Diagnosis and treatment of bulimia

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ABBREVIATIONS USED IN THE TEXT:

Beck depression inventory (BDI)

Binge-eating disorder (BED)

Body mass index (BMI)

Bright white light (BWL)

Cerebrospinal fluid (CSF)

Cognitive behavioural therapy (CBT)

Diagnostic and statistical manual of mental disorders (DSM)

Dim red light (DRL)

Dopamine transporter (DAT)

Estrogen receptor β (ER β)

Family- based treatment (FBT)

Interpersonal psychotherapy (IPT)

Messenger RNA (mRNA)

National institute for clinical excellence (NICE)

Obsessive-compulsive disorder (OCD)

Randomized controlled trial (RCT)

Selective serotonin reuptake inhibitors (SSRI)

Self-induced vomiting (SIV)

Tricyclic antidepressants (TCA)

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1. SUMMARY

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An eating disorder is a type of psychiatric illness where the behavioural pattern of an individual, with regards to eating, negatively affects his or her mental and physical health. One of these disorders is bulimia nervosa, also known simply as bulimia. Bulimia is characterized by the classic cycle of binge eating followed by purging. This diagnosis in itself can be challenging to make because it involves careful consideration of other disorders and fulfilment of certain criteria according to DSM. Although many different theories exist about the etiology of the disease, no agreement has still been reached in the scientific community. Both biological factors, in terms of neurotransmitters and hormones, as well as social factors, specifically unique to each individual, seem to play a role in the etiology. Treatment primarily involves psychotherapy however, pharmacologic therapy has also been proven to be beneficial. Of all the different drugs available for treatment of the disease, current psychopharmacological research has focused on the selective serotonin reuptake inhibitors (SSRIs). Some researchers have also claimed positive outcomes in light therapy. Bulimia is a serious disorder and should not be taken lightly. Just like any other serious condition, it should be approached with the same intensity for diagnosis and treatment.

*Key word*s: bulimia – binge eating – purging – social idealizations

2. SAŽETAK

Naslov: Dijagnoza i liječenje bulimije

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Poremećaj prehrane je tip psihičke bolesti kod kojih težište ponašanja, s obzirom na prehranu, negativno djeluje na fizičko i psihičko zdravlje pacijenata. Jedan od tih poremećaja je bulimija nervosa, isto tako jednostavnije poznata kao bulimija. Bulimija je opisana kao klasični ciklus prejedanja i pražnjenja (povraćanja). Dijagnoza sama po sebi može biti izazovna zato što uključuje pažljivo razmatranje drugih poremećaja i ispunjenje posebnih kriterija po DSM-u. Iako mnogo teorija postoje o etiologiji bolesti, nije došlo do ujedinjenosti u znanstvenim krugovima. Biologijski čimbenici u vezi neurotransmitera i hormona, a isto tako i socijalni čimbenici specifični za pojedinog pacijenta, igraju veliku ulogu u etiologiji. Liječenje prvenstveno uključuje psihoterapiju, ali i farmakološku terapiju koja je dokazano vrlo korisna. Od svih različitih lijekova dostupnih za liječenje bolesti, psihofarmakološka dostupna istraživanja su fokusirana na selektivne inhibitore ponovne pohrane serotonina (SSRIs). Neki znanstveni istrarživaći također istražuju pozitivne rezultate u svjetlosnoj terapiji. Bulimija je ozbiljni poremećaj i ne smije se uzeti olako. Isto kao bilo koje ozbiljno stanje mora joj se priči sa istim intenzitetom za dijagnozu i liječenje.

Ključne riječi: bulimija – prejedanje – povraćanje – socijalna idealizacija

3. INTRODUCTION

Taking a look at human history it is evident that eating disorders have existed for a long time. The classic cycle of binging and purging, as seen in bulimia, was a habitual practice among the elite members of society during the roman period. Individuals who attended all day banquets would purge in order to make room for more food. This idea of purging the contents of the stomach was even considered therapeutic by some societies. In ancient Egypt, for example, physicians would actually recommend purging once a month for three days in order to preserve health. In a similar manner, during the medieval ages, purgation was used as a remedy to treat a variety of conditions. With all of these historical misconceptions about the so-called benefits of purging, illnesses like bulimia seem to have been inevitable in the present. The first published description of bulimia as a disorder was made in the year 1979 by Professor Gerald Francis Morris Russell, a British psychiatrist who worked at the Royal Free Hospital and the Maudsley Hospital in London. According to Russell, patients who overate were exhibiting a "morbid fear of becoming fat" and as a result, purged afterwards. In addition to this, he noted the seriousness of the disease especially after seeing that it can be accompanied by depression and suicide. As a result of Professor Russell's contributions to the identification of bulimia as a mental disorder in itself, in the year 1980 bulimia nervosa appeared in the DSM-III. This disorder truly has an appropriate name as the term bulimia comes from the Greek words βουλιμία *boulīmia* meaning "ravenous hunger" while nervosa translates to nervous. This disease of "nervous ravenous hunger" seems to have a complicated etiology that is still not fully understood yet, regardless of that, appropriate treatment options are available with varying success rates. The main treatments given to those suffering with bulimia nervosa are psychopharmacological and psychosocial treatments. Of the psychopharmacological therapies, cognitive behavioural therapy, family-based treatment, and interpersonal psychotherapy have shown promising results for patients

with bulimia. Possible combinations of one of these therapies with pharmacotherapy is also promising however, trials performed to show the effectiveness of this mode of treatment have not proven to be exceptionally powerful as opposed to what was originally suggested. Out of the possible pharmacotherapy options, antidepressants seem to predominate with SSRIs being the most popular choice. Beginning any of the above mentioned treatments is important for patients with bulimia because this disease has such a huge impact on the daily lives of these individuals. The quality of life of these patients is severely affected in addition to the numerous complications that they face as a result of the cycle of binging and purging. Like with most mental disorders, treatment of bulimia is a chronic and challenging process that the patient must accomplish together with their psychiatrist.

