**BARIATRIC SURGERY-A FACTOR LOWERING BODY DISSATISFACTION AND DEPRESSION IN ADOLSCENTS AND ADULTS**

**ABSTRACT:**

Obesity is an escalating global chronic disease. Bariatric surgery is a very efficacious treatment for obesity and its comorbidities. Alterations to gastrointestinal anatomy during bariatric surgery result in neurological and physiological changes affecting hypothalamic signaling, gut hormones, bile acids, and gut microbiota , which coalesce to exert a profound influence on eating behavior. A thorough under-standing of the mechanisms underlying eating behavior is essential in the management of patients after bariatric surgery.

Hunger and satiation are the predominant signals involved in the initiation or termination of a meal. Psychological experiences, peripheral physiological signals, and central neural processes interact before, during, and after food in-take to form a bio psychological closed loop conceptually beginning with hunger and proceeding through satiation and satiety, before returning to hunger (85). The consequences of when this loop becomes pathological are either overweight or underweight. Obesity and its associated complications are increasing unabated, but bariatric surgery is an effective treatment (50, 194, 254)

**INTRODUCTION**

The term “body dissatisfaction” has been recognized as an important psychological link of obesity that is associated to eating disorder, poor self-esteem, and depression. Whereas, it is also being studied that not all individuals with obesity or who are obese and overweight are equally vulnerable and prone to the factors like depression, anxiety and poor self-esteem, and this may or may not be present in persons and individuals with normal weight. In this context, the multifarious relationship of body image and individual weight status give the impression like a worthwhile direction of research inquiry. The state obesity is widely deliberated to be one of the most serious public health problems of recent times, not only increasing health care costs and hazard of illness but also burdening individuals with obesity with severe psychological consequences(1) (Friedman MA and Brownell KD, 2021). Next to self-esteem and emotional well-being, body image is a key concept believed to be negatively affected in obesity.(2) (Wardle J and Cooke L, 2005).

Body image is being said that is a multidimensional construct and if we refer it then it would not be bad to a person’s perceptions and attitudes, including feelings, thoughts and behaviors, regarding their own body and appearance (3). According to this the out coming cognitive-behavioral model of body image, personality and physical attributes as well as interpersonal attributes and cultural socialization all play a fundamental role in how much and on a scale how intense these invested individuals are in their body image and how they can possibly evaluate all of it. Also another facet of the attitudinal body image is referred to as body satisfaction or body dissatisfaction (Pole M et al 2004). That means the body dissatisfaction and body satisfaction refers to all of the above given factors.

Furthermore, it also demonstrates the subjective evaluation of the degree to which an individual has a positive or negative regard for their body. Similarly all of this is familiar to the pre-existing concept itself, the measurement of body image is not only multidimensional but very important as well, a circumstance that explains why, e.g., weight dissatisfaction does not only necessarily imply body dissatisfaction (Flynn KJ and Fitzgibbon M 2020). The important assessment tools like subjective satisfaction, investment in appearance and beliefs about the body, and avoidance behavior perceptual accuracy of or attitudes regarding body image are verily essential (Sarwer DB and Thompson JK 2004). While the former tends to make use of figural drawing scales and computer morphing techniques, the latter is often assessed using self-report questionnaires (Gardner RM and Brown DL, 2010; Pull CB and Aguayo GA, 2011) .

Body dissatisfaction is an unfailing predictor of depression. The factor that is known BMI is the most common factor linked to body dissatisfaction. It is not negatively correlated with body dissatisfaction for female adolescents. (Presnell K and Bearman SK, 2004). BMI, higher rate of depression, and very shallow and low self-esteem are associated with body dissatisfaction among college students (Penkal JL and Kurdek LA 2007). Franklin et al, 2006 found in a community sample of 2,813 Australian youths that body dissatisfaction mediated the association between obesity and negative self-esteem in females. Contributing to this, the results of a very recent cross-sectional study showed that in a survey of 1,490 youth in grades 7 through 12, obese youth reported higher body dissatisfaction and greater depressive symptoms, including anhedonia and negative self-esteem. (Goldfield GS et al, 2010).

