



Food Addiction; Prevalence and its Impact on Menoufia Medical Students

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ABSTRACT

Background: Food addiction, a dysfunctional eating pattern, is featured by a powerful desire to overeat highly appetizing foods. Food addiction has drawn more attention over the last decades as it is implicated as a factor in the rising rates of obesity worldwide. **Objectives:** to measure the prevalence, predictors, and impact of food addiction among the undergraduate medical students in Menoufia University. **Method:** A cross sectional study was carried out on 922 undergraduate medical students in Menoufia University. The modified Yale Food Addiction Scale (mYFAS 2.0) was used for food addiction diagnosis. Anxiety and depression were assessed using General Anxiety Disorder-7 scale (GAD-7) and Patient Health Questionnaire depression scale (PHQ-9) respectively. **Results:** Food addiction prevalence among the studied group was 10.4 % (96 out of 922), with 43 (44.8%) of them were of mild degree, 28 (29.2%) were of moderate degree and 25 (26.0%) had a severe form of food addiction. The most prevalent food addiction indicator was excess eating till feeling full (151, 16.4%). Significant predictors of food addiction were Smoking ($p < 0.001$, OR 4.65 [2.51-8.31]), gender ($p = 0.024$, OR 1.38 [1.08-3.10]), dieting ($p < 0.001$, OR; 3.45 [2.05-5.81]), depression ($p = 0.001$, OR; 2.56 [1.49-4.39]), and anxiety ($p < 0.001$, OR; 3.26 [1.92-5.54]). **Conclusion:** Food addiction had a considerable prevalence among the medical students, and it was strongly associated with smoking, dieting, depression, anxiety, and obesity. As a result, providing health education programs and psychological care is critical to lower the prevalence of food addiction and its related comorbidities among medical students.

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INTRODUCTION

Worldwide, obesity is currently one of the most serious and escalating challenges to public health.¹ The tremendous rise in obesity rates over the previous few decades has been exacerbated by significant changes in the physical environment. Environmental variables such as nutrition transition, sedentary lifestyles and non-homeostatic eating, all contribute directly to the establishment of an obesogenic environment (easy access to low-priced, high-calorie, high-sugar, and high-fat foods that are considered to be addictive).²

Highly appetizing food stuffs, rich in sugar, fat and/or salt are particularly stimulating to the brain's

reward pathways, promoting an increase in food intake and triggering withdrawal symptoms, suggesting a behaviour similar to substance abuse.³ This food-related behavior has given rise to the concept of food addiction (FA).² Food addiction refers to a condition marked by compulsive eating, intensive cravings, and potentially the presence of food ingredients with drug-like effects that weaken the willpower to refrain from consuming them.⁴ Food addiction has been for a long time a matter of argument and while it shares many behavioural and physiological similarities with substance abuse, it hasn't yet been defined as a disorder in the

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Diagnostic and Statistical Manual of Mental Disorders (DSM-5).⁵

The most apparent adverse effects of food addiction are overweight and obesity, but it is also strongly associated with eating disorders and psychiatric problems, like stress, anxiety, depression, and sleeping problems.⁶

It has been observed that young people, especially university students, are highly affected by the food environment and they are more susceptible to eating disorders and food addiction. Students typically go from family-based routines to more independent food selections and, consequently, different new eating habits.⁷ Their dietary habits are usually characterized by a lack of variety in the foods consumed, skipping meals, excessive intake of cheap and tasty fast and processed foods with high addictive potential.⁸ Furthermore, as a result of the stress of academic demands, time limits, and social challenges, university students are susceptible to depression. Medical students, specifically, may face additional constraints such as a heavy workload, the medical curriculum, many exams, and the stress of the clinical environment, all of which contribute to their higher incidence of depression when compared to other college students of similar age.⁹

Identifying the frequency of food addiction among university students might help in the establishment of measures to prevent addictive eating in this population. Therefore, this study's primary aim was to determine the prevalence of food addiction in Menoufia University medical students. The secondary aim was to investigate the predictors of FA and its impact on the students.

