

Original Article

# Assessing the relationship of psychological health with addiction to food.

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## Abstract

**Background:** Food addiction is a behavioral addiction toward foods with high fat and sugar content that leads to overeating. In clinical practice, there is no diagnosis of addiction because diagnostic criteria focus on symptoms, distress, and impairment in daily functioning. Thus, this study aimed to assess the relationship of psychological health with addiction to food.

**Methodology:** A self-administered questionnaire-based cross-sectional study was conducted on a total of 1200 participants aged between 15 and 60. The relationship between food addiction towards emotional and physical health was assessed using Yale Food Addiction Scale; items were rated and scored using a) a five-point Likert scale for assessing food addiction and b) a two-point scale used for assessing psychological health.

**Results:** It was found that most of the participants had mild food addiction (66.5%). It was found that 65.5% of participants had mild psychological problems. When the food addiction was assessed in association with the demographic variable, a significant association was found for gender (P-value=0.009), BMI (P-value=0.024), lifestyle activity (P-value= 0.038), and family history (P-value=0.000).

**Conclusion:** It was found that increased food addiction might lead to increased psychological problems.

## Keywords

Psychological Health, Addiction, Food, Yale Food Addiction Scale.



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## Introduction

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Food addiction is a behavioral addiction toward foods with high fat and sugar content that leads to overeating. In clinical practice, there is no diagnosis of addiction because diagnostic criteria focus on symptoms, distress, and impairment in the daily functioning of addictive disorder. According to research, food addiction is a mental disorder or neurological factor which leads to overeating without a sense of control. Symptoms of food addiction are more prevalent (24.9%) among adults who are overweight and obese<sup>1</sup>. Obesity has become a major public health burden worldwide due to the huge social and economic impact derived from its related comorbidities. Excessive body weight has been estimated to account for 16% of the global burden of disease, and according to World Health Organization estimates, over 600 million adults are obese worldwide. Obesity is described as a multi-etiological disorder, and several factors have been shown to be involved in its onset and development. Despite the important progress in the study of obesity, prevalence rates continue to increase, suggesting that additional elements must be involved in the pathogenesis of this disease. In this context, new theories are arising regarding food intake. Understanding obesity as a food addiction is a novel approach that has garnered considerable attention. Some studies have shown an association between mood and the overall dietary pattern, including specific nutrients<sup>2</sup>.

Recent research also showed that palatable and high-calorie food might have addictive potential. Individuals chronically eat some foods in amounts larger than needed to stay healthy, which shows a loss of control in food behavior. Additionally, a 40% prevalence of food addiction has been shown in obese individuals seeking bariatric surgery. All these traces indicate that there might be a potential relationship between behaviors and weight gain<sup>3</sup>. In recent years, there has been an increase in scientific evidence showing both neurobiological and behavioral relationships between drugs and food intake. Basic research using animal and human models has shown that certain foods, mainly highly palatable foods, have addictive properties. In addition, overeating

palatable food has shown similar responses in the dopaminergic and opioid systems. These similarities between food and drugs led to the hypothesis of food addiction. Therefore, theories of "food addiction" indicate that certain highly processed foods could have a high addictive potential and might be responsible for some cases of obesity and eating disorders<sup>4</sup>.

Recently, it has been shown that subjects showing compulsive overeating consume higher amounts of some macronutrients (fats and proteins) compared with non-food-addicted individuals. It is well established that hyperplasia induced by the consumption of fat-enriched food and refined sugars is influenced by mesolimbic and nigrostriatal dopaminergic inputs<sup>5</sup>. For example, the consumption of highly palatable food, especially sugar, entails the release of endogenous opioids in the nucleus accumbens (NAc) and activates the dopaminergic reward system. In addition, the rats exposed to intermittent access to sugar solution showed some components of addiction, such as escalation of daily sugar intakes, withdrawal signs, craving, and cross-sensitization to amphetamine and alcohol. These researches suggested that certain foods are potentially rewarding and could trigger addictive-like behaviors in laboratory animals and humans. Most of the recent studies have revolved around the connection between a healthy diet and mood disorders like anxiety and depression. Although direct evidence connecting diet and mental health hasn't been found yet, currently, there are trials in progress to obtain it.

