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Pre-intervention characteristics in weight loss participants scoring positive and negative for food addiction

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Abstract

Obesity is a major health issue in the United States. It has been suggested that addictive-like tendencies toward foods, especially highly processed foods, contributes to this epidemic. If so, interventions used to treat substance-use disorders may be effective for treating overweight/obese patients with food addiction (FA; based on the Yale Food Addiction Scale, version 2.0). This pilot study evaluated four interventions, selected because of their effectiveness in the treatment of substance-use disorders [motivational interviewing (MI), pharmacotherapy (P; naltrexone-bupropion), MI with pharmacotherapy (MI+P), information control (IC; diet and physical activity instruction)], in overweight/obese individuals with and without FA (FA+ and FA-, respectively). Here we report the baseline (pre-intervention) characteristics of FA+ and FA- participants based on their intake documents. FA was fairly common in this population (37.1% of those screened). Most participants experienced depression (81.9%, FA+ 94.3%, FA- 73.0%) and anxiety (60.2%, FA+ 74.3%, FA- 50%) with greater prevalence ($p<.01$) and severity in those who were FA+. Many participants screened positive for binge eating (42.2%, FA+ 65.7%, FA- 25.0%) and to a lesser extent PTSD (18.1%, FA+ 37.1%, FA-4.2%), with greater prevalence among those who were FA+ ($p<.01$). Drug abuse (20.5%) and mood disorder (8.4%) were relatively uncommon and prevalence did not differ between FA phenotypes ($p>.05$). The FA construct identified a distinctive subset of overweight/obese individuals. Differences in baseline characteristics suggest that FA+ and FA- individuals may differ in their response to interventions and the types of support they need to achieve their weight/body fat loss goals.

Abbreviations: Food addiction (FA), food addiction positive (FA+), food addiction negative (FA-), motivational interviewing (MI), pharmacotherapy (P), MI with pharmacotherapy (MI+P), information control (IC), Yale Food Addiction Scale (YFAS), Healthy Behaviors Clinic (HBC), Regional West Physicians Clinic (RWPC), Weight and Lifestyle Inventory (WALI), Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder-7 (GAD-7), Drug Abuse Screening Test-10 (DAST-10), Mood Disorder Questionnaire (MDQ), Posttraumatic Stress Disorder (PTSD) Checklist for DSM-5 (PCL-5), Doctor of Nursing Practice (DNP)

Introduction

Obesity is a major health issue in the United States and is associated with increased risk of comorbidities (hypertension, diabetes, cardiovascular disease, lipid disorders, depression, anxiety, etc.) and increased medical expenditures (approximately 42% higher for obese than for normal weight individuals) [1]. Numerous approaches have been tried to address obesity with limited long-term success [2-8]. Recently, it has been suggested that addictive-like tendencies toward foods, especially highly processed foods that are high in fat and sugar, contribute to this epidemic [4-7]. The Yale Food Addiction Scale (YFAS) is a relatively new, validated instrument that can help researchers and practitioners assess clients for food addiction (FA) and has been used often in populations with obesity [8,9]. In recent studies, 20-25% of overweight (BMI 25-29)/obese (BMI ≥ 30) persons tested positive for FA [7,10]. However, no known obesity interventions specifically target individuals who are positive for FA. If an addictive-like process contributes to obesity for some individuals, then interventions used to treat substance-use disorders may be effective for the treatment of FA [11].

Therefore, we initiated a pilot study to evaluate four interventions, selected because of their effectiveness in the treatment of substance-use disorders [individual motivational interviewing alone (MI), pharmacotherapy alone (P; naltrexone-bupropion), MI with pharmacotherapy (MI+P), and an information control (IC; diet and physical activity instruction)], in overweight/obese individuals with and without FA with the goal of developing effective interventions for each group. This study is unique in purposefully recruiting FA positive (FA+) and FA negative (FA-) participants to evaluate how they may differ in their response to obesity interventions and in evaluating whether substance addiction treatments can be applied successfully to FA. Here we compare the baseline characteristics (pre-intervention) of FA+ and FA- participants based on their intake documents. Such comparisons expand our knowledge of the similarities and differences between overweight/obese individuals with and without addictive-like tendencies towards food, providing insights that may help improve

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obesity interventions and support for both types of individuals. Details of the interventions and their impacts (biometric and dietary) will be reported separately after the conclusion of the study.

