their practical curriculum of Community Medicine.

Data Collection Instruments: Data was collected through a guided self-completed E-form that included 4 parts; the first contained socio-demographic data on age, sex, residency and living with family status, the second one is a food frequency questionnaire which was based on United States (U.S.) Department of Health and Human Services and U.S. Department of Agriculture dietary guidelines for Americans 2015-2020 [8] and the European Society of Cardiology guidelines for cardiovascular disease prevention in clinical practice 2012 [9]. The food frequency questionnaire covers the frequency of consumption of the following food groups: fruits and vegetables, whole grains, milk and milk products, meats, high fat and sugary foods and drinks.

The third part of the E-form is concerned with measurement of weight and height and calculation of body mass index. The final section was about levels of physical activity. Prior to filling the E-form, students were given instructions on how to fill out the form completely and truthfully. Weight measurement was done with the students without shoes and in light clothing and height measurement was done with the students standing and their backs leaning in opposition to the stadiometer.

In order to ensure accuracy and confidentiality, the e-form was anonymous with unique identifier for each student. Also, completion of the e-form with the student's self data was voluntary; however, they were willing to assess themselves with 100% response rate.

Statistical Analysis: Data was collected through the e-form, coded and entered using excel. The statistical package of social science (SPSS) version 21 was used for analysis.

Calculation of body Mass Index (BMI) was done by dividing the weight in kilogram by height in square meter (kg/m^2) and classified into 4 classes based on World Health Organization (WHO) cut off points [10] as follows: BMI ≤ 18.5 was classified as underweight, BMI ranges from 18.5 to 24.9 as normal weight, BMI ranges from 25 to 29.9 as overweight and BMI ≥ 30 as obese.

Descriptive statistics were performed for all variables to summarize the data, mean, standard deviation, minimum and maximum values for age and number and percentage for qualitative values.

Frequency of eating different types of food was described for male and female participants and comparison was done between them to detect any significant difference. Also, comparisons were done to detect any significant effect of residence, living with family status and frequency of eating with family on the students' pattern of food consumption and their commitment to dietary guidelines.

Based on United States (U.S.) Department of Health and Human Services and U.S. Department of Agriculture dietary guidelines for Americans 2015-2020 [8] and the European Society of Cardiology guidelines for cardiovascular disease prevention in clinical practice 2012 [9], cut off points used for being following dietary guidelines was as follows: daily consumption for colored vegetables and whole grains, 3 cups or more per day for milk, 2 times or more per week for fish.

Statistical differences between groups were tested using Pearson Chi-Square test, 2-sided tests' p values less than or equal to 0.05 were considered statistically significant.

Ethical Considerations: A written informed consent was obtained from the students through the e-form preceded by pre-verbal explanation of the practical module and its objectives stressing on the possibility of using the generated data for research. Also, the student's participation through their self-data was voluntary and they were given the option of completing their assignment by assessing one of their peers from other faculties.

To ensure confidentiality, the e-form was anonymous with unique identifier for each student which was known only by the student him/herself, the head of Department Council and the department data management team for the sake of data clearance. The research did not include any invasive procedures.

RESULTS

A total of 891 medical students participated in this study with 100% response rate. Analysis of the socio-demographic characteristics of the students showed that their mean age was 21.5 and about 62% were females. Regarding residence, the majority of the participants (85.9%) came from urban areas while only 59 % was living with their families.

Table 1 indicates that the prevalence of abnormal body mass index was significantly different between male and female participants as follows; overweight and obesity prevalence was about 42% among male students and 32% among female students while underweight prevalence was about 3 and 7% respectively.

Only about one fourth of the students mentioned daily consumption of fruits and vegetables or colored vegetables while most of them mentioned their daily consumption of whole grains, high fat and sugary foods as displayed in Table 2. Students live in rural areas reported significantly more frequent consumption of fruits and vegetables and whole grains than those live in urban areas.