Meanwhile, it is established that a healthy diet affects brain health by boosting brain development<sup>6</sup>, changing brain proteins and enzymes to increase neural transmitters, and promoting a healthy gut biome which decreases inflammation. Inflammation affects cognition and mood serotonin levels through various food enzymes, which improve mood. A nutrient-rich diet produces changes in brain proteins that improve the connections between brain cells. But diets high in saturated fats and refined sugars have been shown to have a "very potent negative impact on

brain proteins<sup>7</sup>. At the same time, a high sugar and fat diet decreases the gut's healthy bacteria. Some study results have shown that a diet high in sugar may worsen the symptoms of schizophrenia. A study conducted in 2019 confirmed an adverse effect of sugar intake from sweet food/beverage on long-term psychological health and suggested that a lower intake of sugar might be associated with better psychological health<sup>8</sup>. Thus, the present study aimed to assess the relationship between psychological health with addiction to food and to compare the relationship of food addiction with the demographic variables of the general population of Karachi.

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## Methodology

This was a validated, self-administered questionnaire-based cross-sectional study conducted on the students of Karachi of different districts, including Korangi district, Central district, East district, and Malir district, from November 2020 to August 2021. A total of 1200 subjects of both gender aged between 15 and 60 year participated in this study. Participants with any diagnosed psychological disorder or on prescribed mental disorder medications were excluded from the study. The exclusion criteria were based on the fact to minimize the effect of confounders on the study results. The study was reviewed and approved by the research ethics committee of Dadabhoy Institute of Higher Education, Karachi (Reference Number: DIHE/R&D/ERC/2019-08).

The relationship between food addiction towards emotional and physical health was assessed using Yale Food Addiction Scale. Items were rated and scored according to the following patterns; a) a five-point Likert scale for assessing food addiction and b) a two-point scale used for assessing psychological health. Data of the study were ordinal according to two-level scale for assessing the psychological health which were scored as (1,

0) for yes and no, respectively, and five levels scale for assessing the food addiction as (0, 1, 2, 3, 4) for never, once a month, 2-4 times a month, 2-3 times a week and 4 or more times or daily, respectively.

The Statistical Package for Social Sciences software (SPSS, version 20) was used for data processing and statistical analysis. Categorical variables were analyzed using frequencies and percentages, whereas associations and correlations were assessed using Chi-square tests and the linear regression model. Statistical significance was set at  $p < 0.05$ .

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## Result

The majority of the population was single (47%), belonging to mainly middle class (58%). Many of them were performing occasional physical activity in routine (38%), while few were involved in vigorous exercise (3%). It was found that most of them had a family history of hypertension (47%) and cardiovascular diseases (28%). It was also found that 20.5% of participants did not have any psychological health problem in general, whereas 65.5% of participants had mild psychological health problems. When the psychological health problems were assessed in association with food addiction, it was found that increased food addiction would lead to increased psychological health problems (Table 3).

When the food addiction was assessed in association with the demographic variable, a significant association was found for gender ( $P$ -value=0.009), BMI ( $P$ -value=0.024), lifestyle activity ( $P$ -value=0.038), and family history ( $P$ -value=0.000), where male participants, normal weight to obese individuals, participants with active lifestyle and participants with the family history of hypertension were significantly addicted to food (Table 4).

