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Food Addiction in Patients with Obesity

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Abstract

Background: Food Addiction (FA) is based on the fact that similar behaviors are found and identical neurological pathways are activated in both food intake and psychoactive substance use. FA could explain the difficulties with the control of food consumption, failures in attempts to reduce food intake and the inability to abstain or reduce specific type of food. Excessive sugar, fat or salt content in processed food could be significant components of FA due to the activation of the reward circuit in the same way as by other psychoactive substances. The prevalence and the role of FA in obesity remain unclear and need to be evaluated.

Objective: The aims of this study were to assess the prevalence of food addiction in patient with obesity and to evaluate the relationship between food addiction and different aspects of eating disorders.

Material and methods: We prospectively evaluated 93 patients with obesity (39 males and 54 females, age 44 ± 13 yrs, BMI: 38.8 ± 8 kg/m^2). The French version of the Yale Food Addiction Scale (YFAS) was used for both the diagnosis and the severity of food addiction assessment. The diagnosis of FA was met if participants endorsed three or more criteria as well as at least one of the two clinically significant items (impairment or distress). The severity of FA was a simple sum of the seven diagnostic criteria. Different aspects related to eating disorders were evaluated by the French version of the Eating Disorders Inventory-2 (EDI-2) questionnaire.

Results: The prevalence of FA was 32% among the participants and according to the YFAS score. In a simple regression analysis, we have seen a positive relationship between the severity of FA and the severity of bulimia ($p<0.001$, $r^2=0.10$). The same positive relationship was seen between the severity of FA and the difficulties in recognizing and accurately identify the emotions and sensations of hunger and satiety, namely the interoceptive awareness ($p=0.03$, $r^2=0.04$).

Conclusion: The highlighting of two aspects related to eating disorder, the bulimia and the difficulties with interoceptive awareness, could give some information for more adapted care for patients with FA, focused on both the treatment of bulimia and the reconnection with hunger and satiety.

Keywords: Obesity; Food addiction; Eating disorders

Introduction

The prevalence of Eating Disorders (ED) is high among patients with overweight or obesity and is increasing worldwide. Among all ED, the Binge Eating Disorder (BED) might be the most frequent one [1]. ED, in addition to genetic predisposition and environmental factors, might be important contributors to the increasing prevalence of obesity [1]. Aside ED, the controversial concept of food addiction (FA) has been raised recently. This concept is based on the fact that similar neurobiological pathways are activated in both food intake and psychoactive substance abuse. Indeed, the consumption of different kinds of processed food (rich in sugar, fatty acids or salt) can activate brain structures commonly associated with substance dependence [2]. Moreover, FA presents similar behavioral aspects found in both substance abuse and behavioral addiction (i.e., gambling), like the loss of control and increased impulsivity [3].

In some cases, food addiction could explain the difficulty to control food consumption, the failure in attempt to reduce food intake and the inability to abstain from specific types of food or the reduction of their consumption. The discussion remains open to know if FA should be considered as a specific disorder and, if it is the case, whether it should be considered as an addiction or as a severe form of BED. Developed in 2009, the Yale Food Addiction Scale (YFAS) questionnaire is widely used to assess food addiction [4.] According to YFAS, the prevalence of FA varies between 5% and 10% among general

population and could be as high as 25% among patients with obesity [5]. Moreover, the prevalence of FA is higher in morbidly obese patients-candidates for bariatric surgery (up to 42%) and for those suffering from BED (57%) [6]. On the other hand, the influence of FA on weight loss and its maintenance among patients engaged in a conservative or surgical treatment of obesity remains unclear [6,7].

In our study, we aimed to evaluate the prevalence of FA in a population of obese patients engaged in a conservative weight loss treatment. We also focus on different aspects of eating behavior to identify a specific pattern of eating habits among patients corresponding to criteria of FA.

Materials and Method

Ninety three patients with overweight or obesity (BMI ≥ 25 kg/m^2) have been evaluated in the study. They were prospectively recruited at the Service of Therapeutic Education for Chronic Disease, University Hospitals of Geneva, after having signed the written consent. The study protocol was approved by the local ethical committee. Participant's recruitment took 4 months. Anthropometric and obesity history related data were collected at the same time as the questionnaires. The evolution of obesity was assessed by the total amount of kilos lost during a lifetime.

