THE PREVALENCE AND DETERMINANTS OF FOOD
ADDICTION AMONG FAMILY MEDICINE RESIDENTS IN
JEDDAH'S JOINT PROGRAM 2019

Dr. Sara A. Al-Juhani
Dr. Ghassan Murshid
Dr. Noha Dashash
Dr. Ola Abdulrasheed
Dr. Adel Ibrahim

AJP

THE PREVALENCE AND DETERMINANTS OF FOOD ADDICTION AMONG FAMILY MEDICINE RESIDENTS IN JEDDAH'S JOINT PROGRAM 2019[1]

[1]Dr. Sara A. Al-Juhani
Family Physician: Joint program of Family Medicine
Jeddah, Saudi Arabia
Author's E-mail: sa_sina@hotmail.com
[2]Dr. Ghassan Murshid
Family Physician: National Transformation Office, Directorate of Health Affairs
Jeddah, Saudi Arabia
[3]Dr. Noha Dashash
Consultant: Family Medicine
Assistant Director of Health Affairs for Planning and Transformation
Jeddah, Saudi Arabia
[4]Dr. Ola Abdulrasheed
Consultant: Community Medicine
Manager of Research and Studies Administration: Directorate of Health Affairs
Jeddah, Saudi Arabia
[5]Dr. Adel Ibrahim
Consultant: Community Medicine
Directorate of Health Affairs
Jeddah, Saudi Arabia

Abstract

Purpose: This study sought to measure the prevalence of food addiction and to assess its risk factors among family medicine residents of the joint program in Jeddah 2019.

Methodology: This is a cross-sectional study using the modified Yale Food Addiction Scale, Version 2;149 out of 180 candidates were approved to participate.

Findings: Most physicians were females (63%), non-smokers (66%), without chronic diseases (95%), single (55%), and living with their families (93%); participants had a mean age of 28 years and a mean body mass index (BMI) of 25. Only 11.4% of the physicians adhered to the diagnostic criteria of food addiction, with 41% experiencing mild food addiction, 24% moderate, and 35% severe. The symptom count had a mean of 1.46, and the most endorsed symptom scored was "persistent desire or repeated unsuccessful attempts to quit." There was no statistically significant clinical relationship to be found between food addiction and the different determinants, such as gender, age, relationship status, chronic disease, smoking, and BMI in this non-clinical sample.

Unique contribution to theory, practice and policy: The shows that the prevalence of food addiction among Saudi family physicians in training is similar to other studies targeting non-clinical samples around the world. Up to our knowledge, this is one of the first studies in Saudi Arabia, exploring the prevalence of food addiction. We hope that this study highlights the issue as Saudi Arabia has one of the highest rates of obesity around the world.

Keywords: *Food, addiction, Saudi, family, medicine*

---

[1] This research was undertaken on behalf of the Saudi Board of Family Medicine within the Joint Program of Family and Community Medicine in Jeddah.

1. INTRODUCTION

1.1 Background

Substance addiction is a neuropsychiatric disorder characterized by a recurring desire to continue taking a drug despite its harmful consequences. Conversely, non-substance addiction covers pathological gambling, food addiction, Internet addiction, and mobile-phone addiction (Zou, 2017). Although there is still no specific diagnosis for food addiction, the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) states that the term may be used to describe severe substance-use disorders (American Psychiatric Association, 2013). Diagnostic criteria concentrate on the effect of addictive-like symptoms, distress, and impairment in daily functions. Several studies have shown similarities between both behavioral and substance addictions. The DSM-5 launched a new diagnostic category—non-substance-related disorders—within the "Substance-Related and Addictive Disorders" section of the manual. For now, this category only encompasses gambling disorders; however, multiple other behaviors were considered for inclusion, for example, compulsive overeating (Konkolÿ Thege, Woodin, Hodgins, & Williams, 2015), problematic sexual behavior, and excessive Internet gaming. (Potenza, 2014). Food addiction was eliminated from this category as a result of insufficient evidence (Gordon, Ariel-Donges, Bauman, & Merlo, 2018). In contrast, the American Society of Addiction Medicine has included food addiction in its list of addictive disorders (Tarman, 2014). Different studies have found that drug use and overeating share behavioral and biological similarities (Davis & Carter, 2009; Gearhardt, 2011; Schulte, Avena, & Gearhardt, 2015). Regarding measuring tools, many approaches have been used, for example, self-report questionnaires, patient self-identification, and the Yale Food Addiction Scale (YFAS), which was adapted from the modified DSM criteria for substance use disorders (Gordon et al., 2018).

Later, various studies have linked a range of factors to food addiction—one of which is obesity (Ahmad, 2018). Similar neurological and behavioral features can be found in both obesity and drug addiction. About a quarter of overweight and obese individuals report clinically significant symptoms of food addiction. Similarly, about 56.8% of individuals with binge-eating disorder "a serious eating disorder in which you frequently consume unusually large amounts of food and feel unable to stop eating" (Mayo Clinic, 2018), report clinically significant food addiction symptoms. (Gearhardt et al., 2011) Although there is an overlap between food addiction and binge-eating symptoms, the two constructs do not form part of the same disorder. However, despite significant research, the concept of food addiction remains controversial. Some researchers question whether food can be addictive as it is necessary to our survival, while others point out the common biological, behavioral, and psychological similarities between food and drug addiction. Nevertheless, both sides agree that more research is needed to form a consensus. A non-systematic review by Hone-Blanchet and Fecteau (2014, as cited in Gordon et al., 2018), which compared animal and human models of food addiction to the characteristics of substance-use disorder concluded that there was significant overlap between the two conditions.

Obesity and the complication of being overweight have reached pandemic proportions. These conditions are associated with high rates of chronic diseases related to excess weight, such as diabetes, hypertension, and cardiovascular diseases. Saudi Arabia has one of the highest rates of excess weight and obesity in both children and adults. This places the population at higher risk of increased rates of morbidity and mortality, which is mainly caused by unhealthy eating, sedentary lifestyles, and weight gain (DeNicola, Aburizaiza, Siddique, Khwaja, & Carpenter, 2015).