**Table 1: Demographic characteristics of studied participants (n=1200).**

| <b>Demographic variables</b>     | <b>n(%)</b>                           |           |
|----------------------------------|---------------------------------------|-----------|
| <b>Age</b>                       | Below 20                              | 78(6.5)   |
|                                  | 21-30 years                           | 454(37.8) |
|                                  | 31-40 years                           | 247(20.6) |
|                                  | 41-50 years                           | 302(25.2) |
|                                  | Above 50 years                        | 119(9.9)  |
| <b>Gender</b>                    | Male                                  | 839(69.9) |
|                                  | Female                                | 361(30.1) |
| <b>Education</b>                 | School                                | 36(3.0)   |
|                                  | College                               | 173(14.4) |
|                                  | Undergraduate                         | 615(51.3) |
| <b>Marital Status</b>            | Postgraduate                          | 376(31.3) |
|                                  | Married                               | 484(40.3) |
|                                  | Single                                | 569(47.4) |
|                                  | Widow                                 | 78(6.5)   |
| <b>Socio Economic Status</b>     | Divorced                              | 69(5.8)   |
|                                  | Lower class (4,000-20,000)            | 180(15.0) |
|                                  | Middle class ( $\geq$ 50,000-100,000) | 691(57.6) |
| <b>Family Structure</b>          | Upper class (above 100,000)           | 329(27.4) |
|                                  | Nuclear                               | 440(36.7) |
| <b>BMI</b>                       | Joint                                 | 760(63.3) |
|                                  | Underweight (Below 18.5)              | 55(4.6)   |
|                                  | Normal (18.5-24.9)                    | 470(39.2) |
|                                  | Overweight (25.0-29.9)                | 468(39.0) |
| <b>Lifestyle Activities</b>      | Obese (above 30)                      | 207(17.3) |
|                                  | Sedentary lifestyle                   | 150(12.5) |
|                                  | Active Lifestyle                      | 669(55.8) |
| <b>Family History</b>            | Very active lifestyle                 | 381(31.8) |
|                                  | Diabetes                              | 163(13.6) |
|                                  | Hypertension                          | 566(47.2) |
|                                  | Cardiac Problem                       | 335(27.9) |
| <b>Current Physical Activity</b> | Any other                             | 136(11.3) |
|                                  | Inactive                              | 75(6.3)   |
|                                  | Occasional                            | 454(37.8) |
|                                  | Light                                 | 337(28.1) |
|                                  | Moderate                              | 248(20.7) |
|                                  | moderately vigorous                   | 49(4.1)   |
|                                  | Vigorous                              | 37(3.1)   |

**Table 2: Presence or absence of food addiction among the participants based on the total YFAS score and 8 criterions.**

| Variable                | n(%) |            |
|-------------------------|------|------------|
| <b>Total YFAS score</b> | No   | 677(56.4)  |
|                         | Yes  | 523(43.6)  |
| <b>Criteria 1</b>       | No   | 779(64.9)  |
|                         | Yes  | 441(35.1)  |
| <b>Criteria 2</b>       | No   | 1017(84.8) |
|                         | Yes  | 183(15.3)  |
| <b>Criteria 3</b>       | No   | 209(17.4)  |
|                         | Yes  | 991(82.6)  |
| <b>Criteria 4</b>       | No   | 55(4.6)    |
|                         | Yes  | 1145(95.4) |
| <b>Criteria 5</b>       | No   | 954(79.5)  |
|                         | Yes  | 246(20.5)  |
| <b>Criteria 6</b>       | No   | 289(24.1)  |
|                         | Yes  | 911(75.9)  |
| <b>Criteria 7</b>       | No   | 819(68.3)  |
|                         | Yes  | 381(31.8)  |
| <b>Criteria 8</b>       | No   | 729(60.8)  |
|                         | Yes  | 471(39.3)  |

**Table 3: Appearance of symptoms and clinical significance of food addiction among the participants.**

| Variable                 | n(%) |            |
|--------------------------|------|------------|
| <b>Symptoms Appeared</b> | No   | 113(9.4)   |
|                          | Yes  | 1087(90.5) |
| <b>Diagnosis Met</b>     | No   | 729(60.8)  |
|                          | Yes  | 471(39.3)  |

**Table 4: Association of Food addiction with psychological health problems.**

| Food Addiction | Symptoms of psychological health |     | p-value |
|----------------|----------------------------------|-----|---------|
|                | No                               | Yes |         |
| <b>No</b>      | 677                              | 50  | 0.000*  |
| <b>Yes</b>     | -                                | 473 |         |