Obesity in adolescents further leads to extreme teasing on regular basis, which in turn may cause depression in obese youth, who consequently experience amplified dissatisfaction with the way they look and their appearance. Also, obese female adolescents and adults are more predisposed to have body dissatisfaction, which further may lead to depression and lower self-esteem. Adolescents with negative body image concerns are more likely to be depressed, anxious, and suicidal than those without intense dissatisfaction over their appearance, even when compared to adolescents with other psychiatric illnesses. As such, the target should be to systematically explore the degree of body dissatisfaction in individuals with obesity compared to the individuals who have normal ranging BMI and normal-weight individuals.

The link between weight status and body image is complex (Schwartz and Brownell,2004). The

argument that bodies image might be affected by obesity through psychological distress, which has an eye-opening impact on quality of life. While body image is a subjective psychological phenomenon, it is also largely determined by social experiences (Grogan S,2008). Current Western societies tend to idealize slenderness, and it is assumed that media portrayal of the ideal female or male body has great influence on the way individuals evaluate and experience their physical appearance (Tiggemann M and Slater A,2004) . These ideals are generally associated with being strong-willed and in control of one’s body, and individuals not able to conform to this ideal face substantial stigma (Grogan S, 2008).

**OBESITY AND DEPRESSION**

For years it has been assumed that any relationship of obesity to depression in the general population is largely coincidental, but a recent sub analysis found that the effect of obesity on the development of depression was stronger. The the possibility of a biological link between overweight, obesity, and depression, with obesity seen as an inflammatory state was highlighted. Inflammation has also been associated with depression, which is perceived as a stressful live event in which the brain responds in a similar way as it responds to a medical illness, leading to elevated pro inflammatory cytokines.

In people with normal weight, fat tissue contains fat cells, but in obese people, fat tissue is loaded with macrophages, cells that ingest pathogens and other foreign materials and release inflammatory hormones such as TNF-alpha and interleukin-6 that constantly activate the immune system at a low level, therefore contributing to a chronic inflammatory state (Bastard JP et al, 2006).It was also noted that although the biological mechanisms underlying obesity and depression-onset risk may not be different across cultures, sociocultural systems could be different and stricter in one culture compared with another culture. Compared with normal weight adolescents, obese adolescents have a higher prevalence of school and mental health problems, including poor academic performance and self-esteem, anxiety, depressive disorders, and a greater number of reported suicide attempts. Despite this and the rapidly increasing incidence and adverse health outcomes associated with overweight and mental health problems, very few intervention studies have been conducted with adolescents to improve both their healthy lifestyles and mental health outcomes (Manyk BM et al,2009).

An elevated body mass index (BMI) is predictive of a chronic course of depressive and anxiety symptoms (Zhao, G. et al, 2009); Milaneschi, Y. et al, 2019). The odds of developing major depressive disorder (MDD) and anxiety increase as a function of the number of coexisting metabolic impairments, such as those characteristic of metabolic syndrome (Jokela, M. et al, 2014); Tang F et al, 2017). Obesity is coupled to various structural and functional changes in the brain that are remarkably similar to those observed in depressive disorders, such as region specific increases in cell density and compromised neural connectivity and excitability (Rapuano, K.M. et al. (2020); Opel, N. et al. (2021). Several lines of evidence suggest that prolonged inflammation caused by poor dietary lifestyle and inactivity and resulting metabolic consequences are required for such outcomes.

