Obesity Surgery
https://doi.org/10.1007/s11695-019-03915-3

BRIEF COMMUNICATION

A Longitudinal Preliminary Study of Addiction-Like Responses to Food and Alcohol Consumption Among Individuals Undergoing Weight Loss Surgery

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Abstract

Reductions in addiction-like food behaviors and increases in alcohol intake have been reported after weight loss surgery. However, no studies have tracked these measures in combination and prospectively. In this preliminary study, 27 participants underwent bariatric surgery (Roux-en-Y gastric bypass (RYGB) ($n = 10$) and sleeve gastrectomy (SG) ($n = 6$)), dietary weight loss ($n = 6$), or no treatment ($n = 5$). Participants were weighed, completed the Yale Food Addiction Scale (YFAS), and reported alcohol intake frequency before intervention and at 4 and 24 months after baseline. At 24 months, only the surgery group showed significant reductions in BMI. Between baseline and 24 months, YFAS scores decreased ($p = .006$) and alcohol intake increased in the surgery group ($p = .005$). Significant changes were not observed in the diet or no treatment groups.

Keywords Obesity · Weight loss surgery · Food addiction · Alcohol

Approximately 35% of American adults have obesity (BMI ≥ 30) [1]. Obesity is associated with greater risk for adverse physical health outcomes including diabetes and cardiovascular disease [2]. Bariatric surgery has been shown to be an effective intervention for obesity, resulting in significant and often sustained weight loss and improvements in comorbid conditions [3].

A key factor contributing to weight gain and obesity is excess caloric consumption resulting in a positive energy balance. Excess intake can be driven by the pleasure derived from highly palatable foods, and it has been proposed that some individuals may develop addiction-like behaviors with such foods [4]. Symptoms of addiction-like eating, assessed with the Yale Food Addiction Scale (YFAS), have been shown to decrease following weight loss surgery [5, 6]. However, only two studies have examined YFAS scores pre- and post-operatively, and only one study included an assessment of YFAS symptoms at 12-month post-surgery [7]. Therefore, more research is needed to determine whether post-surgical reductions in YFAS symptoms are maintained over longer periods of time.

In addition to changes in food addiction symptoms, there is evidence that alcohol consumption may increase following weight loss surgery [4, 8]. This may be due, in part, to a post-surgical enhancement of the effects of alcohol, including faster rate of increases in blood alcohol levels observed following Roux-en-Y gastric bypass (RYGB) surgery [8]. It is also possible that increased alcohol intake represents a reward or addiction transfer as suggested by Conason et al. [9].

There have been no studies examining both alcohol intake and YFAS scores pre- and post-surgery. Therefore, the purpose of this preliminary study was to examine YFAS scores and alcohol consumption habits prior to RYGB, sleeve gastrectomy (SG), or a diet weight loss intervention and at two follow-up points (4 and 24 months after baseline). A no treatment group was also included to rule out the effects due to the passage of time.

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Published online: 30 May 2019

Methods

Participants Participants were recruited from candidates for bariatric surgery at Mount Sinai St. Luke's Hospital, fliers posted around the hospital, and via Internet advertisements (e.g., Craigslist). Sixteen participants underwent weight loss surgery (10 underwent RYGB and 6 underwent SG), 6 participated in a dietary weight loss intervention that included a liquid meal replacement diet for 3 months, and 5 participants received no treatment. Most (93%) participants were female. The average age at baseline was 32.7 (SD = 7.6) without differing between groups ($F(2,24) = .59$, $p = .56$) 40.7% of participants identified as Hispanic/Latino, 44.4% identified as Black/African American, 33.3% did not report race, 14.8% identified as White, and 7.4% identified as Native American, Pacific Islander, or other.

Body Mass Index Height and weight were measured using a stadiometer and an electronic scale to calculate body mass index (BMI).

Yale Food Addiction Scale The Yale Food Addiction Scale is a 25-item self-report measure assessing addictive-like responses to food. The features of addiction measured by the YFAS are based on the substance dependence disorder criteria in the DSM-IV-TR. The YFAS shows adequate internal reliability, good convergent validity, and fair discriminant validity [10].