1.2 Rationale

Food addiction is considered a cause of obesity, but there is a lack of studies exploring this addiction. Obesity is a significant problem in the Kingdom of Saudi Arabia (KSA), especially in women. However, no studies have been conducted on food addiction in KSA.

1.3 Aims of the Study

1. To estimate the impact of food addiction on obesity and their correlation in young adults.
2. To measure the prevalence of food addiction among family medicine residents in Jeddah's joint program in 2019.
3. To assess the risk factors of food addiction for family medicine residents in Jeddah's Joint Program in 2019.

2. LITERATURE REVIEW

Food addiction is controversial in the literature addressing obesity and excess weight (Novelle, 2018). Despite an increase in the number of publications regarding food addiction, little attention has been paid to its clinical assessment (Pursey, Stanwell, Gearhardt, Collins, & Burrows, 2014).

Over the last ten years, food addiction has become an important subject among the scientific community and in the media. However, this does not mean that it is a novel problem that has only emerged in the twenty-first century. The idea that food can be addictive is not new. More than 60 years ago, Randolph (1956) defined the term food addiction as "a specific adaptation to one or more regularly consumed foods to which a person is highly sensitive, [which] produces a common pattern of symptoms descriptively similar to those of other addictive processes." For a long time, food addiction was a matter of debate; one reason for this was the lack of a measurable construct to define it. This changed when a standardized measure, the YFAS, appeared in 2009. Attention to the subject dramatically increased after the appearance of this scale, as reflected by the sharp rise in studies on food addiction following 2009 (Fawzi & Fawzi, 2018).

The YFAS is a validated tool for the diagnosis of food addiction (Meule & Gearhardt, 2014). It has been developed based on the criteria for substance dependence in the *Diagnostic and Statistical Manual of Mental Disorders* (Carter, 2016). Version 2 of the scale has also been developed, upgraded, and documented (Gearhardt, Corbin, & Brownell, 2016). The scale is now the essential tool used for investigating food addiction and eating behaviors and their roles in obesity (Magyar, Nunes-Neto, & Masheb, 2018; Ahmad, 2018). An abbreviated form of the current version of the YFAS is the mYFAS 2.0 by Schulte and Gearhardt (2017).

Studies using the YFAS showed a prevalence in food addiction (FA), in different population samples, ranging from 5.4% (Pedram et al., 2013) to 56.8% (Gearhardt, 2011). The weighted mean prevalence of FA across all studies using the YFAS was 19.9%. Other studies using the YFAS showed a FA symptom count ranging from 1.8 (Murphy, Stojek, & MacKillop, 2014) to 4.6 (Gearhardt, 2011). The weighted mean number of symptoms reported was 2.8 ± 0.4; in non-clinical samples, a mean of 1.7 ± 0.4 symptoms was evident; clinical samples endorsed a mean of 4.0 ± 0.5 symptoms (Pursey, 2014).

Using the mYFAS Version 2, Schulte and Gearhardt conducted a study recruiting a sample more nationally representative of the US than previous research, which revealed a FA prevalence of 15%, and a mean symptom score of 1.81. They also found that FA was

associated with a higher BMI in women and in older, white, and low-income subjects (Schulte & Gearhardt, 2017).

Another study by Nunes-Neto (2018) found a FA prevalence of 4.32% in a large Brazilian non-clinical sample. FA was more common in women and was associated with co-occurring mood disorders, skin-picking disorders, and early-life psychological abuse (Nunes-Neto, 2018). Further, a study by Masheb, Ruser, Min, Bullock, and Dorflinger (2018) showed a FA prevalence of 10% among participants attending a weight-management program in the US.

In the case of determinants, the majority of studies concluded that FA was most prevalent in obese women (Ahmad, 2018). Many other determinants, such as smoking status, chronic diseases, and eating disorders, were significantly shown to affect the prevalence and symptom count of FA (Pursey, 2014).

3. METHODOLOGY

This is a cross-sectional study targeting family medicine residents in Jeddah's Joint Program, 2019. All 180 residents of the four levels of the Joint Program of Family Medicine in Jeddah were included. The prevalence of the problem was estimated to be 50%, with a confidence level from 90% to 99% (95%), and an error between 1% and 10% (5%).

A questionnaire was used (self-administered) for gathering data on demographics, self-reported measurements of body weight and height, and the Modified YFAS, Version 2. It was sent using a link via Google Forms (sheet).

The study outcomes include the prevalence of food addiction and the relationship of different factors—such as obesity, the condition of being overweight, weight, height, age, body mass index (BMI), smoking and chronic diseases—with food addiction.

The variables are food addiction, obesity, excess weight, weight, height, age, BMI, smoking, and chronic diseases.

Data entry and analysis were conducted using (SPSS) with a significance for the p value of < 0.05. Statistical analysis was carried out as follows

1. Regarding the statistical relationship between the diagnosis of food addiction and the different determinants and demographics, a chi-square test was performed.

2. Age was not normally distributed, so we used non-parametric tests.

3. Regarding the statistical relationship between the score count of food addiction and the different determinants and demographics, we used non-parametric tests, as the scores were not normally distributed.