**BODY DISSATISFACTION**

Body dissatisfaction indicates the subjective and negative evaluation of one’s physical appearance, regarding one’s figure, weight and shape and suggests a condition in which there is a significant incongruity between perceived and ideal body image (Halliwell E and Dittmar H 2006). Concerns about body image can considerably affect a person’s psychophysical well-being. Negative body image includes all cases of clinically significant discomfort related to body image dissatisfaction such as subjects with objective differences in physical appearance (e.g. patients with obesity) and in subjects with imaginary or exaggerated aesthetic problems, or both (Geller S et al, 2019) . Body dissatisfaction can be demonstrated by frequent control of weight and body parts or by avoidance behavior such as wearing loose clothing or avoiding going to particular places (e.g. swimming pools) to avoid comparisons with other people (Grogan S 2016). Segura-Garcia et al, 2012 studied both gender control group, and 58 patients with eating disorders were administered the Body Image Dimensional Assessment (BIDA), and the authors showed that the patients with obesity before, and after bariatric surgery felt a dissatisfaction of their bodies, these patients have has a misperceptions of their physical appearance. Growing up, our body suffers from considerable changes, especially during teenage years. Patients with obesity feel a little uncomfortable and frustrated with their physical appearance, they have a wrong perception of their image, and consequently a possible decrease their self-esteem, sometimes showing difficulties in functional areas such as work, relationship, social activity (Pona AA et al, 2016). In etiology and treatment of obesity body image plays an imperative role (Monpellier VM et al,2018). Perdue TO et al, have carried out a study to investigate the evolution in their perception, and the concerns about their body image in post bariatric surgery patients, and what emerged was an experience of “mind–body lag”.

Obesity is associated with significant psychosocial impairments compared with the normal weight population, patients have a higher rate of suffering from a psychological disorder such as depression, anxiety disorders, or eating disorders (Rajan T and menon V 20117) and shared genetic loci for increased BMI and major psychiatric disorders are suggested (Bahrami et al,2020). Additionally, people with obesity report poor quality of life, high body image concerns, and frequent stigmatization (Puhl RM 2020). While physicians typically focus on the physical and medical consequences of obesity, treatment seeking patients are often motivated by putative positive impacts on their psychosocial life (Cohn I et al, 2019). It has been suggested that overall psychosocial functioning improves after bariatric surgery (Ivazej V and Grilo CM 2019), yet the likelihood of improvement and its mechanism remain unclear. A relevant mechanism of psychosocial functioning in obesity might be the interactions between disordered eating, depression and body image (Ziser K et al, 2019). The latter is a fundamental aspect of the self-concept, because it is a constant characteristic and includes meaning of the body for self-esteem. Changing body weight does not necessarily result in a change in one’s self-concept. Therefore, body image could be relevant in obesity treatment beyond its role as an indicator of weight status reflection.

**BARIATRIC SURGERY**

Bariatric surgery (BS) is performed by surgically reducing, removing or resecting a smaller or larger part of the stomach, with or without rerouting the small intestines (Danish Centre for Health Technology Assessment 2007). In Denmark, no psychological counselling is included as a structured part of the treatment process for an individual pre- or post-BS. There are, however, some hospitals and a patient association (viz. Bariatric Society) that organize deliberate self-help groups for all patients who have undergone BS. Studies with adult seeking BS have shown that men and women request surgery for different reasons (Libeton et al. 2004). While men are primarily motivated by concerns about future health and medical problems, women’s motivation is predominantly due to their appearance (Libeton et al. 2004, Munoz et al. 2007). In general, female BS candidates’ rate of dissatisfaction regarding physical appearance is significantly higher than that in males (Duval et al. 2006). According to Merleau-Ponty’s phenomenology, our perception, understanding and identities originate in and are experienced through our bodies (Merleau-Ponty 1945/2001, Crocker 2009). Embodiment is defined in the manner that reflects the phenomenological view as how we as humans live in, experience and find significance in our world through our bodies, especially through perception, language and movement in space and time (Crocker 2009). Perceptions of own physical appearance are closely linked to the concept of body image (BI), which is viewed as a construct that refers to what one thinks, feels, perceives and does in relation to one’s body (Gallagher 1986). BI is considered an important part of the individual’s self-concept related to self-esteem (Taylor 2009). Self-concept may be understood as a (stable) set of convictions of one’s qualities and abilities including both the social self and BI and self-esteem is considered a positive or negative attitude towards these qualities and abilities (Taylor 2009).