Alcohol Intake Alcohol consumption was assessed by a single item: "How many drinks do you typically consume per week?" One drink was explained as equivalent to approximately one 12-oz can of beer, 5-oz glass of wine, or 1.5-oz shot of hard liquor. Possible responses included 0 (coded as 0), 1–2 (coded as 1), 3–4 (coded as 2), 5–6 (coded as 3), or 7 or more (coded as 4).

Data Analysis

Independent samples *t* tests and Mann–Whitney *U* tests were used to examine the differences between completers and non-completers and between surgery groups (RYGB vs. SG). One-way analysis of variance (ANOVA) and the Kruskal–Wallis tests were used to examine group differences at baseline. Paired samples *t* tests and Wilcoxon signed-rank tests were used to compare BMI, YFAS scores, and alcohol intake scores at baseline and at 4.0 (SD = 1.0) months after the baseline and between the baseline and 24.3 (SD = 5.7) months afterward within groups. A bivariate correlation assessed the relationship between changes in YFAS and alcohol scores.

Data from those who completed the assessments at baseline and 24 months were included in the current analyses. Of these participants, data were not available for all participants at 4 months ($n = 6$) and 2 assessments were excluded as they were completed outside the time frame. However, baseline and final follow-up data from the 6 subjects who missed the first follow-up were included. At 24 months, 28 participants who completed baseline measures were lost to follow-up. Participants who completed the final assessment did not differ in age ($t(54) = 1.19$, $p = .24$), BMI ($t(54) = -.74$, $p = .46$), level of education ($U = 341$, $p = .51$), household income ($U = 251$, $p = .09$), YFAS scores ($t(50) = .14$, $p = .89$), or weekly alcohol intake ($U = 299.5$, $p = .80$) compared with those lost to follow-up. Baseline YFAS ($t(14) = -.37$, $p = .72$) and weekly alcohol intake scores ($U = 18$, $p = .13$) did not differ between participants who underwent RYGB ($n = 10$) or SG ($n = 6$). There was a significant difference in baseline BMI by surgery type ($t(14) = 2.39$, $p = .03$), with a higher mean BMI in the RYGB group. However, changes in BMI, YFAS, and weekly alcohol intake scores between baseline and 24 months were not different between RYGB and SG (p's > .05). Therefore, surgery participants were grouped together in subsequent analyses.

Results

Body Mass Index

Baseline BMI did not vary between groups ($F(2,24) = 1.19$, $p = .32$; M = 44.3, SD = 4.4). When comparing baseline and 4 months within each group, BMI declined significantly in all groups (p's < .05). When comparing baseline and 24 months within each group, BMI declined significantly in the surgery group only ($t(15) = 14.78$, $p < .001$). There was a trend toward an increase in BMI in the no treatment group ($t(4) = -2.55$, $p = .06$) and no change was observed in the diet group ($t(5) = 1.98$, $p = .11$).

Yale Food Addiction Scale

YFAS scores at pre-intervention did not vary between the groups ($F(2,24) = 1.14$, $p = .26$). At baseline, 6.3% of the surgery group, 33.3% of diet group, and 40% of the no treatment group met the criteria for food addiction, which requires at least three symptoms of food addiction and clinically significant impairment. When comparing baseline and 4 months within groups, YFAS scores significantly decreased in the surgery group ($t(11) = 2.97$, $p = .013$) (Fig. 1). No differences in YFAS scores were seen in the diet group ($t(4) = 1.09$, $p = .32$) or the no treatment group ($t(3) = .39$, $p = .72$) between baseline and 4 months. YFAS scores declined significantly between baseline and the final assessment in the surgery group ($t(15) = 3.17$, $p = .006$). Neither the diet group ($t(5) = .59$, $p = .58$) nor the no treatment group ($t(4) = .49$, $p = .65$) showed significant changes.

