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Review article

Substance use after bariatric surgery: A review

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ABSTRACT

Background: Prevalence of obesity has increased dramatically. Obese individuals may undergo bariatric surgery to lose excessive body fat and mitigate obesity-related comorbidities. However, bariatric patients are particularly vulnerable to substance use problems. We conducted a review to examine the prevalence change and factors associated with substance use and determine the association between substance use and health status after weight loss among bariatric patients.

Methods: We searched peer-reviewed articles published between January 1990 and January 2015 in several databases (PubMed, PsycINFO, Cochrane Library, Google Scholar) using different keywords combinations. Studies that focused on pre-surgery substance use only or without reported effect measurements were excluded.

Results: Overall, 40 studies were included in the review. Preoperative history of substance use was a reliable correlate of postoperative substance use. The prevalence of postoperative alcohol use was higher among patients with preoperative history of alcohol use than those without. Postoperative prevalence of alcohol use ranged from 7.6% to 11.8%. No significant prevalence change in cigarette smoking from pre-to postoperative period was observed. Time effect was not observed on smoking or drug use prevalence, while an increase in alcohol consumption was inconsistent across studies. The proportion of new-onset substance users among bariatric patients after surgery ranged from 34.3% to 89.5%.

Conclusion: Substance use is associated with poor health among bariatric patients. Preoperative assessment and postoperative follow-up should include interventions to reduce relapse among users and prevent substance use initiation.

Contents

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Abbreviations

BMI	Body Mass Index
AUD	Alcohol use disorder
SUD	Substance use disorder
NSAID	Nonsteroidal anti-inflammatory drug
LAGB	Laparoscopic adjustable gastric band
RYGB	Roux-en-Y gastric bypass
VSG	Vertical sleeve gastrectomy
LASG	Laparoscopic sleeve gastrectomy
VBG	Vertical banded gastroplasty
WE	Wernicke encephalopathy
OR	Odds ratio
HR	Hazard ratio
NIDDK	The National Institute of Diabetes and Digestive and Kidney Diseases.
Unit	
kg/m^2	BMI (*body mass index*)
g/l	*Blood ethanol concentration*

1. Introduction

During the past decades, the prevalence of obesity has increased substantially worldwide and has become a public health concern (James, 2004). Adults aged 20 and above with body mass index (BMI) – defined as individual's body weight (kg) divided by the square of height (m^2) - over 30 kg/m^2 are considered being obese (WHO, 2000). The increases in obesity prevalence are related to dramatic lifestyle changes, including dietary habits and physical inactivity (Fryar et al., 2012). Among factors related to lifestyle changes, substance use is related to obesity since there may be overlaps in brain circuitry that underlie addictive behavior as well as overeating, and substance dependence could be reinforced by food addiction (Saules et al., 2010).

Obesity is associated with physiological and psychological comorbidities (Raj & Kumar, 2010; Anderson et al., 2007; Hayden-Wade et al., 2005). Severely obese individuals are at the highest risk of suffering obesity-related comorbidities (Freedman et al., 2007; Booth et al., 2015). Bariatric surgery is considered a good treatment option for reducing excessive body fat (Svetkey et al., 2008) because non-surgical approaches, such as lifestyle modification and pharmacologic treatment, have resulted in only modest weight loss (Fitzgerald and Baur, 2014). Individuals with BMI $\geq$40 or 35 $\leq$ BMI $\leq$39.9 with serious obesity-related comorbidities are recommended to receive bariatric surgery and individuals with BMI $\geq$30 and at least one obesity-related comorbidities might also be eligible to undertake certain type of bariatric surgery (i.e. adjustable gastric band) (NIDDK, 2015). A global survey estimates that in 2013 at least 0.01% of total population (n = 4.7 billion from 52 nations or national groupings) worldwide have undergone bariatric surgery (Angrisani et al., 2013). The successful application of bariatric surgery to treat severe obesity has been well-documented (Lawson et al., 2006). Buchwald et al. (2004) conducted a meta-analysis of adult bariatric surgery that included 136 studies covering 22 094 patients aged 16–64 years and found that, on average, 61% of excessive weight loss had been achieved for all studied patients after the surgery (excluding 30 post-operative days). Further, obesity-related medical comorbidities had been found to be resolved or improved in the majority of the patients (86% in type II diabetes, 70% in hyperlipidemia, 79% of hypertension, and 84% of apnea).

Due to physiologic changes after surgery, bariatric surgery patients were more sensitive to the effect of substance consumption than those without (Buffington et al., 2006). For instance, Ertelt et al. (2008) found that 84% of those who consumed alcohol after bariatric surgery experienced intoxicating effects of alcohol after consuming a small amount of alcohol and 29% of them indicated that the time of the intoxicating effects of alcohol lasted longer than they experienced before bariatric surgery. Additional descriptions of mechanisms for changes of substance absorption and addiction after bariatric surgery are reported elsewhere (Woodard et al., 2011; Dutta et al., 2006; Klockhoff et al., 2002). Prior studies have also documented the negative impact and risk of substance use on the health outcomes of bariatric surgery patients: some post-operative substance users may have an increased likelihood of developing Wernicke Encephalopathy (Grace et al., 1998; El-Khoury, 2010), ulcer diseases (Coblijn et al., 2014) and malnutrition (Wendling and Wudyka, 2011).

Preoperative history of substance use was prevalent and reported by up to 60% of bariatric surgery patients (Conason et al., 2013), although cessation was highly recommended for surgery candidates, preoperative substance use was significantly associated with postoperative substance use. Saules et al. (2010) found that, among 54 bariatric patients (mean age = 44.6 ± 9.1) who were enrolled in a drug and alcohol treatment program, 35.8% of them had a preoperative history of heavy use of drugs and/or alcohol. With regards to relatively high prevalence rates for alcohol, marijuana, amphetamines and tobacco use among adolescents (Winters et al., 2014; Carneiro et al., 2006), bariatric surgery patients at younger age were more likely to present substance use problems than those at older age (King et al., 2012).

Prior findings have shown that preoperative history of substance use (tobacco, alcohol, and illicit or recreational drug use) may be an important correlate of postoperative substance use (Saules et al., 2010; King et al., 2012; Raebel et al., 2014). However, it is unclear about how postoperative substance users differ from preoperative substance users in characteristics and patterns of substance use. On the other hand, the health impact of post-operative substance use on bariatric surgery patients' health conditions and weight loss outcomes are also unknown. Therefore, it is important to understand differences in postoperative substance use between 'relapsed users' (who had a substance use history but quit before the surgery to meet the requirements for undergoing bariatric surgery) and 'new-onset users' (who had never used substances before the surgery but used substances after the surgery).

We have found just three reviews (Sogg, 2007; Ertelt et al., 2008; Heinberg et al., 2012) that examined alcohol use problems