METHODS

A cross-sectional study (questionnaire-based) was conducted from the end of September to the end of November 2023 among undergraduate medical students from Menoufia University, Egypt.

According to previous study which have indicated that 11.4% of medical students at Minia University in Egypt suffer from food addiction,¹⁰ The following equation was used to compute sample size: $n = (z^2 \times p \times q) / D^2$ and 0.025 was chosen as the acceptable limit of precision (D). The sample size was estimated to be 1007 students. Participants who were over the age of 18 and voluntarily agreed to

Table 1: Sociodemographic data of the studied participants (N= 922)

Characteristic	Value
Age	
Mean ±SD	21.69± 1.49

Range	18-24
Gender	No (%)
Male	285 (30.9)
Female	637 (69.1)
Residence	
Rural	569 (61.7)
Urban	353 (38.3)
Housing during the study	
With family	676 (73.3)
Away from family	246 (26.7)
Family income	
Enough	818 (88.7)
Not enough	104 (11.3)
Smoking	
Yes	599 (65.0)
No	323 (35.0)
Physical activity	
Yes	200 (21.7)
No	722 (78.3)
Have any chronic disease	
Yes	62 (6.7)
No	860 (93.3)

engage in the study and did not have any psychiatric problems were eligible.

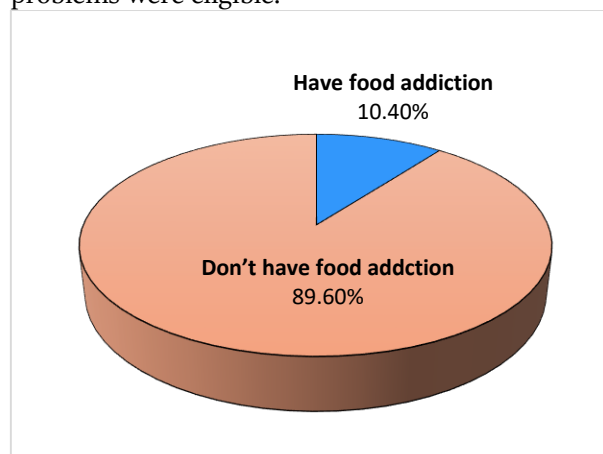


Figure 1: Prevalence of food addiction among the studied group

Each academic year at Menoufia medical faculty is divided into four small groups of approximately 200 students each. The study sample was formed by randomly selecting one group of students from each grade. Eighty-five of the questionnaires (8.4%) were excluded from the analysis as they were incomplete, so the total sample size was 922.

Data collection tools: All the involved participants had been interviewed and asked to complete the questionnaire which included four sections. *Section one:* Sociodemographic data, which was designed to

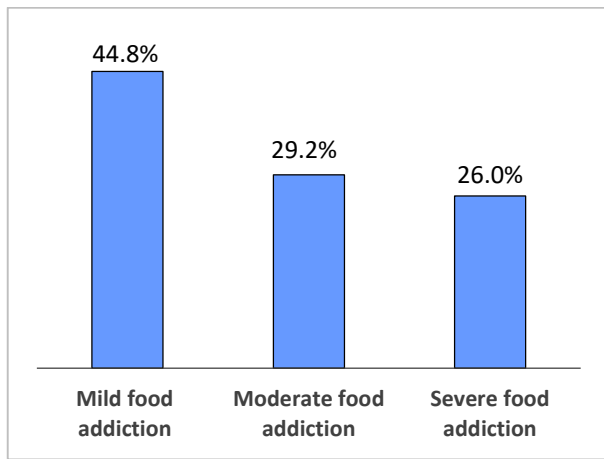


Figure 2: Degrees of food addiction among the studied group.