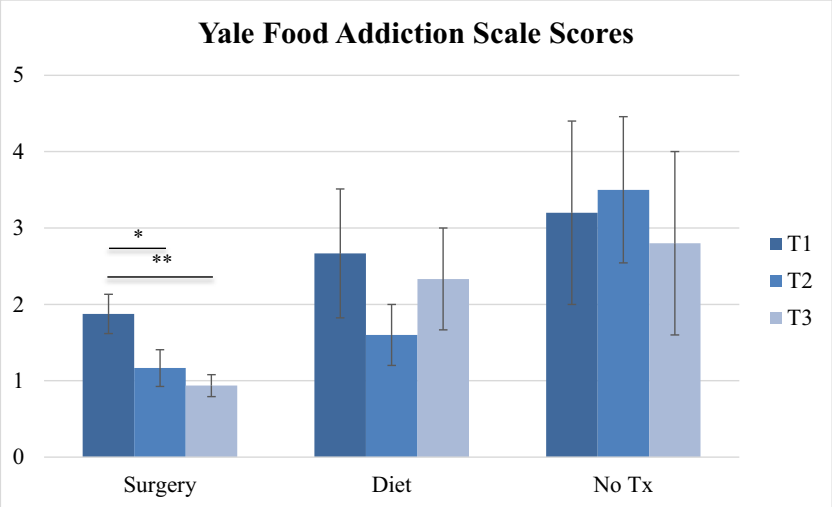

Fig. 1 Mean ± SEM Yale Food Addiction Scale scores at baseline (T1), 4-month follow-up (T2), and 24-month follow-up (T3). No Tx = no treatment. *Significant difference from T1 ($p < .01$); **Significant difference from T1 ($p < .01$)

Alcohol Intake

Alcohol intake at baseline did not vary between groups ($\chi^2(2) = 1.61$, $p = .45$). When comparing baseline and 4 months within each group, alcohol intake did not change significantly (p's > .05; Fig. 2). However, alcohol intake significantly increased between baseline and the final assessment in the surgery group ($Z = -2.82$, $p = .005$). Significant changes were not observed in either the diet group ($Z = -1.0$, $p = .32$) or the no treatment group ($Z = -1.0$, $p = .32$) between baseline and 24 months. Notably, of 10 surgery participants who reported not drinking prior to surgery, 6 reported drinking once or twice a week at the second follow-up at 24 months.No correlation was observed between change in alcohol intake scores from baseline to 2 years and change in YFAS scores from baseline to 2 years in surgery participants ($r(14) = -.06$, $p = .84$).

Discussion

At 24 months, only the surgery group showed a significant reduction in BMI from baseline. A significant reduction in YFAS scores was observed in both follow-up assessments in the surgery group. A decrease in YFAS scores was not observed in the diet or no treatment groups. Two years after baseline, a significant increase in alcohol intake was also seen in surgery patients, consistent with previous work [9]. Six out of ten surgery participants who reported 0 drinks per week prior to surgery reported having 1 to 2 drinks per week at 24 months. Notably, increased weekly alcohol intake was not observed when comparing baseline to the initial follow-up at 4 months, highlighting the importance of long-term follow-up.

Further research is needed to understand the factors motivating greater alcohol intake following weight loss surgery.

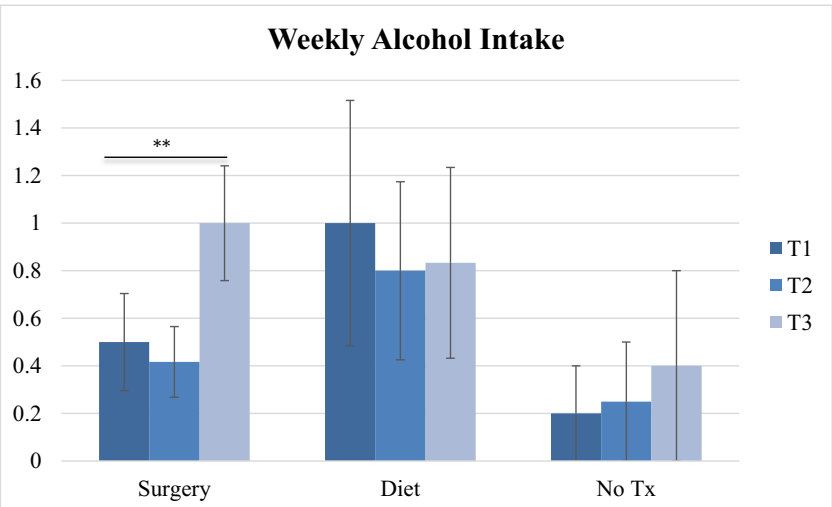

Fig. 2 Mean ± SEM weekly alcohol intake at baseline (T1), 4-month follow-up (T2), and 24-month follow-up (T3). No Tx = no treatment. **Significant difference from T1 ($p < .01$)