\*p<0.05 is considered significant

**Table 5: Association of Food addiction with the demographic variables of the participants.**

| Variables                 | Food Addiction      |             | p-value |
|---------------------------|---------------------|-------------|---------|
|                           | No<br>n(%)          | Yes<br>n(%) |         |
| <b>Age</b>                | Below 20            | 42(3.5)     | 0.000*  |
|                           | 21-30 years         | 254(21.2)   |         |
|                           | 31-40 years         | 109(9.1)    |         |
|                           | 41-50 years         | 195(16.3)   |         |
|                           | Above 50 years      | 77(6.4)     |         |
| <b>Gender</b>             | Male                | 472(39.3)   | 0.865   |
|                           | Female              | 205(17.1)   |         |
| <b>Education</b>          | School              | 18(1.5)     | 0.000*  |
|                           | College             | 89(7.4)     |         |
|                           | Undergraduate       | 394(32.8)   |         |
|                           | Postgraduate        | 176(14.7)   |         |
| <b>SES</b>                | Lower class         | 96(8.0)     | 0.348   |
|                           | Middle class        | 402(33.5)   |         |
|                           | Upper class         | 179(14.9)   |         |
| <b>BMI</b>                | Underweight         | 26(2.2)     | 0.000*  |
|                           | Normal weight       | 272(22.7)   |         |
|                           | Overweight          | 291(24.3)   |         |
|                           | Obese               | 88(7.3)     |         |
| <b>Lifestyle Activity</b> | Sedentary lifestyle | 79(6.6)     | 0.000*  |
|                           | Active Lifestyle    | 433(36.1)   |         |
|                           | Very active         | 165(13.8)   |         |
| <b>Family History</b>     | Diabetes            | 68(5.7)     | 0.000*  |
|                           | Hypertension        | 365(30.4)   |         |
|                           | CVD                 | 182(15.2)   |         |
|                           | Any other           | 63(5.3)     |         |

CVD= Cardiovascular Diseases; SES=Socioeconomic status.

\*p<0.05 is considered significant.

## Discussion

Food is essential to survival, it is normal to eat repeatedly every day, but some characteristics separate normal eating from food addiction. People overeat to feel better, but it usually ends up in obesity, malnutrition, and other problem. Thus, a person who is addicted to foods eats too much, and when the food to which they are addicted is not available, they experience anxiety or other painful emotions<sup>9</sup>.

Previous studies revealed that food-addicted individuals were more often single and had lower physical, psycho-social, and sexual quality of life,

which leads to higher depression and binge eating<sup>10</sup>. Similarly, the current study had a high number of single individuals.

A current study showed that food addiction had a significant association with gender (P-value= 0.009), BMI (P-value= 0.024), lifestyle activity (P-value= 0.038), and family history (P-value= 0.000), where male participants, normal weight to obese individuals, participants with active lifestyle and participants with the family history of hypertension were significantly addicted to food. Similarly, a previous study found that food addiction did not differ by age group, race/ethnicity, education,

income, tobacco and alcohol use, or physical activity. However, it did differ by level of depression ( $p < 0.01$ ). The previous finding showed that food addiction did not differ by BMI. This could be due to an addictive-type response to highly palatable foods resulting in obesity. Thus, obesity status might not be a correlate of food addiction but instead might be a consequence of food addiction<sup>11,12</sup>.

The current study found a mild prevalence of food addiction among individuals. The prevalence of food addiction found in this study is lower than that observed previously. Consistent with the latter study, it showed a low prevalence of food addiction among reproductive-aged women of white, black, and Hispanic race/ ethnicity<sup>13</sup>. In contrast, a previous study concluded that food addiction is actually a consequence of the convergence of various lifestyle behaviors.

Furthermore, avoidance of unhealthy lifestyle behaviors could therefore be useful in preventing the onset of food addiction<sup>14</sup>. Previous studies have proven that by controlling obesity or through improved quality of sleep, food addiction could be reduced among individuals<sup>15,16</sup>.

The current study also showed that increased food addiction would lead to increased physical and psychological health problems. Thereby concluding that increased food addiction would lead to increased psychological health problems. Consistent with published studies, it observed that depression levels correlated with food addiction. This suggested that anxiety and depression are linked to addictive-like eating behaviors, similar to other types of substance dependence. Overall, the prevalence of food addiction was 66.5% among the studied population and the results were comparable with other studies<sup>17</sup>.

There were a few limitations of this study; as it was a cross-sectional observational study, it could not create a causal relationship between food addiction causing psychological health issues. However, further longitudinal research is needed to shed more light on the mechanism of obesity

among food-addicted individuals. Moreover, research is also required to understand the mechanisms that link food and psychological well-being and determine how and when nutrition can be used to improve mental health.

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## Conclusion

Findings of present study show a mild prevalence of food addiction among middle-class overweight individuals. It was found that increased food addiction might lead to increased physical and psychological health problems. The effects of certain foods or dietary patterns on glycemia, immune activation, and the gut microbiome might play a role in the relationships between food and mood.

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## Conflicts of Interest

The authors have declared that no competing interests exist.

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