Methods

Participant recruitment

Participants were recruited from overweight/obese patients referred to the Healthy Behaviors Clinic (HBC) by doctors at the Regional West Physicians Clinic (RWPC) in Scottsbluff, Nebraska, USA and through snowballing. Potential participants completed a set of screening questionnaires as part of the standard HBC admission process. These included the Weight and Lifestyle Inventory (WALI; 17 sections) [12], Yale Food Addiction Scale (YFAS 2.0; 35 items) [13], Patient Health Questionnaire-9 (PHQ-9; 9 items) [14], Generalized Anxiety Disorder-7 (GAD-7; 7 items) [15], Drug Abuse Screening Test-10 (DAST-10; 10 items) [16], Mood Disorder Questionnaire (MDQ; 3 sections) [17], Posttraumatic Stress Disorder (PTSD) Checklist for DSM-5 (PCL-5; 20 items) [18], and a medical history. These instruments were reviewed by a Doctor of Nursing Practice (DNP) who is board certified in Adult Health and Psychiatry to pre-screen potential participants for eligibility.

Eligibility

Eligible individuals were overweight/obese adults age 19-65 years of either sex and any race/ethnicity who could understand/read English. Because treatments were randomly assigned, they also had to meet criteria specific to the pharmacotherapy interventions (P, MI+P) (e.g. restrictions on medications, medical conditions, pregnancy/lactation). HBC nurse researchers informed those who were eligible about the study and consented those choosing to participate.

Assessment of food addiction and treatment assignment

The YFAS 2.0 [13], which adapts the eleven DSM-5 diagnostic indicators of substance-use disorders to the consumption of highly processed foods, was used to assess participants' obesity phenotype (FA+ or FA-). Participants with ≥ 2 symptoms plus impairment/distress were considered FA+. Those with 0-1 symptoms and/or no impairment/distress were considered FA-. Participants within each phenotype were randomly assigned to one of the treatment groups (IC, MI, MI+P, P).

Measures and data analysis

To compare the characteristics of individuals with and without FA prior to delivery of interventions, we scored the screening instruments in participants' baseline intake documents; the WALI, Section J: Eating Patterns I (binge eating), YFAS 2.0 (FA), PHQ-9 (depression), GAD-7 (anxiety), DAST-10 (drug abuse), MDQ (mood disorder), and PCL-5 (PTSD). Descriptive statistics (M, SD) were used to characterize variables. Differences among variables between participants with and without FA were evaluated with Independent t-tests, Mann-Whitney U tests, or Fisher's Exact tests ($\alpha = .05$). All data analyses were performed using IBM® SPSS® Statistics (Version 25) software.

Results and discussion

Recruitment effort/demographics

We screened 105 individuals. Eighty-three were enrolled in the study, 14 have withdrawn, 8 were ineligible because of their age (2), medications (2), or medical conditions (4). We planned to recruit equal numbers of FA+ and FA- participants, therefore, as the end of the recruitment period neared we were only able to accept individuals who were FA+. Thus, 14 individuals who were FA- were not enrolled. Up to this point attrition has been approximately 10%, however, the study is still in progress, so this value may change.

Of the 83 participants, 74 were women (89.2%) and 9 were men (10.8%). Most were Caucasian (n = 59, 71.1%), 23 were Hispanic (27.7%), and 1 was black (1.2%). Average age was 42.7 (SD = 12.6) and was similar among those who were FA+ (M = 43.1, SD = 12.7) and FA- (M = 42.3, SD = 12.6) ($p>.05$). Age, ethnicity, FA characteristics (presence, clinical significance, total symptoms, level of severity) and prevalence of binge eating, depression, PTSD, and mood disorder did not differ by gender ($P > .05$). Data were insufficient to assess gender differences in drug abuse and anxiety. Genders were pooled for the remaining analyses.

Prevalence and characteristics

Of the 105 overweight/obese individuals screened, 62.9% were FA- and 37.1% were FA+. This is greater than the prevalence of FA among overweight/obese individuals in a recent meta-analysis (M = 24.9%, range = 7.7 - 56.8%) [7]. and is likely greater than the prevalence of FA in the general population as FA prevalence tends to be less among healthy weight individuals (11.1%, range = 1.6 - 24.0%) [7].