No significant difference was found between male and female students regarding their pattern of consumption of different types of food as shown in Table 2 and 4. Also, Tables 3 and 5 show no significant difference regarding consumption of different food groups between those who live and eat frequently with their families and those who do not except for regular consumption of colored vegetables.

Table 1: Percent distribution of body mass index categories by sex among fourth year medical students Cairo University, academic year 2016-2017 (n=891)

Sex	Male students		Female students	
	No	%	No	%
Underweight	11	3.2	37	6.7
Normal weight	187	55.0	337	61.2
Overweight	108	31.8*	139	25.2
Obese	34	10.0*	38	6.9
Total	340	100.0	551	100.0

Table 2: Frequency of consumption of energy yielding foods among fourth year medical students by sex and residence, Cairo University, academic year 2016-2017 (n=891)

Food Consumption	Sex				Residence			
	Male N = 340		Female N = 551		Urban No = 765		Rural N = 126	
	No	%	No	%	No	%	No	%
Fruits and vegetables								
Daily	88	25.9	168	30.5	219	28.6*	37	29.4
3-4 times/week	137	40.3	231	41.9	308	40.3	60	47.6
1-2 times/week	91	26.8	124	22.5	187	24.4	28	22.2
Rarely	24	7	28	5.1	51	6.7	1	0.8
Colored vegetables								
Daily	89	26.2	140	25.4	199	26.0	30	23.8
3-4 times/week	124	36.5	221	40.1	293	38.3	52	41.3
1-2 times/week	97	28.5	149	27.0	216	28.2	30	23.8
Rarely	30	8.8	41	7.5	57	7.5	14	11.1
Whole grain								
Daily	320	94.1	508	92.2	705	92.2*	123	97.6
Less than daily	20	5.9	43	7.8	60	7.8	3	2.4
High fat and sugary food								
Daily	296	87.1	485	88.0	95	12.4	15	11.9
Less than daily	44	12.9	66	12.0	670	87.6	111	88.1
Sugary drinks								
Daily	280	82.4	438	79.5	154	20.1	19	15.1
Less than daily	60	17.6	113	20.5	611	79.9	107	84.9

Chi square test was used for testing significance

*P = <0.05

Table 3: Frequency of consumption of energy yielding foods among fourth year medical students by living with family status and frequency of eating with them, Cairo University, academic year 2016-2017 (n=891)

Food Consumption	Living with family				Eating with Family							
	Yes N = 526		No N = 365		Daily N = 313		3-4 times/week N = 158		1-2 times/week N = 128		Rarely N = 292	
	No	%	No	%	No	%	No	%	No	%	No	%
Fruits and vegetables												
Daily	159	30.2	97	26.6	100	31.9	49	31.0	36	28.1	71	24.3
3-4 times/week	216	41.1	152	41.6	121	38.7	71	44.9	56	43.8	120	41.1
1-2 times/week	126	24.0	89	24.4	80	25.6	31	19.6	29	22.7	75	25.7
Rarely	25	4.8	27	7.4	12	3.8	7	4.4	7	5.5	26	8.9
Colored vegetables												
Daily	151	28.7*	78	21.4	103	32.9*	42	26.6	32	25.0	52	17.8
3-4 times/week	208	39.5	137	37.5	122	39.0	69	43.7	51	39.8	103	35.3
1-2 times/week	143	27.2	103	28.2	73	23.3	41	25.9	39	30.5	93	31.8
Rarely	24	4.6	47	12.9	15	4.8	6	3.8	6	4.7	44	15.1
Whole grain												
Daily	482	91.6	346	94.8	289	92.3	145	91.8	124	96.9	270	92.5
Less than daily	44	8.4	19	5.2	24	7.7	13	8.2	4	3.1	22	7.5
High fat and sugary food												
Daily	69	13.1	41	11.2	48	15.3	17	10.8	15	11.7	30	10.3
Less than daily	457	86.9	324	88.8	265	84.7	141	89.2	113	88.3	262	89.7
Sugary drinks												
Daily	107	20.3	66	18.1	66	21.1	30	19.0	24	18.8	53	18.2
Less than daily	419	79.7	299	81.9	247	78.9	128	81.0	104	81.3	239	81.8