We did not find a correlation between change in YFAS scores and change in alcohol intake scores among surgery patients. This may be due to the fact that surgery patients in the current study endorsed relatively few YFAS symptoms at baseline, making it difficult to test the addiction transfer hypothesis. Research exploring whether substance abuse history or mental health conditions, such as depression and anxiety, influence greater alcohol use after surgery may be worthwhile.

The current study is limited by small group sizes and a largely female sample. Study strengths include a prospective design and inclusion of a control group participating in a diet weight loss program. Another strength is the racially and ethnically diverse sample. This is also the first study to examine both YFAS and alcohol intake pre- and post-surgery.

This preliminary study suggests that patients may experience sustained reductions in addiction-like food intake but increased alcohol intake following weight loss surgery. These effects were specific to surgery patients and were not observed among individuals enrolled in a diet weight loss program or no treatment.

Funding This research study was supported by NIH Grant DA-03123 (NMA), NIH grant R01DK080153 (AG), and Kildehoj-Santini (NMA).

Compliance with ethical standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval Statement All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Statement Informed consent was obtained from all individual participants included in the study.

References

1. Flegal KM, Kruszon-Moran D, Carroll MD, et al. Trends in obesity among adults in the United States, 2005 to 2014. JAMA. 2016;315(21):2284–91. https://doi.org/10.1001/jama.2016.6458.
2. Guh DP, Zhang W, Bansback N, et al. The incidence of comorbidities related to obesity and overweight: a systematic review and meta-analysis. BMC Public Health. 2009;9:88. https://doi.org/10.1186/1471-2458-9-88.
3. Sjostrom L, Lindroos AK, Peltonen M, et al. Lifestyle, diabetes, and cardiovascular risk factors 10 years after bariatric surgery. N Engl J Med. 2004;351(26):2683–93. https://doi.org/10.1056/NEJMoa035622.
4. Obesity and addiction: can a complication of surgery help us understand the connection? Obes Rev. 2017;18(7):765–75. https://doi.org/10.1111/obr.12542.
5. Sevinçer GM, Konuk N, Bozkurt S, et al. Food addiction and the outcome of bariatric surgery at 1-year: prospective observational study. Psychiatry Res. 2016;244:159–64. https://doi.org/10.1016/j.psychres.2016.07.022.
6. Pepino MY, Stein RI, Eagon JC, et al. Bariatric surgery-induced weight loss causes remission of food addiction in extreme obesity. Obesity (Silver Spring, Md). 2014;22(8):1792–8. https://doi.org/10.1002/oby.20797.
7. Ivezaj V, Wiedemann AA, Grilo CM. Food addiction and bariatric surgery: a systematic review of the literature. Obesity reviews: an official journal of the International Association for the Study of. Obesity. 2017;18(12):1386–97. https://doi.org/10.1111/obr.12600.
8. Steffen KJ, Engel SG, Wonderlich JA, et al. Alcohol and other addictive disorders following bariatric surgery: prevalence, risk factors and possible etiologies. Eur Eat Disord Rev. 2015;23(6):442–50. https://doi.org/10.1002/erv.2399.
9. Conason A, Teixeira J, Hsu CH, et al. Substance use following bariatric weight loss surgery. JAMA Surg. 2013;148(2):145–50. https://doi.org/10.1001/2013.jamasurg.265.
10. Gearhardt AN, Corbin WR, Brownell KD. Preliminary validation of the Yale Food Addiction Scale. Appetite. 2009;52(2):430–6. https://doi.org/10.1016/j.appet.2008.12.003.