Lifestyle changes together with diet and exercise are usuallyconsidered as the first lines of prophylaxis and therapy inweight management treatments and are the mainstay ofassociated public health messages. This is not dissimilar tolifestyle changes being the cornerstone of the public healthmessage in relation to the prevention and management ofhypertension, dyslipidemia, or diabetes. Frustratingly how-ever, lifestyle approaches for obesity are of limited efficacyin managing and treating severe overweight and its comor-bidities. This is disappointing to clinicians and patients asmany fail to maintain weight loss in the long term. Onlyaround 15% of obese and overweight people who attemptto lose excess weight by diet therapy can manage to sustain10% weight loss over a period of 1 yr (160). Dietary-in-duced weight loss tends to be largely unsustainable withweight rebound within 1 yr. In the majority of cases, allweight lost is regained within 3–5 yr

**NUTRIENT DEFICIENCY ACCORDING TO THE TYPE OF BARIATRIC SURGERY:**

**The** categories of bariatric surgery are:

1. RESTRICTIVE PROCEDURES
2. MALABSORPTIVE PROCEDURES
3. COMBINATION PROCEDURES (restrictive and malabsorptive)

Bariatric surgery is currently the most effective method of sustainable weight loss among morbidly obese patients. The types of bariatric surgeries can be divided into three categories: restrictive procedures, malabsorptive procedures, and combination procedures. In general, patients undergoing restrictive procedures have the least risk for long-term diet-related complications, whereas patients undergoing malabsorptive procedures have the highest risk. For many patients, the benefits of weight loss, such as decreased blood glucose, lipids, and blood pressure and increased mobility, will outweigh the risks of surgical complications. Most diet-related surgical complications can be prevented by adhering to strict eating behavior guidelines and supplement prescriptions. Eating behavior guidelines include restricting portion sizes, chewing foods slowly and completely, eating and drinking separately, and avoiding foods that are poorly tolerated. Supplement prescriptions vary among practitioners and usually involve at least a multivitamin with minerals. Some practitioners may add other supplements only as needed for diagnosed deficiencies; others may prescribe additional prophylactic supplements. The most common nutrient deficiencies are of iron, folate, and vitamin B12. However, deficiencies of fat-soluble vitamins have been reported in patients with malabsorption procedures, and thiamin deficiency has been reported among patients with very poor intake and/or nausea and vomiting. Frequent monitoring of nutrition status for all patients can aid in preventing severe clinical deficiencies.

**ADOLSCENTS MENTAL HEALTH:**

The World Health Organization (WHO, 2017) reported that 10–20% of children and adolescents worldwide experience mental health problems. It is estimated that 50% of all mental disorders are established by the age of 14 and 75% by the age of 18 (Kessler et al., 2007; Kim-Cohen et al., 2003). The most common disorders in children and adolescents are generalized anxiety disorder and depression, respectively (Mental Health Foundation, 2018; Stansfeld et al., 2016). According to the Royal Society for Public Health, & Young Health Movement (2017), the prevalence of anxiety and depression has increased by 70% in the past 25 years in young people. Depression and anxiety have adverse consequences on adolescent development, including lower educational attainment, school dropout, impaired social relationships, and increased risk of substance abuse, mental health problems and suicide (Copeland et al, 2014; Gore et al., 2011; Hetrick et al, 2016). Morgan et al. (2017) reported that the rate of self-harm in the UK has risen by 68% in girls aged 13–16 over the last 10 years. Reasons for the apparently growing psychological morbidity in young people are not known conclusively.

McCrae (2018) suggests that diagnostic activity has been influenced by educational initiatives to

raise mental health awareness. Undeterred by stigma, many young people feel free to discuss their psychological difficulties and seek professional help. Another important factor is the ease of sharing personal experiences in the digital information age (Reid-Chassiakos et al, 2016). Whereas in the past mental health problems were suffered in isolation, today a struggling younger person can readily find others with similar problems, either through social interaction or support groups. Alongside increasing awareness and help-seeking behavior, doctors may be more inclined to diagnose and treat mental health problems, possibly with the effect of lowering the diagnostic threshold.