Chi square test was used for testing significance

*P = <0.05

Table 4: Frequency of consumption of protein rich foods by sex and residence among fourth year medical students Cairo University, academic year 2016-2017 (n=891)

Food Consumption	Sex				Residence			
	Male N = 340		Female N = 551		Urban No = 765		Rural N = 126	
	No	%	No	%	No	%	No	%
Milk								
Less than 3 cups/day	310	91.2	508	92.2	63	8.2	10	7.9
3 cups or more/day	30	8.8	43	7.8	702	91.8	116	92.1
Red meat								
Less than once/week	30	8.8	60	10.9	75	9.8	15	11.9
Once/week	109	32.1	184	33.4	255	33.3	38	30.2
Twice or more/week	201	59.1	307	55.7	435	56.9	73	57.9
Poultry								
Less than once/week	8	2.4	13	2.4	21	2.7	0	0.0
Once/week	42	12.3	82	14.9	107	14.0	17	13.5
Twice or more/week	290	85.3	456	82.7	637	83.3	109	86.5
Fish								
Less than once/week	79	23.2	142	25.8	189	24.7	32	25.4
Once/week	224	65.9	356	64.6	497	65.0	83	65.9
Twice or more/week	37	10.9	53	9.6	79	10.3	11	8.7

Chi square test was used for testing significance

*P = <0.05

Table 5: Frequency of consumption of protein rich foods by living with family status and frequency of eating with them among fourth year medical students Cairo University, academic year 2016-2017 (n=891)

Food Consumption	Living with Family				Eating with Family							
	Yes N = 526		No N = 365		Daily N = 313		3-4 times/week N = 158		1-2 times/week N = 129		Rarely N = 292	
	No	%	No	%	No	%	No	%	No	%	No	%
Milk												
Less than 3 cups/day	478	90.9	340	93.2	281	89.8	144	91.1	118	92.2	275	94.2
3 cups or more/day	48	9.1	25	6.8	32	10.2	14	8.9	10	7.8	17	5.8
Red meat												
Less than once/week	52	9.9	38	10.4	35	11.2	12	7.6	17	13.3	26	8.9
Once/week	166	31.6	127	34.8	104	33.2	55	34.8	34	26.6	100	34.2
Twice or more/week	308	58.5	200	54.8	174	55.6	91	57.6	77	60.1	166	56.9
Poultry												
Less than once/week	15	2.9	6	1.6	8	2.6	4	2.5	4	3.1	5	1.7
Once/week	72	13.7	52	14.2	44	14.1	18	11.4	22	17.2	40	13.7
Twice or more/week	439	83.5	307	84.1	261	83.3	136	86.1	102	79.7	247	84.6
Fish												
Less than once/week	126	24.0	95	26.0	79	25.2*	33	20.9	39	30.5	70	24.0
Once/week	339	64.4	241	66.1	198	63.3	101	63.9	77	60.2	204	69.9
Twice or more/week	61	11.6	29	7.9	36	11.5	24	15.2	12	9.4	18	6.2

Chi square test was used for testing significance

*P = <0.05

Table 6: The relation between socio-demographic characteristics and level of physical activity among fourth year students, Cairo University, academic year 2016-2017 (n=891)