collect demographic data, including age, gender, residence, family income, smoking history, physical activity, medical history, height and weight. BMI was calculated by dividing weight in kilograms by height in meters squared. The participants were categorized into three groups based on their BMI: normal weight (18.5-24.9), overweight (25-29.9), and obese (≥ 30). *Section two:* The Modified Yale Food Addiction Scale (mYFAS 2.0), It is a validated instrument for assessing FA diagnosis over the last 12 months and detecting the presence of FA indicators. The measure has 13 self-report questions, 11 of which assess food addiction symptoms and two of which assess clinically significant distress and impairment related to diet. Based on the answers to each question, each FA symptom or indicator is given a score ranging from never (0) to everyday (7). Each question has a threshold; if the symptom score reaches the threshold, the FA indicator criterion will be fulfilled. Lastly, the eleven symptoms are combined to form a scoring option based on symptom count. Individuals who have two or more symptoms and meet the clinical impairment/distress criterion are classified as having a food addiction. Additionally, it can be categorized as having no food addiction or having mild, moderate, or severe food addiction (mild FA= 2-3 symptoms plus distress or impairment, moderate FA = 4-5 symptoms plus distress or impairment, severe FA = 6 or more symptoms plus impairment or distress).¹¹ *Section three:* General Anxiety Disorder-7 (GAD-7) scale that included seven anxiety-related questions with four alternative replies (not at all, several days, over half the days, or nearly every day; during the previous two weeks) and a coding system (0, 1, 2, and 3). Three categories were established according to the overall score: 0-9 indicate non to mild anxiety, 10-14 indicate moderate

Table 2: Frequency of food addiction indicators among the studied group (N= 922)

Indicators	N (%)
Excess eating till feeling full	16.4
Excess eating till laziness	9.5
Avoid social activities	10.2
Mood improvement with certain foods	14.4
Psychological disturbance due to my eating habits	8.4
life troubles due to my eating habits	8.7
I am not able to care my family due to my eating habits	8.2
Persistence of my eating habits despite of its problems	11.5
Decreased enjoyment with food as before	5.1
Urgent desire to eat neglecting anything else	10.0
Failure to stop or to decrease certain foods	11.4
Lack of attention toward dangerous situation due to preoccupation with eating	8.9
My family was annoyed & concerned about my overeating	11.8

anxiety, while 15-21 indicate severe anxiety.¹² *Section four:* Patient Health Questionnaire depression scale (PHQ-9) is a nine-item depression assessment tool. Each question had four choices for responses (not at all, several days, more than half the days, or nearly every day; over the last two weeks) with a corresponding code system (0, 1, 2, and 3). The overall score was divided into five categories: none or minimal depression (scoring 0-4), mild depression (scoring 5-9), moderate depression (10-14), moderately-severe depression (15-19), and severe depression (20-27).¹³

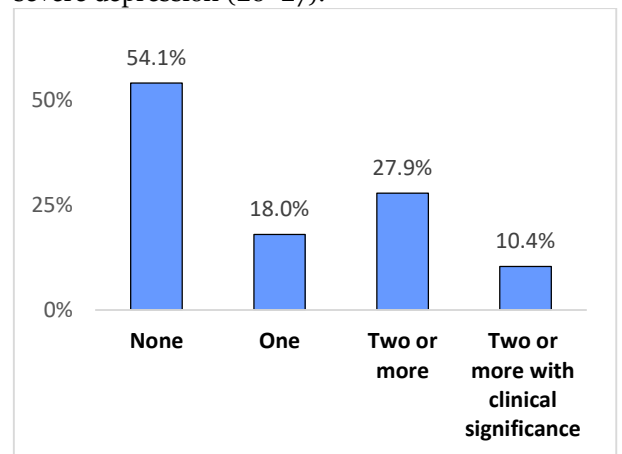


Figure 3: Distribution of students according to number of reported food indicators (N= 922)

Statistical analysis: Data analysis was done using SPSS software (version 24.0, Chicago, IL, USA). For categorical variables, descriptive statistics were carried out using frequency and percent while quantitative variables were presented as mean and standard deviation (SD). The Chi-squared test (χ^2) was applied to analyse associations between

Table 3: Characteristics of the studied group according to food addiction (N= 922)