4. We also calculated the mean for each statement.

3.1 Ethical Considerations

1. Approval was granted by the Joint Program of Family and Community Medicine in Jeddah.

2. Approval was provided by the Institute Review Board in Jeddah.

3. Written or verbal consent was obtained from all participants.

3.2 Relevance and Expectations

1. Relationship between food addiction, BMI, and other risk factors.

2. Food addiction is an important cause of obesity and the condition of being overweight in Saudi Arabia.

4. RESULTS

There were 152 respondents out of 180 residents (84%). Of these, 149 agreed to participate and complete the questionnaire (63.1% were females, and 36.9% were males), and three submitted their refusal.
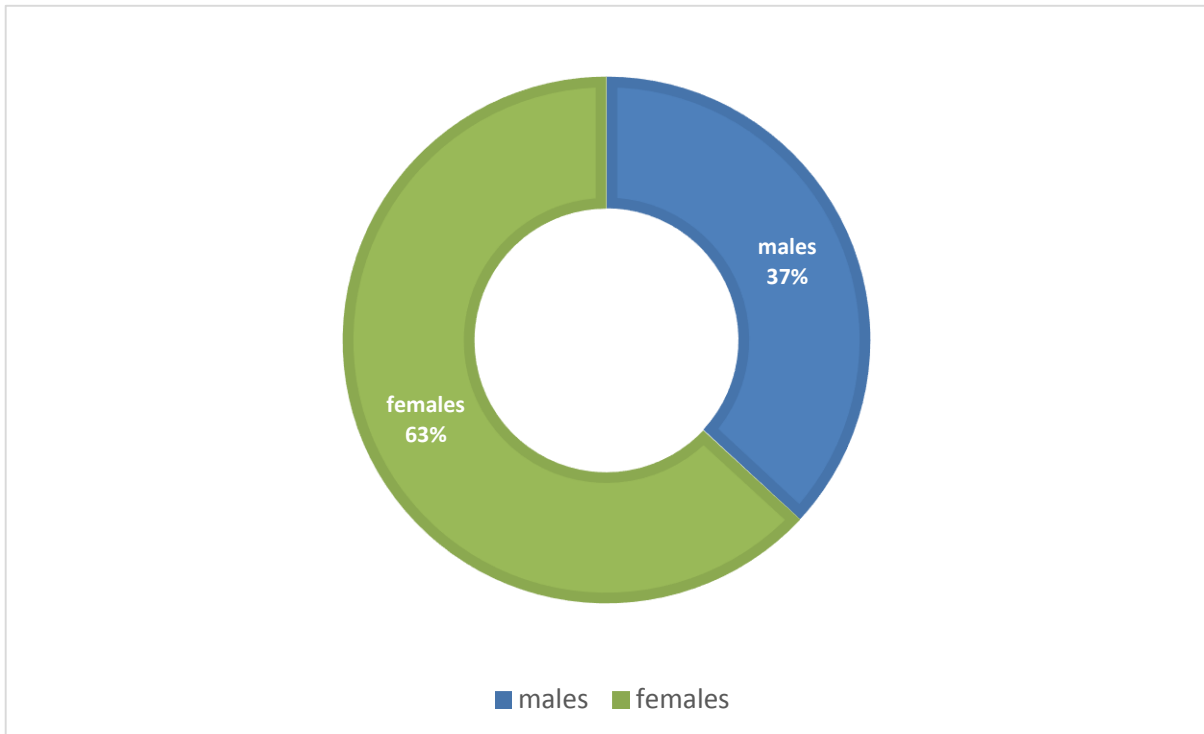

Figure 1. Gender demographics

The ages of participants ranged between 24 and 36 years, with a mean of 27.84 ± 2.233. The weights of the participants ranged between 37 kg and 115 kg, with a mean of 67.36 ± 14.319. The heights of the participants ranged between 146 cm and 186 cm, with a mean of 164.74 ± 8.739. The BMIs of the participants ranged between 15 and 38, with a mean of 24.7 ± 4.203. In terms of tenure of residency, there were 44 first-year participants (29.5%), 46 second-year participants (30.9 %), 39 third-year participants (26.2 %), and 20 fourth-year participants (13.4%).
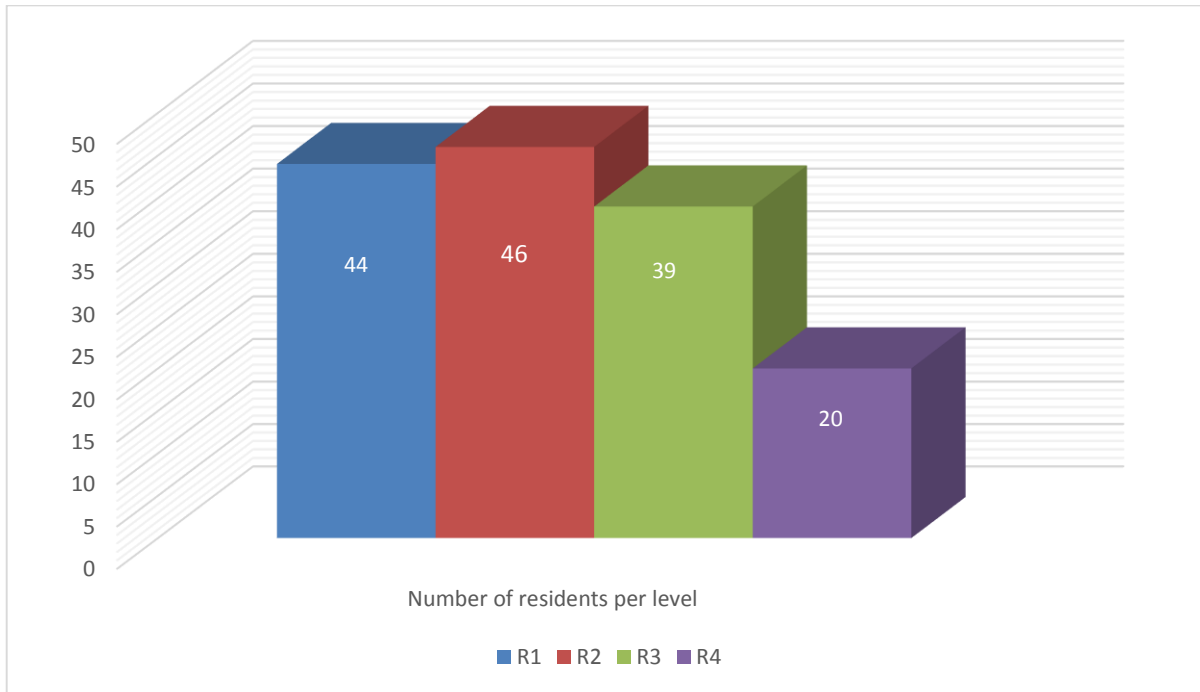
Figure 2: Residency levels of the participants in the study (Levels R1, R2, R3, and R4)