**EPIDEMIOLOGY**

There is also a very gigantic possibility of an astonishing factor for the reported increase during adolescence is the set of social and biological changes of the distinguishing of post-pubertal phase, such as enhanced social understanding and self-awareness, brain journeys has the possibility that it also changes involved in responses to remuneration and hazard and also the highly increased reported stress levels (Blakemore SJ (2008) and Patton GC, Viner R (2007). Regarding differences between genders, while no significant differences are found in depression during childhood, depression during adolescence has a strong female preponderance, similar to adulthood (Avenevoli Set al, 2013 and Seedat S et al, 2016). This difference is still observed between distinct epidemiological and clinical illustrations and across various methods of assessment. As such, it is unlikely due to differences in help-seeking or reporting of symptoms and more closely tied to female hormonal changes, which suggests a direct link to hormone-brain relations (Angold A, 2009).

Up to 71% of pre surgical patients experience concerns about body image, a multidimensional construct comprised of self-perceptions and self-attitudes concerning one’s body, including thoughts, beliefs, feelings, and behaviors (Cash TF,2004 and Pona AA et al,2017). Body image dissatisfaction encompasses shape and weight concerns including a fear of weight gain or disliking one’s shape or figure due to excess skin (Walson E et al, 2020). These concerns tend to manifest from a preoccupation with or overvaluation of one’s body and can cause significant distress (Grilo CM et al, 2013). Shape and weight concerns are commonly cited reasons for seeking bariatric surgery.

**PATHOGENESIS**

Comprehension of the pathogenesis of depression in adolescents and adults is a challenging task, due to its heterogeneous clinical presentation and diverse causes. Putative risk factors, potentially modifiable during adolescence without professional intervention, are substance use (alcohol, cannabis and other illicit drugs, tobacco), diet and weight (Cairns KE et al 2016). Alcohol use is known to have neurotoxic effects during this developmentally sensitive period. Cannabis and other illicit drugs can have an impact on serotonin and other neurotransmitters causing an increase in depressive symptoms. Furthermore, alcohol, cannabis and other illicit drug use have various deleterious social and academic consequences for the adolescent which could increase their risk for depression (Cairns KE et al 2016). The relationship between tobacco use and depression is unclear. However, it has been proposed that this linkage may arise from the effects of nicotine on neurotransmitter activity in the brain, causing changes to neurotransmitter activity (Boden JM et al, 2010). Overweight can usually have the negative impact on self-image which elevates the risk for depression. Moreover, depressed people may lead a less healthy lifestyle and suffer from deregulation in the stress response system, which may contribute to weight gain (Cairns KE et al 2016). Association between depression and environmental factors, such as exposures to acute stressful events (personal injury, remembrance) and chronic adversity (maltreatment, family discord, bullying by peers, poverty, physical illness), has been subject of papers. Stressful life events seem more strongly associated with first onset rather than recurrence, and risk is considerably greater in girls and in adolescents who have multiple negative life events. The most important factors are chronic and severe relationship stressors (Thapar A et al, 2012). A significant interaction was found between exposure to maternal threatening behaviors and deficits in emotional clarity in relation to depressive symptom severity (Trent ES et al, 2019). Genetic factors can also play a very important role in the pathogenesis. Many reports suggest that a variant (5- HTTLPR) in the serotonin transporter gene might increase the risk of depression, but only in the presence of adverse life stressors or early maltreatment. The findings are less robust in adolescent boys than girls. This gene variant has also been reported to affect fear related and danger-related brain circuitry, which is altered in depression. However, such findings seem to vary not only by genotype but also by age, sex, and severity of symptoms, and are also reliant on good quality measures of adversity and depression (Thapar A et al,2012 and Risch N et al, 2009).

**PREVALENCE OF DEPRESSION**

The prevalence of depression is significantly linked to age, being low in children (< 1%) and increasing throughout childhood and adolescence. Nevertheless, the prevalence of depression in adolescence varies significantly between studies and reports. A reported prevalence in Great Britain was 4%, whereas in the USA was 2.1% and in France was 11.0% (Costella EJ et al ,2006 and Perou et al, 2013) Nevertheless, a systematic review from 2013 stated the life prevalence of depression varies from 1.1 to 14.6% (Wesselhoeft R et al, 2013).