	Food addiction (No=97)	No food addiction (No=825)	Test#	P value
Age				
Mean ±SD	21.61± 1.64	21.70±1.48	0.597	0.551
Gender				
Male	43 (15.1)	242 (84.9)	9.14	0.003*
Female	54 (8.5)	583 (91.5)		
Residence				
Rural	60 (10.5)	509 (89.5)	0.001	0.976
Urban	37 (10.5)	316 (89.5)		
Housing during the study				
With family	70 (10.4)	606 (89.6)	0.074	0.786
Away from family	27 (11.0)	219 (89.0)		
Family income				
Enough	80 (9.8)	738 (90.2)	4.23	0.040*
Not enough	17 (16.3)	87 (83.7)		
Smoking				
Yes	35 (35.0)	65 (65.0)	72.69	< 0.001*
No	61 (7.4)	761 (92.6)		
Physical activity				
Yes	65 (10.9)	534 (89.1)	0.354	0.552
No	31 (9.6)	292 (90.4)		
Presence of chronic diseases				
Yes	11 (17.7)	51 (82.3)	3.68	0.055
No	86 (10.0)	774 (90.0)		
Social isolation				
Yes	56 (14.8)	323 (85.2)	13.14	<0.001*
No	40 (7.4)	503 (92.6)		
Presence of family troubles				
Yes	23 (17.4)	109 (82.6)	7.80	0.005*
No	74 (9.4)	716 (90.6)		
Exposed to painful feeling last year				
Yes	61 (12.4)	429 (87.6)	4.13	0.042*
No	36 (8.3)	396 (91.7)		
Had a diet the last year				
Yes	53 (19.0)	226 (81.0)	30.53	<0.001
No	44 (6.8)	599 (93.2)		
Intake of fast food				
Less than 3 times /week	59 (9.6)	555 (90.4)	8.88	0.003
More than 3 times /week	27 (18.2)	121 (81.8)		
Craving toward which type of food				
Sweets group	22 (11.4)	171 (88.6)	11.53	0.021*
Carbs groups	28 (12.4)	198 (87.6)		
Salted foods	23 (6.7)	318 (93.3)		
Fatty meals	19 (17.3)	91 (82.7)		
Soft drink	5 (9.6)	47 (90.4)		
Depression				
None or minimal	14 (3.8)	354 (96.2)	17.58	0.001*
Mild	42 (12.6)	292 (87.4)		
Moderate	23 (13.1)	153 (86.9)		
Severe	17 (38.6)	27 (61.4)		
Anxiety				
None to mild	36 (5.8)	580 (94.2)	57.81	<0.001
Moderate	40 (17.0)	195 (83.0)		
Severe	21 (29.6)	50 (70.4)		
Impact of food addiction on BMI				
Obese	25 (26.0)	52 (6.3)	43.81	<0.001*
Not obese	71 (74.0)	774 (93.7)		

Chi squared test except age using t-test *significant

Table 4: Multivariate analysis for possible predictors of food addiction among the studied participants (N=922)

	B	Wald test	Odds ratio CI 95%	P value
Gender				
Male		5.08	1.83 (1.08-3.10)	0.024
Female	0.605	-	-	-
Income				
Enough		-	-	-
Not enough	0.377	0.936	1.46 (0.68-3.13)	0.333
Smoking				
Yes		24.65	4.56 (2.51-8.31)	<0.001
No	1.52	-	-	-
Social isolation				
Yes		1.34	1.38 (0.79-2.41)	0.246
No	0.326	-	-	-
Family troubles				
Yes		1.34	1.48 (0.76 -2.88)	0.248
No	0.393	-	-	-
Painful feeling the last year				
Yes		2.51	1.54 (0.90-2.64)	0.113
No	0.43	-	-	-
Dieting the last year				
Yes		21.81	3.45 (2.05-5.81)	<0.001
No	1.24	-	-	-
Intake of fast food				
≤3 times /week		-	-	-
>3 times /week	0.38	1.62	1.47 (0.81-2.64)	0.203
Depression				
None to mild		-	-	-
Moderate & severe	0.94	11.56	2.56 (1.49-4.39)	0.001
Anxiety				
None to mild		-	-	-
Moderate & severe	1.18	19.05	3.26 (1.92-5.54)	<0.001

dichotomous variables. To identify independent predictors of food addiction, multivariate regression analysis was performed. Significance level was established at P-value less than 0.05.