The majority of the participants (about 93.3%) lived with their families and only 6.7% lived alone. About 50.1% had never been married and 44.3% were married; only 4.7% were divorced or separated.
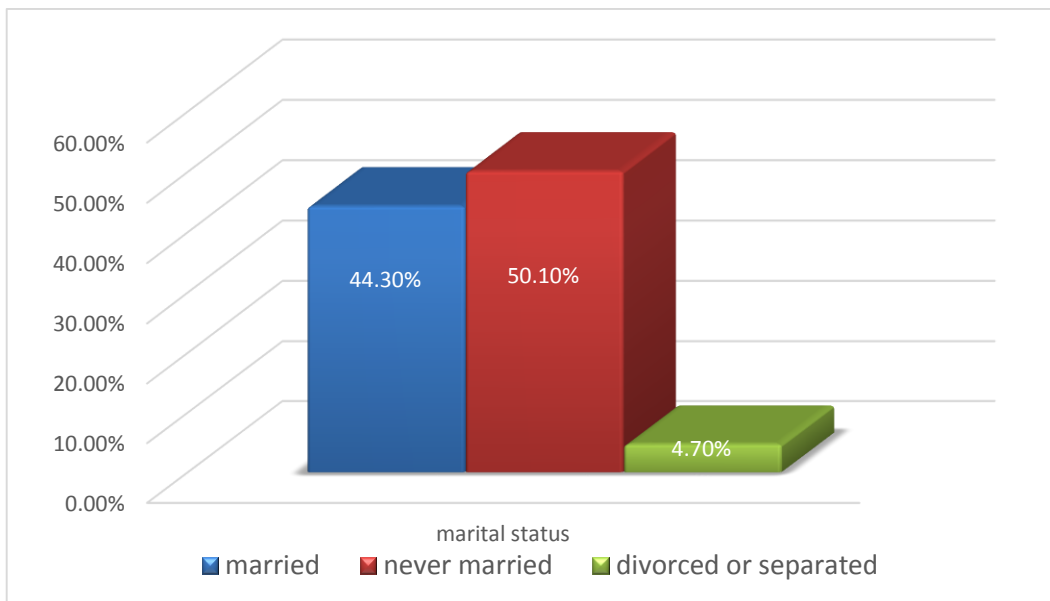

Figure 3: Relationship demographics

Regarding smoking, 24.8% were current smokers, 9.4% were former smokers, and 65.8%
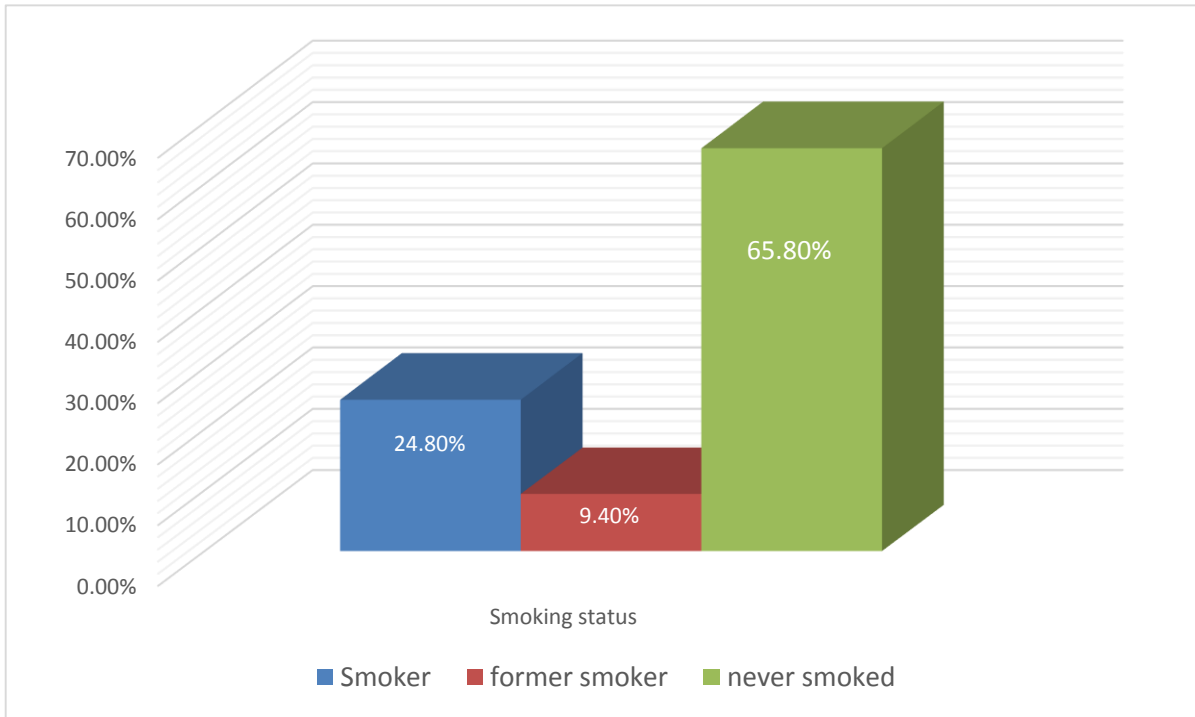
had never smoked.