Assessment of food addiction

We used the French validated version of the YFAS questionnaire to assess food addiction and its severity [4]. YFAS is a 25-items, self-report scale, designed and validated by Gearhardt et al. in 2009, in order to measure the symptoms of food addiction that have occurred over the past 12 months, regarding certain kinds of food as the DSM-IV–TR criteria for substance dependence. There are 7 criteria for food addiction: Tolerance (A), Withdrawal (B), The substance is often taken in larger amounts or over a longer period than was intended (C), A persistent desire or unsuccessful effort to cut down or control substance use (D), Spending a great deal of time in activities necessary to obtain the substance, or recover from its effects (E), Giving up social, occupational, or recreational activities because of substance use (F) and continuing substance use with the knowledge that it is causing or exacerbating a persistent or recurrent physical or psychological problem (G). Two additional items assess the clinical significant impairment or distress caused by food intake. There are 2 scoring options, one for the diagnosis and one for the severity. The diagnosis is met if 3 or more symptoms were present during the past 12 months in addition to a clinically significant impairment or distress. The severity is the simple count of diagnostic criteria met [4].

Assessment of eating disorders

Eating disorders were assessed by the French version of the "Eating Disorder Inventory 2" questionnaire [8], a widely used questionnaire that assesses eating disordered attitude and behaviour. EDI-2 is used to evaluate treatment success in eating disorder intervention studies. This 91 items inventory yields scores on scales that evaluate drive for thinness, bulimia, body dissatisfaction, ineffectiveness, perfectionism, interpersonal distrust, interoceptive awareness, maturity fears, asceticism, impulse regulation and social insecurity. For each item point response formats are used ranging from "always" to "never" [8].

Statistical analysis

All statistical analyses were performed with the STATA software (v.10, Stata Corporation, USA). The alpha was set at 0.05.

Result

Food addiction among patients with obesity

Out of 93 participants, 30 of them (32%) present the diagnosis of food addiction according to YFAS and 63 do not **(Table 1)**. Food addiction was not related to age, gender, BMI, obesity duration or its evolution.

Table 1: Physical characteristics and obesity's characteristics between patients with and without food addiction.

	Patients with food addiction	Patients without food addiction	Total	p value
Sex (F/M)	19/11	35/28	54/39	0.47
Age (years)	42.5 (± 12.8)	45.6 (± 13.3)	44.6 (± 13.1)	0.28
BMI (kg/m2)	39.0 (± 7.1)	38.7 (± 8.4)	38.8 (± 8.1)	0.86
Number of years of obesity (years)	19.9 (± 10.0)	18.9 (± 11.9)	19.2 (± 11.3)	0.69
Number of kilos lost (Kg) in a lifetime	46.5 (± 38.2)	54.1 (± 59.9)	51.6 (± 53.5)	0.57

Food addiction and eating disorders

Comparing the EDI-2 score between subjects with and without FA, we found that patients with FA tend to suffer more from bulimia than patients without FA ($p<0.001$, $r^2=0.1$, **Table 2**).

In the same way, patients with FA tend to experiment more difficulties with their interoceptive awareness than patients without FA ($p=0.03$, $r^2=0.04$, **Table 2**). Interoceptive awareness can be defined by the self-confidence in recognizing and accurately identifying emotions and sensations of hunger and satiety. The higher the score of EDI-2, the more lack of

confidence with the interoceptive awareness is. The 9 remaining aspects of eating behavior evaluated by the EDI-2 were non-significant between patients with or without FA.

Table 2: Relationship between food addiction (YFAS) and different aspects of eating behavior (EDI-2).

	Patients with food addiction	Patients without food addiction	Total	p value
Drive for thinness	9.5 (± 3.7)	7.8 (± 5.4)	8.3 (± 5.0)	0.12
Bulimia	4.2 (± 4.2)	1.9 (± 2.3)	2.6 (± 3.2)	<0.001
Body dissatisfaction	19.7 (± 7.0)	16.16 (± 7.0)	17.3 (± 7.1)	0.02
Ineffictiveness	5.9 (± 4.7)	4.04 (± 5.6)	4.6 (± 5.3)	0.12
Perfectionism	6.4 (± 3.9)	5.0 (± 4.1)	5.5 (± 4.1)	0.14
Interpersonal distrust	3.8 (± 3.6)	3.7 (± 4.0)	3.8 (± 3.8)	0.89
Interoceptive awareness	6.1 (± 3.9)	3.95 (± 4.7)	4.6 (± 4.5)	0.035
Maturity fears	5.5 (± 4.2)	4.3 (± 3.7)	4.7 (± 3.8)	0.16
Asceticism	5.2 (± 1.9)	4.097 (± 3.1)	5.1 (± 2.7)	0.67
Impulse regulation	4.6 (± 3.2)	4.6 (± 4.2)	4.6 (± 3.9)	0.96
Social insecurity	3.7 (± 2.9)	3.3 (± 3.7)	3.3 (± 3.4)	0.92