RESULTS

A cross sectional study was done over 922 participants of faculty of medicine. Their mean age was 21.69± 1.49, out of them 69.1% were females. Asking about family income, it was found that 88.7% of them had enough family income. Smoking was present in about 10.8% of them and 65.% of them stated that they play sports. Regarding their medical history only 6.7% of them were found to have chronic diseases (Table 1).

Food addiction prevalence among the studied group was 10.4 % (Figure 1) with 44.8% of them were of mild degree, 29.2% were of moderate degree and 26.0% had a severe form of food addiction (Figure 2).

The most prevalent FA indicator was excess eating till feeling full in 16.4% of students followed by feeling of mood improvement 14.4%, family anxiety about me 11.8%, and persistent eating a lot despite psychological problems in 11.5 % of students (Table 2).

Figure 3 showed that 18.0 % of the studied students had one FA indicator, 27.9 % had two indicators or more and 10.4% of them fulfilled the criteria for FA diagnosis i.e., have two or more indicators with clinical significance.

Regarding gender, food addiction was significantly higher among male students 15.1% versus 8.5% of females (P= 0.003). Students with low family income had higher prevalence of food addiction (16.3%) than those with enough family income (9.8%). There was a significant relationship between having food addiction and smoking; 35.0% of smokers have food addiction versus 7.4% among non-smokers (P < 0.001). Regarding social isolation, 14.8% of those who suffered it had food addiction

versus 7.4% among those who didn't suffer from social isolation with significant difference ($P < 0.001$). It was revealed that 17.4% of those who had family troubles had food addiction versus 9.4% of those who did not complain of family troubles ($P = 0.005$). There was statistically significant association with exposure to painful feelings the last year ($P < 0.042$), 12.4% of them have food addiction versus 8.3% of those who had not been exposed. Dieting was also a significant risk factor and predictor as 19.0% of those who had dieting the last year have food addiction versus 6.8% among those who didn't follow any diet ($P < 0.001$). Frequent intake of fast food was also a significant risk factor as 18.2% of those who had fast food intake more than three times per week were food addict versus 9.6% among those who had fast food intake less than three times per week ($P < 0.001$). There was a significant association between craving toward fatty meals and having food addiction (17.3%) ($P = 0.021$). Food addiction was significantly higher among those who have depression and anxiety (20.0% of those with severe depression versus 5.7% of those who don't have and 29.6% of those with severe anxiety versus 5.8% of those who don't have anxiety) ($P < 0.001$ & < 0.001 respectively). Regarding BMI classification, 26.0% among those who have food addiction were obese versus 6.3% among those who don't have food addiction ($P < 0.001$) (Table 3).

The conducted multivariate analysis showed that significant predictors for food addiction were gender ($P = 0.024$, OR 1.38 [1.08-3.10]), smoking ($P < 0.001$, OR; 4.65 [2.51-8.31]), dieting ($P < 0.001$, OR; 3.45 [2.05-5.81]), depression ($P = 0.001$, OR; 2.56 [1.49-4.39]) and anxiety ($P < 0.001$, OR; 3.26[1.92-5.54]) (Table 4).

DISCUSSION

The present study was conducted to estimate the prevalence of food addiction among university students and highlight its possible risk factors.