Figure 4: Smoking status of participants

The majority of the participants had no chronic diseases (95.3%). In terms of BMI categories, 3.4% were underweight, 54.5% were of healthy weight, 30.2% were overweight, and 12.1% were obese.
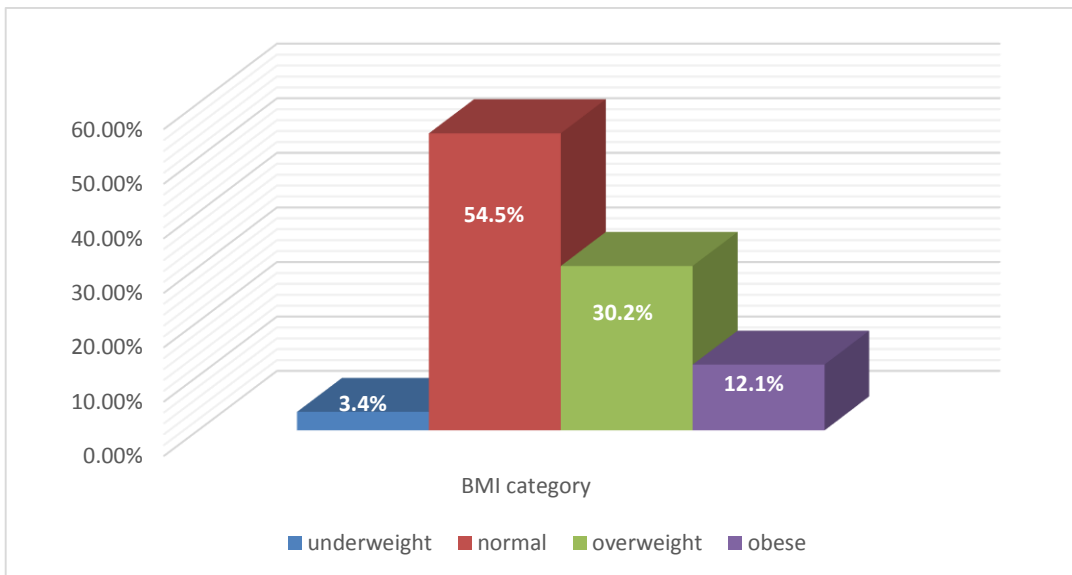

Figure 5: BMI status of participants

The findings in Table 1 reveal that 11.4% of the participants could be diagnosed with FA according to the criteria. About 88.6% did not fulfill the criteria for a diagnosis of FA. Of those diagnosed with FA, seven participants (41.2%) were found to have a mild FA, four (23.5%) to have a moderate FA, and six (35.3%) to have a severe FA.

The study showed no statistical relationship between the diagnosis of FA and the different proposed determinants: gender ($p = 0.883$), tenure of residency ($p = 0.487$), living arrangements ($p = 0.885$), relationship status ($p = 0.556$), smoking status ($p = 0.538$), chronic diseases ($p = 0.806$), BMI ($p = 0.051$), and age ($p = 0.901$).
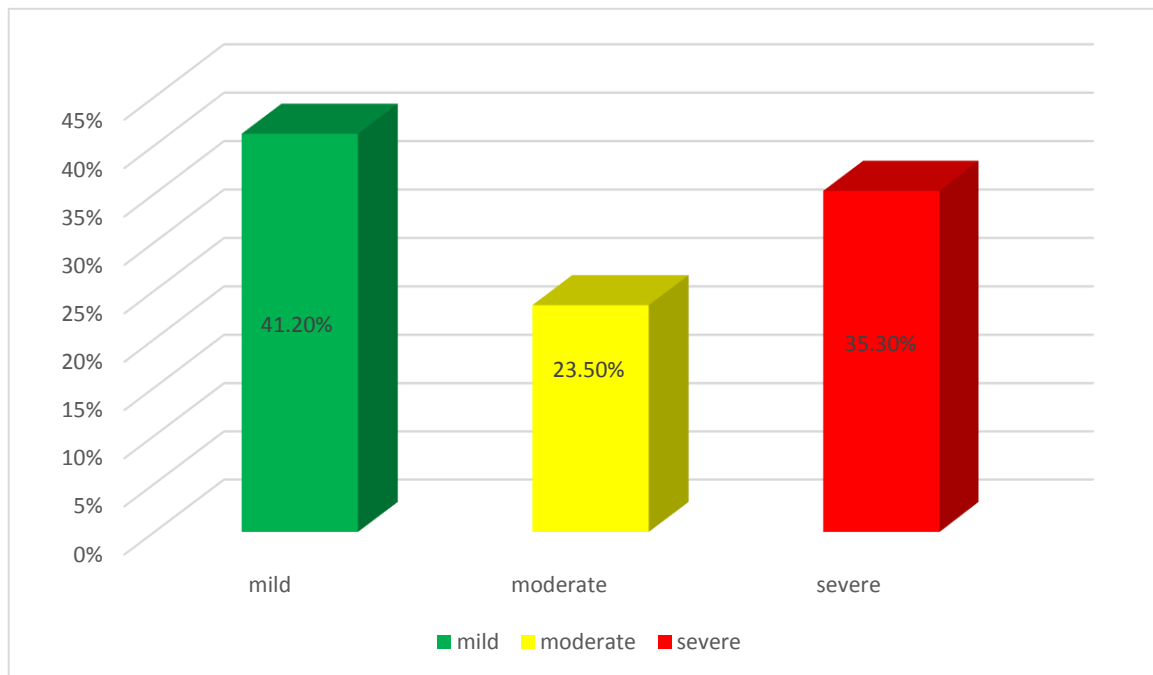

Figure 6: Food addiction category

Table 1: Relationship Between Food Addiction Diagnosis and Risk Factors

| Group | Total number of participants (n = 149) | | Chi-square | P value* |
| | Meets criteria for FA (n = 17) 11.4% | Does not meet the criteria for FA (n = 132) 88.6% | | |
	Number (% within diagnosis)	Number (% within diagnosis)		
Male	6 (35.3%)	49 (37.1%)	0.022	0.883
female	11 (64.7%)	83 (62.9%)		
R1	4 (23.5%)	40 (30.3%)	2.43 5	0.487
R2	8 (47.1%)	38 (28.8%)		
R3	3 (17.6%)	36 (27.3%)		
R4	2 (11.8%)	18 (13.6%)		
Living with family	16 (94.1%)	123 (93.2%)	0.021	0.885
Alone	1 (5.9%)	9 (6.8%)		
Living with friends	0 (0%)	0 (0%)		
Married	7 (41.2%)	59 (44.7%)	1.174	0.556
Never married	10 (58.8%)	66 (50%)		
Divorced or separated	0 (0%)	7 (5.3%)		
Never smoked	10 (58.8%)	88 (66.7%)	1.239	0.538
Former smoker	1 (5.9%)	13 (9.8%)		
Current smoker	6 (35.3%)	31 (23.5%)		
Without chronic disease	16 (94.1%)	126 (95.5%)	0.060	0.806
With chronic disease	1 (5.9%)	6 (4.6%)		
Underweight	0 (0%)	5 (3.8%)	7.769	0.051
Normal	6 (35.3%)	75 (56.8%)		
Overweight	10 (58.8%)	35 (26.5%)		
Obese	1 (5.9%)	12.9%)		

*Based on chi-square

The mean score for the participants was 1.46 ± 2.039.