Socio-demographic characteristics	Sex				Residence				Living with family			
	Male N = 340		Female N = 551		Urban N = 765		Rural N = 126		Yes N = 526		No 365	
	No	%	No	%	No	%	No	%	No	%	No	%
Level of physical activity												
Daily	35	10.3*	36	6.5	59	7.7	12	9.5	43	8.2	28	7.7
5-6 times per week	24	7.1*	24	4.4	43	5.6	5	4.0	26	4.9	22	6.0
3-4 times per week	55	16.2*	75	13.6	114	14.9	16	12.7	76	14.5	54	14.8
1-2 times per week	129	37.9*	146	26.5	242	31.7	33	26.2	158	30.0	117	32.1
No physical activity at all	97	28.5*	270	49.0	307	40.1	60	47.6	223	42.4	144	39.4
Type of physical activity												
Aerobic	41	12.1*	90	16.3	113	14.7	18	14.3	77	14.6	54	14.8
Competitive sports	60	17.6	9	1.6	60	7.8	9	7.1	33	6.3	36	9.9
Cross training	19	5.6	18	3.3	34	4.4	3	2.4	19	3.6	18	4.9
Strength training	58	17.1	8	1.5	62	8.1	4	3.2	32	6.1	34	9.3
Others	64	18.8	152	27.6	184	24.1	32	25.4	139	26.4	77	21.1
No physical activity at all	98	28.8	274	49.7	312	40.8	60	47.6	226	43.0	146	40.0

Chi square test was used for testing significance

*P = <0.05

Table 4 shows that a small percent of male and female participants (8.8 and 7.8% respectively) mentioned consuming 3 cups of milk equivalent or more per day. As for the meat group, 59.1 and 55.7% of males and females respectively had high consumption of red meat (twice or more per week) while only 10.9% of male students and 9.6% of female students mentioned this high pattern of consumption when asked about fish.

As shown in Table 6, there was a significant difference between male and female students in practicing physical activity while 10.3 % of male students mentioned practicing physical activity on a daily basis, only 6.5% of the female participants did so. Also, 28.5% of male participants mentioned not practicing any physical activity for about half of the female participants (49.0%). Practicing competitive sports and strengthening exercises

were higher among male (17.6 and 17.1% respectively) than female students (1.6 and 1.5%) while aerobic physical activities were higher among female (16.3%) than male students (12.1%).

DISCUSSION

The purpose of the current study was to measure the prevalence of overweight and obesity and assess the frequency of consumption of different food groups among fourth year medical students who are at a stage of transition from studying academic subjects to studying clinical subjects, as achieving and maintaining a healthy body weight has a favorable effect on metabolic risk factors and lower cardiovascular (CV) risk.

The current study revealed that 8.1% and 27.7 % of the students were obese and overweight respectively. Similar prevalence was reported among United States and Malaysian medical students by Brehm *et al.* in 2016 [6] and Gopalakrishnan *et al.* 2012 respectively [11], however, lower prevalence rate of obesity (3.9%) and overweight (17.2%) was reported among Sudanese medical students in 2015 [12].

Faulty dietary habits and physical inactivity which were found among the study participants can explain this percentage of overweight and obesity. Also, stress is an important challenge that face the medical students [13] and there is a reciprocal relation between stress and eating as found in previous studies thus eating habits may be affected by behavioral consequences of stress [14, 15] and people existing in a stressful environment tend to consume more foods as a stress coping mechanism [16]. While other study showed that the intake of unhealthy food during the exams was one of the causes of stress among medical students [13].

Both obesity and overweight were significantly higher among male than female students, a finding that might be explained by the fact that females are more cautious about their weight status than males. A finding that is similar to the studies conducted among Lebanese university students in 2008 [17] and among 22 universities' students in 22 low, middle income and emerging economy countries in 2014 [18].

Faulty dietary habits encountered by the students in the current study were low consumption of fruits and colored vegetables, milk and fish and high consumption of red meat and high fat and sugary foods, in addition to physical inactivity. These findings have negative consequences both on students' health and their future patients when they become health care providers.

This unhealthy dietary pattern is a well known risk factor for non communicable diseases (NCD) diseases that show an increasing prevalence all over the world [19].