Gender-specific pattern of eating behavior among patients with food addiction

When comparing the 7 criteria for FA (YFAS) and the 11 items for ED (EDI-2), we found gender specific difference concerning the persistent desire or unsuccessful effort to cut down or control the food intake. This criteria was present in all women (100%) but only in 54% of men (p=0.04).

Discussion

Food addiction among patients with obesity

The 32% prevalence of FA among our patients with obesity is higher than generally described in the literature [5,9-11]. In our study, FA was not related to age or gender, which differs from others studies, mostly based on general population [10-12]. In these studies, the prevalence of FA was higher among overweight/obese females aged over 35 years [12]. However, among obese patients, no difference in age or gender has been shown [13]. FA was not related to BMI, which is confirmed by literature [1]. These data may be limited by method. However, self-reported questionnaires are the best clinical way to assess FA so far.

Food addiction and eating disorders

The positive relationship between the severity of FA and bulimia has already been described [14-16]. There is a large overlap between FA and bulimia nervosa, and, a high percentage of individuals with bulimia nervosa have been diagnosed as patients with FA (YFAS, more than 80%). Bulimia is the diagnostic group with the highest prevalence of FA according to YFAS diagnosis (i.e., prevalence is higher than in individuals with anorexia, binge eating disorder and obese individuals with or without binge eating disorder) [14]. Only few studies have addressed how FA relates to treatment outcomes. FA is closely related to other eating disorders as bulimia and binge eating disorder [1]. FA combined with Eating Disorders and other psychiatric comorbidities could interfere with successful weight loss maintenance. The concomitance of FA and eating disorders is associated with worse clinical conditions and symptoms [10]. These patients also seem to have a reduced psychosocial functioning [11]. FA severity among bulimic patients might improve following a short term psychological intervention [16]. Beside ED, FA tend to exist in others psychiatric disorders as mood disorders [7].

The relationship between FA and the lack of confidence with the interoceptive awareness is a relatively new fact and has been described in neuro-imagery. Indeed, obese people, when compared to healthy weight population, show a reduced activation in brain regions associated with cognitive control and interoceptive awareness of sensations in the body in response to food stimuli. This might indicate a weakened control system of food consumption combined with hypo-sensitivity to satiety and discomfort signals after eating [17]. Basic interoceptive process and interoceptive awareness may crucially contribute to the complex formation of body image, as well as to its disturbances. Lower interoceptive accuracy and awareness are associated with body-image concerns; reduced levels of interoceptive awareness may predispose individuals for greater body-image dissatisfaction in non-clinical populations and the development of eating disorders or the severity of body-image disturbance in clinical populations [14].

Specific patterns of eating behavior among food addicts

The persistent desire or unsuccessful effort to cut down or control substance use that appears in all women and in 54% of the males (general population) is described as the most frequent criterion found among obese patients with FA although the related study focused solely on women [18].

Conclusion

We have found a relatively high prevalence of FA among a population of patients with obesity and seeking for a conservatory weight loss treatment. Due to the close relationship between FA and ED we found, clinicians should carefully assess specific addictive eating patterns in patients with ED as well as in patients with obesity. They also should keep in mind that patients suffering from FA might experience worse clinical conditions and symptoms than patients without FA. For these patients, FA symptoms should be a target of specific psychotherapeutic interventions as used for substance-related disorders (e.g., cognitive behavioral therapy (CBT), dialectical behavior therapy, motivational interviewing, motivational enhancement therapy, mindfulness-based therapies, family therapies and pharmacotherapy). Abstinence from or reduction of addictives substances (e.g., highly palatable foods) and behaviors (e.g., binge eating) may be necessary although a harm reduction strategy may be useful. In addition to that, a systematical investigation of cognitive restrictions among patients with obesity and FA might be helpful. Due to thier tendency to lack confidence with their interoceptive awareness, reconnecting food addict patients with their inner body sensations could be a strategy to ease the severity of FA.

Disclosure Statement

The authors have read and approved this version of the manuscript. None of the authors have any conflicts of interest.

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