The results in Tables 2 and 3 suggest that there was no statistically significant difference in the underlying distribution of the scores of males and females (p = 0.926), of those with or without chronic diseases (p = 0.145), across the four levels of residency (p = 0.075), or in terms of living arrangements (p = 0.492), relationship status (p = 0.441), smoking status (p = 0.210), or BMI category (p = 0.075).

Table 2: Relationship Between Scores and Risk Factors (1)

	Group	N	Mean of rank	U	Z	P*
Score	Male	55	75.40	2,563	−0.093	0.926
	female	94	74.77			
	Without chronic disease	142	73.93	345.5	−1.456	0.145
	With chronic disease	7	96.64			

*Based on the non-parametric Wilcoxon Rank Sum Test (the Mann Whitney Test)

Table 3: Relationship Between the Scores and Risk Factors (2)

	Group	N	Mean of rank	Chi	P*
Score	R1	44	71.27	6.896	0.075
	R2	46	86.91		
	R3	39	72.17		
	R4	20	61.33		
	Lives with family	139	74.39	0.472	0.492
	Lives alone	10	83.45		
	Married	66	78.12	1.637	0.441
	Never married	76	73.81		
	Divorced or separated	7	58.5		
	Never smoked	98	74.89	3.125	0.210
	Former smoker	14	59		
	Current smoker	37	81.34		
	Underweight	5	51.2	6.906	0.075
	Normal weight	80	69.26		
	Overweight	45	85.89		
	Obese	19	79.63		

*Based on non-parametric analysis of variance (the Kruskal Wallis Test)

In Table 4, the mean for the first question was 1.83 ± 1.901; for the second question, it was 1.76 ± 1.785; for the third question, 0.43 ± 1.301; for the fourth question 1.44 ± 1.828; for the fifth question, 1.39 ± 1.975; for the sixth question, 0.96 ± 1.680; for the seventh question, 0.63 ± 1.463; for the eighth question, 1.13 ± 1.754; for the ninth question,

0.88 ± 1.546; for the tenth question, 1.62 ± 1.836; for the eleventh question, 1.98 ± 2.173; for the twelfth question, 0.74 ± 1.401; and for the thirteenth question, 0.64 ± 1.336. The highest mean was for the question regarding "persistent desire or repeated unsuccessful attempts to quit" (1.98 ± 2.173).

Table 4: The Means of the Questionnaire Statements

Statement	DSM-5 SUD criteria	Mean answer	S.D.
I ate to the point where I felt physically ill	Substance taken in larger amounts and for longer period than intended	1.83	1.901
I spent more time feeling sluggish or tired from overeating	Much time/activity required to obtain, use, and recover	1.76	1.785
I avoided work, school, or social activities because I was afraid that I would overeat there	Important social, occupational, or recreational activities given up or reduced	0.43	1.301
If I had emotional problems because I had not eaten certain foods, I would eat those foods to feel better	Characteristic withdrawal symptoms: substance taken to relieve withdrawal	1.44	1.828
My eating behavior caused me much distress	Use causes clinically significant distress	1.39	1.975
I had significant problems in my life because of food and eating. These may have been problems with my daily routine, work, school, friends, family, or health	Use causes clinically significant impairment	0.96	1.680
My overeating affected my taking care of my family or doing household chores	Failure to fulfill major role obligations	0.63	1.463
I kept eating in the same way even though my eating caused emotional problems	Use continues despite knowledge of adverse consequences	1.13	1.754
Eating the same amount of food did not give me as much enjoyment as it used to	Tolerance	0.88	1.546
I had such strong urges to eat certain foods that I could not think of anything else	Craving, or a strong desire or urge to use	1.62	1.836
I tried and failed to cut down or stop eating certain foods	Persistent desire or repeated unsuccessful attempts to quit	1.98	2.173
I was so distracted by eating that I could have been hurt	Use in physically hazardous situations	0.74	1.401
My friends or family were worried about how much I over ate	Continued use despite social or interpersonal problems	0.64	1.336

Table 5: Results Summary

Study design	Cross-sectional
Study population	n = 149 x̄ age: 28 years Males: 37% Females: 63%
FA prevalence	11.4%
Mean symptom score	1.46
Most endorsed symptom score	Persistent desire or repeated unsuccessful attempts to quit
FA diagnosis tool	mYFAS Version 2
Main findings	No clinical significance between FA and the different determinants of gender, age, relationship status, chronic disease, smoking, and BMI in a non-clinical sample

5. DISCUSSION

There are some limitations to this study. First, the sample size is relatively small for a prevalence study. However, this is because the total population of family medicine residents in Jeddah is small. Another limitation is that some determinants, such as physical activity, were not sufficiently taken into account and required more detailed questions than those provided in the questionnaire. Further, we used self-reported, anthropometric measurements. Nevertheless, this is the first study examining FA in Jeddah to the knowledge of the researchers.

The population of this study was chosen for convenience, as the participants were medical practitioners and spoke English, and because this research was undertaken on behalf of the Saudi Board of Family Medicine. This meant that the tool used in this study did not require translation into Arabic. We also used the mYFAS 2.0 as it had fewer questions than the non-modified version.

Most of the participants were females in their late twenties—a similar demographic to other studies, such as that by Fatani, Juhani, and Ibrahim (2017). Most participants were in their first and second years of residency because the number of those accepted into the family medicine program has increased as part of an initiative to transform the healthcare system under the guidance of the KSA's Vision 2030.

The social characteristics of the population revealed that most were single, and the majority lived with their families. More than half of the sample were of normal weight and obesity was only prevalent in 12.1%. However, obesity in Saudi Arabia has been found to average

35% and has reached 44%, especially in women. Other studies have been conducted on primary care providers in Jeddah, such as Al-Ghamdi, Felemban, and Bakarman's (2019) study, which showed a higher percentage of obesity than our study, with 23% of its participants obese and 32% overweight.