When comparing the current study results to the dietary guidelines for Americans 2015-2020 [8] and 2016 European Guidelines on cardiovascular disease prevention in clinical practice [9], it was found that the students' eating pattern was unhealthy regarding the frequency of consumption of many food groups as only 28.7% of the students reported consuming fruits and vegetables on daily basis and 25.7% reported daily consumption of colored vegetables while many studies stressed on the protective effect of daily consumption of five or more servings from fruits and vegetables food group on CV diseases. This finding is similar to the results of another study conducted in Saudi Arabia in 2016 [20], however, higher consumption of vegetables was reported by an Indian study where about 60% of medical students consumed vegetables daily [21].

Also, most of the students (91.8%) reported consumption of less than 3 cups of milk-equivalent per day that didn't correspond to recommendations of healthy nutrition. Moreover, 83.7 and 89.9 % of them reported high red meat intake of 2 or more times per week and low fish consumption of one time or less per week. Similarly, high animal fat consumption among medical students was reported in 2007 by Lina and his colleagues [22].

Most of the students (87.7%) reported daily consumption of high fat and sugary food which can make it difficult to meet the individuals' nutrient needs while being within their daily caloric limits leading to malnutrition diseases or obesity and other chronic diseases.

Previous research reported that living with the family is linked to better dietary habits [23]. This was partially shown in the current study where colored vegetables consumption was significantly higher among students who were with their families and those who eat more frequently with their families in comparison to those who were living away from their families or eat less frequently with their families. On the other hand, no significant differences regarding consumption of whole grains, milk, sugary drinks, or high fat and high sugar food was observed among students living with families and eating with their families compared to those living and eating away from their families.

Whereas physical inactivity has been identified as the fourth leading risk factor for global mortality [24], about two fifths (41.2%) of the students were physically inactive. Also, among those who exercised regularly,

different level of physical activity was observed and only a minority of them (13.4%) reported practicing physical activity five or more times per week which means that most of the students did not meet WHO recommended level of activity which stated practicing aerobic exercises for 30 minutes most days of the week [25, 26].

Contrary to our results, US medical students reported higher levels of physical activity than their age matched peers and the general population [27]. Lack of time, laziness and exhaustion from academic activities were identified by Rao and his colleagues in 2012 as important hindering factors among medical students [28].

The percentage of physical inactivity was significantly higher among females, while the percentage of physical activity at different frequencies was significantly higher among males. It might be due to environmental and cultural factors that discourage females from being more active as for example, fear of crime and violence in outdoor areas especially late in the day and involvement of females in house activities and chores. Similar results are found among medical students at Malaya University in 2016 and medical interns in a private medical college hospital in Chennai in 2019 [29, 30].

CONCLUSIONS AND RECOMMENDATIONS

The study revealed that participating medical students had unhealthy dietary pattern and poor physical activity irrespective to their residence or frequency of eating with family. These results call for strategic intensive university-based plans, urgent nutritional education interventions, health promotion activities and counseling on proper nutrition and physical activity to reduce the students' NCD risks, ensure that today's students will become future's health care providers role models and prepare them for their future role in community counselling. Further research to assess dietary habits and their related factors among these students is recommended over the following years to detect the trend of NCD risk factors and implement the appropriate prevention.

Limitations: Since our study participants were recruited from only one medical school, generalization of the results is limited to similar institutions. Also, involving only fourth year medical students might not represent all Cairo University medical school population in terms of dietary habits and food frequency.

Data Availability: Data are available and can be supplied by the author once requested.

Conflict of Interest: All research authors have no conflict of interest of any type.

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Authors' Contributions: Mona El-Lawendi had a role in the conception and design of the study and drafting the article. Ola Mosrafa had a role in data acquisition and analysis and drafting the article. ME had a role in interpretation of data, drafting and revising the article critically for important intellectual content. All authors read and approved the final manuscript.

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