It was found that prevalence of food addiction was 10.4%. Previous studies had showed variable rates of food addiction among the university students, as it ranged between 7.1% and 18.7%,^{14,15} but studies that were conducted over general population and among overweighing peoples had found higher rates (19.9% and 38% respectively).^{16,17} The most prevalent FA indicator in this study was excess eating till feeling full 16.4% of students followed by feeling of mood improvement 14.4%, family anxiety about me 11.8%, other different predominant food indicators were reported from previous studies done

over adolescents¹⁸ and college students,¹⁴ this may be due to different sociocultural, educational or associated behavioural factors. Food addiction and the indicators for it are frequent among students in medical faculties because they may suffer a disturbed lifestyle due to being entangled in schedules of lectures, clinical and skill courses. Because of this, it is necessary to determine the predictors of addiction in the first stages of food addiction to encourage early preventive methods.

The current study found that depression and anxiety are significantly associated with food addiction, and anxiety was a significant predictor for it. Many previous studies had found a significant association between mental health issues, especially frustration, anxiety, and stress and food addiction.^{6,14,19} Depression was found to affect food choices, stimulate overeating of high caloric foods, and consequently increase the occurrence of truncal obesity.¹⁹

As regards to the relation between gender and food addiction, several studies had concluded that females were at greater risk of food addiction,^{15, 16, 20} and they explained that by the fact that females are more liable to get eating disorders specifically food addiction than males.²¹ These findings contradict with the present study which concluded that a greater percent of males had food addiction. Another group of studies had a different opinion regarding the gender as a risk factor, they found that there is no significant relation between gender and food addiction, but they found that males were more affected with tolerance and consuming food during hazardous situations.^{22, 23}

This study revealed that there were significantly more obese students among those who have food addiction, many other studies concluded that obesity was instead a significant risk factor and predictor for food addiction.^{16,24} Mirror image studies didn't conclude any significant association between the overall food addiction score and obesity.^{18,23} Food addiction is intimately linked to overweight and obesity because it indicates frequent compulsive eating of certain highly palatable foods.²⁴

According to this study, students from low-income families are more likely to develop food addiction. This was in line with a previous study,¹⁰ done on medical students in Minia Egypt who found that the higher socioeconomic standard, the lower food addiction prevalence with significant association, this inverse relation was explained by a previous research that showed that quality of diet is affected by socioeconomic variations, whereas high caloric

foods which are often deficient in nutrients, characterized by addictive liability, physically accessible, and cheap are usually consumed by poor persons.²⁵

Smoking was significantly related to occurrence of food addiction in the current study, and it was a significant predictor. This result agreed with another study that concluded that smoking is a significant risk factor for food addiction.²⁶ Also, it was associated with increased food cravings especially toward high-fatty meals.²⁷ This may be explained by the proposed theory which states that both of nicotine and consumption of greatly palatable foods stimulate what is called reward system in the brain with development of addiction.²⁸ Despite of this we are in need for more research to verify the association between smoking and food addiction and the effect of withholding smoking on the frequency of food addiction manifestations among the affected students.

Dieting was found to be a substantial risk factor and predictor in the current study. This agreed with a study done in Florida on university students where they found that the most significant risk factor for food addiction was dieting.²⁰ Nearly half of binge eaters get their eating habits after dieting.²⁹ It is not well understood whether people had food addiction first and then they get overweight, or they firstly are obese and then get food addiction, however it was demonstrated that alternative restricting and binging of food had led to food addiction in rats, similarly this may occur in humans.³⁰

Despite this study had some strength points like being one of the early studies conducted about this topic, covering many risk factors, use of the standardised modified YFAS for diagnosis and interviewing students from all of the academic years in the faculty, however; it had some weak points as it was a cross sectional study with its limitations as it shows only association not causation between outcome and risk factors and it was done in one university which hinder generalization of results to the whole Egyptian university students.

CONCLUSIONS

Food addiction had a considerable prevalence among medical students, and it was significantly linked to smoking, obesity, dieting, depression, and anxiety. So, adoption of effective behavioural modification programs is needed to decrease rate and impact of food addiction on medical students.

Ethical Approval

This study was authorized by the Ethics Committee of Faculty of medicine, Menoufia University (No.8/2023) and carried out in accordance with the Declaration of Helsinki's ethical and methodological guidelines. After explaining the purpose of the study and ensuring their confidentiality, each participant gave an informed written agreement to participate in the study.

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