The rate of smoking was found to be at 24.8%. Other studies have also shown a predilection for smoking in Saudi Arabia. One study conducted in Jeddah by Alahdal (2015) showed a prevalence of 42.7% in participants attending primary healthcare centers in Jeddah. In this study, 95% of the population had no chronic disease, which is normal considering the age group.

Using the mYFAS 2.0, the study found the estimated point prevalence to be 11.4%. Other studies also using the mYFAS 2.0 have shown a prevalence ranging from 4.32% to 15% (Ahmad, 2018). In contrast, studies using the YFAS showed a prevalence ranging from 5.4% (Pedram et al., 2013) to 56.8% (Gearhardt, 2011). The weighted mean prevalence for FA across all studies using the YFAS was 19.9% (Pursey, 2014).

These differences in prevalence are illustrated in Figure 7 as a comparison between countries, based on the systematic review by Pursey (2014) and the Jordanian study by Ahmad et al (2018) (see also Novelle, 2018).
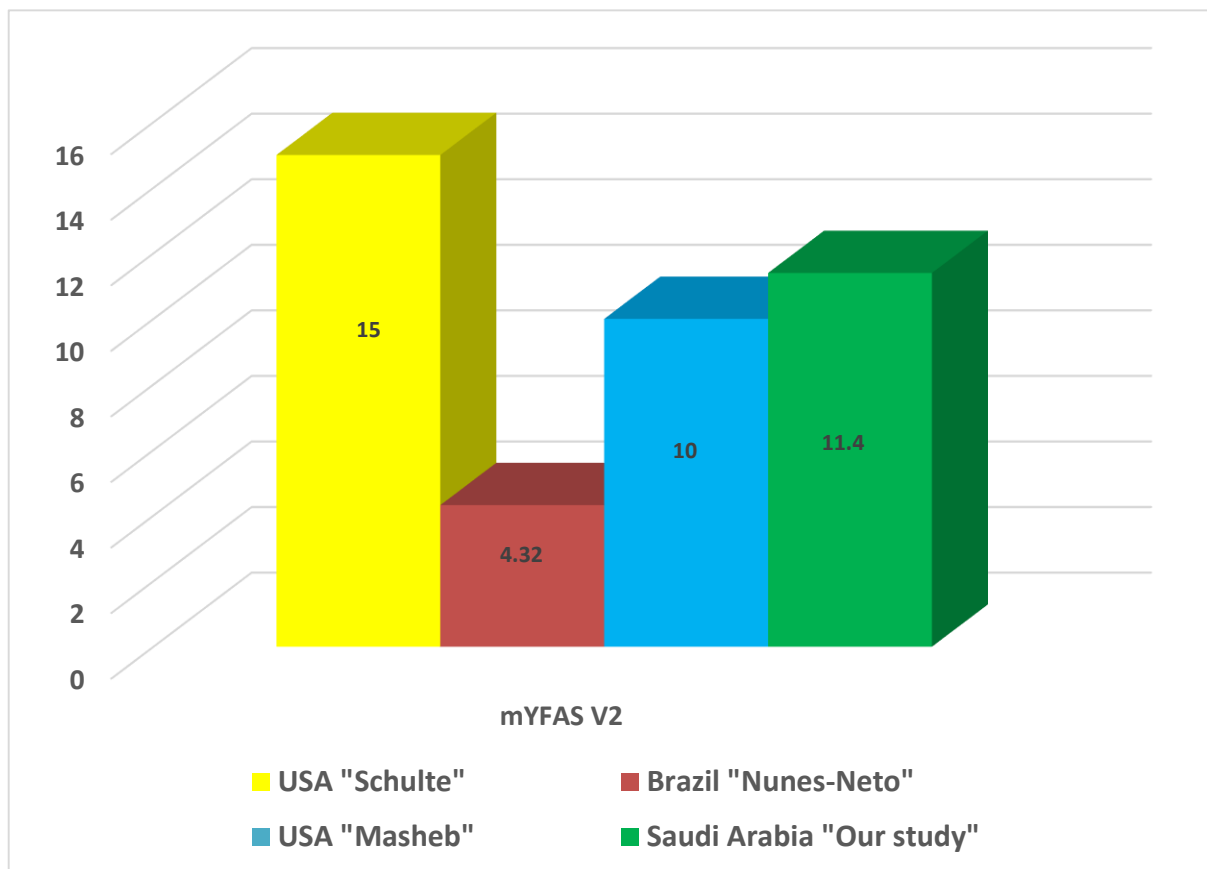

Figure 7: Examples of prevalence for food addiction per country using mYFAS 2.0 and including our study

Regarding FA symptoms, the mean score for the participants in our study was 1.46 ± 2.039. This result is similar to those of other studies in non-clinical settings. For example, the study by Schulte and Gearhardt (2017) showed a mean symptom score of 1.81.

Other studies using the YFAS have shown a FA symptom count ranging from 1.8 to 4.6. The weighted mean number of symptoms reported was 2.8 ± 0.4. In non-clinical samples, a mean of 1.7 ± 0.4 for symptoms was found, whereas the clinical samples endorsed a mean of 4.0 ± 0.5 for symptoms (Pursey, 2014).

This study showed no significant relationship between FA symptoms and the different determinants studied, even though many studies have demonstrated that being female or obese are significant determinants of food addiction (Ahmad, 2018; Novelle, 2018; Pursey, 2014). The lack of significant relationship between these factors found in this study may be attributed to its small sample size of young adult physicians.

6. CONCLUSION AND RECOMMENDATIONS

Despite contradictions in the definition of FA, many studies have recently emerged in this area with several linking factors such as obesity to it. However, in Saudi Arabia, there is yet to be significant work on this topic, even though the prevalence of obesity in this country is among the highest in the world.

This study found the prevalence of FA to be very similar to that shown in the results of other studies around the world. However, we did not find any relationship between factors such as obesity and FA. This could be because the sample we investigated was small and the population we targeted were young adult physicians, mostly of normal weight and without chronic diseases. We recommend that further research be undertaken on FA, targeting a more representative sample of the community with both clinical and non-clinical subjects.