Following current withdrawals, our study population is 54.9% FA- (n = 39) and 45.1% FA+ (n = 32), slightly different than our target of 50% (n = 40) each, however, study timelines limited us to a 7-month recruitment period. Average symptom counts were greater for FA+ (M = 8.0, SD = 2.9) than for FA- participants (M = 1.7, SD = 1.8) ($p<.01$). Most individuals who were FA+ showed severe levels of FA (80%) with the remainder showing moderate (8.6%) or mild (11.4%) levels.

Comparing variables by FA phenotype

Most participants experienced some level of depression (81.9%). Depression tended to be more prevalent (FA+ 94.3%, FA- 73.0%, $p<.01$) and severe (none: FA+ 5.7%, FA- 27.1%; mild: FA+ 8.6%, FA- 41.7%; moderate: FA+ 31.4%, FA- 25.0%; moderately severe: FA+ 31.4%, FA- 6.3%; severe: FA+ 22.9%, FA- 0.0%) among those who were FA+. Burmeister *et al.* [19], and Davis *et al.* [20], reported similar findings. The high incidence of depression among study participants is consistent with Luppino *et al.'s* [21], findings of a bidirectional association between obesity and depression (i.e. obesity increases risk of developing depression, depression increases risk of developing obesity). That depression was common in these overweight/obese participants suggests that they may benefit from the individualized support of the MI intervention which addresses ambivalence, overcoming barriers, and setting achievable personal goals.

Developmental regression and epileptiform EEG abnormalities

We found no association between developmental regression and initial epileptiform EEG abnormalities ($p=0.50$). Regression is a salient feature of ASD thought to be a risk factor for the development of epilepsy with conflicting evidence [5,10,14-17]. A retrospective review of 889 children with primary ASD failed to show an increased occurrence in sleep epileptiform EEG abnormalities in children with history of regression as compared to those without regression [5]. However, a 2017 meta-analysis concluded that there might be a weak relationship between history of regression and epileptiform EEG abnormalities [17]. It is possible that our cohort was not sufficiently powered to reveal an association between regression and epileptiform

EEG abnormalities in children with ASD, however, inconsistencies and lack of clear consensus indicate a need for further research in this area.

The pharmacotherapy interventions (P, MI+P) may also support patients with depression as one component (bupropion) is widely used to treat depression.

Similar to depression, most participants experienced some level of anxiety (60.2%) and it was more common among those who were FA+ (74.3%) than among those who were FA- (50%) (p<.01). Severity also tended to be greater among FA+ individuals (none = 25.7%, mild = 31.4%, moderate = 25.7%, severe = 17.1%) than among those who were FA- (none = 50.0%, mild = 33.3%, moderate = 12.5%, severe = 4.2%).

Just under half of all participants (42.2%) screened positive for binge eating with 2 participants (1 FA+, 1 FA-) not completing the questions. Prevalence of binge eating was greater among FA+ (65.7%) than among FA- individuals (25.0%) (p<.01). Although there was overlap in the presence of FA and binge eating, that a substantial number of those with FA did not meet the criteria for binge eating and vice versa, suggests that they are distinct attributes. Chao *et al.* [22] and Ivezaj *et al.* [23] reported similar findings.

Though PTSD was relatively uncommon among all study participants (18.1%), over a third of those who were FA+ screened positive for PTSD (37.1%), a prevalence far greater than among participants who were FA- (4.2%) (p<.01). Brewerton [11], recently reviewed the relationship between FA, PTSD, and other disorders and concluded that FA could be useful as a proxy for trauma history and PTSD.

Other conditions were less frequently observed. Prevalence and severity of drug abuse were generally low (none = 79.5%, low = 16.9%, substantial = 2.4%, one FA- participant did not complete the questions) and prevalence did not differ by FA phenotype (p>.05). Mood disorder was also uncommon (negative = 91.6%, positive = 8.4%) and did not differ by FA phenotype (p>.05).

Conclusion

Other conditions were less frequently observed. Prevalence and severity of drug abuse were generally low (none = 79.5%, low = 16.9%, substantial = 2.4%, one FA- participant did not complete the questions) and prevalence did not differ by FA phenotype (p>.05). Mood disorder was also uncommon (negative = 91.6%, positive = 8.4%) and did not differ by FA phenotype (p>.05).

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