**PREVALENCE OF OBESITY RELATED BARIATRIC SURGERY:**

Identifying factors associated with postoperative outcomes is the main focus of current literature. (Zhao J et al, 2021). Obesity increases the risk of developing diseases such as cardiovascular disease, type 2 diabetes mellitus, and several malignancies, and severely negatively affects quality of life and productivity (Chooi YC et al, 2019). The worldwide prevalence of obesity has increased dramatically since the 1980s, causing a significant public health crisis (Angin A 2017). Bariatric surgery is widely regarded as an effective treatment modality for obesity and its associated comorbidities. It results in lasting weight loss, improved quality of life, improved co-morbidity control, and decreased mortality (Wolfe BM et al, 2016). The utilization of bariatric surgery has grown dramatically between 2011 and 2019, the total number of bariatric surgeries in the United States increased by 62%. These factors may prove useful in identifying patients at highest risk of treatment failure and those who would benefit from preoperative and postoperative interventions.

**METHODS**

The search for relevant articles was conducted using several databases with the following search terms:

* morbid obesity,
* bariatric surgery,
* hunger and satiety
* psychology,
* psychological health, and
* mental health.

A systematic review of the current literature was conducted to evaluate the impact of bariatric surgery on the psychological health of obese patients. Studies were actually distinguished based on the type of bariatric procedure accomplished although all methods appear to be effective in treating morbid obesity.

**DISCUSSION**

Due to the focus on women in the past research, the overall picture of body dissatisfaction in women is clearer than men and as such the subject of an ever elevating number of studies (McCreary and Sasse,2000) for example report that men and boys also seem to increasingly report over the life span body dissatisfaction and that body image is a concern for males (McCabe MP and Ricciardelli LA,2004). Correspondingly to women, body dissatisfaction in men is linked to low self-esteem, depression, and other disorders like eating disorders (Cafri G et al, 2005), the use of bodybuilding drugs like anabolic steroids or human growth hormone is also included (Wright S et al, 2000). As a subsequent consequence, nuanced approaches to reconnoiter the further relationship between male gender, weight status and body image are obligatory.

Regarding body dissatisfaction in populations with obesity, our findings are in accordance with previous assumptions, especially concerning women with obesity (Sarwer DB et al, 2009). Current groundwork and post-operative care regimes for patients that submit one’s own self to the bariatric surgery often focus on nutrition and physical activity, but scarcely objectify the psychological components (Messiah et al, 2020 and Marshel et al, 2020). Interestingly all studies of women with obesity do not find a relationship between BMI and body dissatisfaction. In this population certain factors like weight-related teasing or stigmatizing experiences appear to play a vital role in elevated body image concerns as well (Puhl RM and Heuer CA,2009). Moreover, it is hypothesized that males with overweight or obesity might protect themselves from body dissatisfaction by considering themselves as ‘big and strong’ rather than ‘fat’. The obesity-related consequences which are negative attains to treatment options is an important practical implication. Schwartz and Brownell theorize that the optimal way to improve the obese patient’s body or image of many individuals with obesity might be considered weight loss. Generally, studies examining body image before and after weight loss treatment find improved body image as a person loses weight and deterioration if the individual regains weight (Sarwer D and Thompson JK, 2009). One particular exception constitutes massive weight loss following bariatric surgery.

Overall, the research and study that does not over writes to a better-quality beholden of bariatric surgery consequences. Our observations suggest that body image is a mediating factor of depression in a subgroup of LSG patients with underprivileged psychological outcome. One exacting exception constitutes bariatric surgery that is followed by massive weight loss. Body satisfaction with hanging skin is not common and does not often necessitate body contouring surgery to assuage this ‘new’ dissatisfaction (de Zewan M et al, 2014).

Based on our observations, we suggest incorporating interventions to improve body image into aftercare regimes. This may be specifically relevant for patients with eating disorders or a desire for supplementary body contouring surgery. Further, it was proposed that the target of future studies on individual perspectives on obesity foundations and consequences in the valuation of treatment outcome.

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