REFERENCES

Ahmad, M. (2018). Examining the connection between food addiction and human obesity *Amman: Nature and science*. Retrieved from www.sciencepub.net/nature/ns161018/ 15_33919nsj161018_102_110.pdf

Al Ahdal, A. (2015). Prevalence and factors associated with tobacco smoking among adults attending primary health care centers at Ministry of Health Sectors, Jeddah, Saudi Arabia. *International Journal of Medical Research Professionals*. doi:10.21276/ ijmrp.2017.3.6.066

Al-Ghamdi, S., Felemban, A., & Bakarman, M. (2019). The prevalence and determinants of obesity among physicians in primary health care centers in Jeddah. *EC Endocrinology and Metabolic Research*, *4*(5), 215–223.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: American Psychiatric Publishing.

Carter, A., Hendrikse, J., Lee, N., Yücel, M., Verdejo-Garcia, A., Andrews, Z., & Hall, W. (2016). The neurobiology of "food addiction" and its implications for obesity treatment and policy. *Annual Review of Nutrition*, *36*(1), 105–128. doi:10.1146/annurev-nutr-071715-050909

Davis, C., & Carter, J. (2009). Compulsive overeating as an addiction disorder. A review of theory and evidence. *Appetite*, *53*(1), 1–8. doi:10.1016/j.appet.2009.05.018

DeNicola, E., Aburizaiza, O., Siddique, A., Khwaja, H., & Carpenter, D. (2015). Obesity

and public health in the Kingdom of Saudi Arabia. *Reviews on Environmental Health*, *30*(3).

Fatani, A., Johani, N., & Ibrahim, A. (2019). Basic life support knowledge of family medicine residents at joint program of family medicine in Jeddah Saudi Arabia, 2017. *International Journal of Community Medicine and Public Health*, *6*(6), 2372.

Fawzi, M., & Fawzi, M. (2018). Validation of an Arabic version of the Yale Food Addiction Scale 2.0. *Eastern Mediterranean Health Journal*, *24*(8), 745–752.

Gearhardt, A. (2011). Neural correlates of food addiction. *Archives of General Psychiatry*, *68*(8), 808. doi:10.1001/archgenpsychiatry.2011.32

Gearhardt, A., Corbin, W., & Brownell, K. (2016). Development of the Yale Food Addiction Scale Version 2.0. *Psychology of Addictive Behaviors*, *30*(1), 113–121. doi:10.1037/adb0000136

Gearhardt, A., White, M., Masheb, R., Morgan, P., Crosby, R., & Grilo, C. (2011). An examination of the food addiction construct in obese patients with binge eating disorder. *International Journal of Eating Disorders*, *45*(5), 657–663. doi:10.1002/eat.20957

Gordon, E., Ariel-Donges, A., Bauman, V., & Merlo, L. (2018). What is the evidence for "food addiction?" A systematic review. *Nutrients*, *10*(4), 477–478.

Konkolÿ Thege, B., Woodin, E., Hodgins, D., & Williams, R. (2015). Natural course of behavioral addictions: A 5-year longitudinal study. *BMC Psychiatry, 15*(1). doi:10.1186/s12888-015-0383-3

Masheb, R., Ruser, C., Min, K., Bullock, A., & Dorflinger, L. (2018). Does food addiction contribute to excess weight among clinic patients seeking weight reduction? Examination of the Modified Yale Food Addiction Survey. *Comprehensive Psychiatry*, *84*, 1–6.

Mayo Clinic. (2018). Binge-eating disorder—Symptoms and causes. Retrieved from https://www.mayoclinic.org/diseases-conditions/binge-eating-disorder/symptoms-causes/syc-20353627.

Meule, A., & Gearhardt, A. (2014). Five years of the Yale Food Addiction Scale: Taking stock and moving forward. *Current Addiction Reports*, *1*(3), 193–205. doi:10.1007/s40429-014-0021-z

Murphy, C., Stojek, M., & MacKillop, J. (2014). Interrelationships among impulsive personality traits, food addiction, and body mass index. *Appetite, 73*, 45–50. doi:10.1016/j.appet.2013.10.008

Novelle, M. (2018). Food addiction and binge eating: Lessons learned from animal models. *Nutrients*, *10*(1), 71. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5793299/

Nunes-Neto, P., Köhler, C., Schuch, F., Solmi, M., Quevedo, J., & Maes, M., . . . Carvalho, A. F. (2018). Food addiction: Prevalence, psychopathological correlates and associations with quality of life in a large sample. *Journal of Psychiatric Research*, *96*, 145–152. doi:10.1016/j.jpsychires.2017.10.003

Pedram, P., Wadden, D., Amini, P., Gulliver, W., Randell, E., & Cahill, F., . . . Sun, G. (2013). Food addiction: Its prevalence and significant association with obesity in the general population. *Plos One, 8*(9), e74832. doi:10.1371/journal.pone.0074832

Potenza, M. (2014). Non-substance addictive behaviors in the context of DSM-5. *Addictive*

Behaviors, 39(1), 1–2. doi:10.1016/j.addbeh.2013.09.004

Pursey, K., Stanwell, P., Gearhardt, A., Collins, C., & Burrows, T. (2014). The prevalence of food addiction as assessed by the Yale Food Addiction Scale: A systematic review. *Nutrients*, *6*(10), 4552–4590.

Randolph T. G. (1956). The descriptive features of food addiction—Addictive eating and drinking. *Quarterly Journal of Studies on Alcohol, 17*, 198–224.

Schulte, E., & Gearhardt, A. (2017). Associations of food addiction in a sample recruited to be nationally representative of the United States. *European Eating Disorders Review*, *26*(2), 112–119.

Schulte, E., Avena, N., & Gearhardt, A. (2015). Which foods may be addictive? The roles of processing, fat content, and glycemic load. *PLos One, 10*(2), e0117959. doi:10.1371/journal.pone.0117959

Tarman, V. (2014). Food junkies: Recovery from food addiction. Toronto: Dundurn Press.

Zou, Z. (2017). *Substance and non-substance addiction*. New York, NY: Springer.