4. EPIDEMIOLOGY

The prevalence of bulimia within a certain population will differ between Western and non-Western countries. Prevalence rates for bulimia in male subjects in Western countries ranges from 0% to 2.1% while in female subjects in Western countries it ranges from 0.3% to 7.3%. On the other hand, prevalence rates in non-Western countries range from 0.46% to 3.2% in female subjects (Makine et al., 2004). There are many theories as to the exact cause of this difference in prevalence including differences in fundamental political ideologies and cultural sociological aspects of those countries. Gender, on the other hand, seems to play an important role when it comes to the incidence of bulimia. According to Barker, bulimia is nine times more likely to occur in women than men (Barker, 2003). As for the age of onset of this disease, there seems to be some inconsistencies when it comes to studies on time trends. According to Gelder, Mayou and Geddes bulimia is prevalent between 1-2% of women aged 15-40 years (Gelder et al., 2005). Taking a look at this disease from the pediatric perspective, the lifetime prevalence of bulimia is between 0.9% and 3%,with an older age of onset of 16 to 17 years (Campbell & Peebles, 2014). Compared to other eating disorders like anorexia, the risk of lifetime suicidality and suicide attempts are much higher. On the other hand, mortality rates in bulimia are estimated to be approximately 2% (Campbell & Peebles, 2014). Economic status is another key contributor as it has been shown that girls from the lowest income bracket studies are 153% more likely to be bulimic than girls from the highest income bracket (Nauert, 2009). In conclusion, bulimia occurs more frequently in the female population of developed countries, specifically in those of lower economic status.

5. ETIOLOGY

The exact cause of bulimia has yet to be agreed upon in the scientific community. However, what is accepted is that the etiology of this disease has many components to it that can broadly be classified as biological, psychological, or social.

Biological Factors:

-Neurotransmitters-

Dopamine

Some studies have suggested that impaired dopaminergic transmission may be linked to the development of eating disorders, particularly bulimia. As a brief review, dopamine is a catecholamine neurotransmitter and is produced by neurons in the brain that have cell bodies in the substantia nigra. Non-striatal dopamine is made in the kidneys by proximal tubule cells. However, this dopamine is thought to act locally and is therefore, of minimum importance for this topic. To count there are five dopamine receptors, each with different effects and locations throughout the body. In addition, there are five important dopaminergic pathways in the brain. Of these five, the medullary-periventricular pathway is suspected in eating behaviour. It consists of neurons in the motor portion of the vagus nerve. Another important pathway is the mesolimbic-mesocortical pathway. It projects from the substantia nigra to the limbic system and neocortex and is involved in the reward system and is implicated in addiction. More research is definitely needed in order to discover if any relationship exists between these pathways and bulimia. What has been discovered to date, thanks to the work of Bartley G. Hoabel, is that striatal dopamine has a vital importance in feeding behaviours as well as the disordered eating behaviours as seen in bulimia. This is also evident with preclinical models of bulimia-like eating behaviours that are associated with

changes in striatal dopamine and dopamine receptor measures. In addition, emerging clinical research also suggests that striatal dopamine abnormalities exist in individuals with bulimia (Broft et al., 2011). What is important to note is that the precise relationship between these findings and the etiology of bulimia still remains unclear and definitely warrants further investigation.

According to a study performed by Dr. Frieling and his colleagues, impaired dopaminergic transmission is suspected to contribute to the etiology of anorexia and bulimia. To prove this, they examined whether the expression of dopaminergic genes is altered in people suffering from these two diseases. They hypothesized that this alteration can be explained by changes in the promoter specific DNA methylation of genes. By examining the blood of patients with anorexia and bulimia, and that of healthy controls for the expression and the promoter specific DNA methylation of the dopamine transporter (DAT) along with the D2 (DRD2) and D4 receptor (DRD4) gene, they were able to draw conclusions about the dysregaltion of dopamine. Anorexia and bulimia patients showed an elevated expression of DAT mRNA (messenger RNA) and a downregulation of the DRD2 expression. Yet, this upregulation of the DAT gene was accompanied by a hypermethylation of the gene's promoter (Frieling et al., 2009). This study suggests that patients suffering from bulimia have a disturbed expression of dopaminergic genes.

Serotonin

Serotonin is a monoamine neurotransmitter that is derived from tryptophan. It is thought to be a contributor to the feelings of well-being, happiness, and satiation. In this being said, some researchers believe that binge behaviour of patients with bulimia actually stems from a chemical imbalance in the brain due to low serotonin levels (Hirst, 1998). Experiments performed on laboratory animals showed that when serotonin is released into

either the ventromedial hypothalamus or the lateral hypothalamus that eating is stopped and starvation results. When serotonin levels are reduced the opposite happens and obesity ensues. Although this study was performed on animals, it still provides insight into possible mechanisms of serotonin involvement in the etiology of bulimia. Another study, performed by Jimerson and his colleagues supports this idea. In this study, cerebrospinal fluid (CSF) neurotransmitter metabolite levels were examined in patients suffering from bulimia with a history of binge eating and in healthy controls. The results of the study showed that bulimic patients had significantly lower CSF concentrations of 5-hydroxyindoleacetic acid and homovanillic acid, metabolites of the neurotransmitters (Jimerson et al., 1992). However, although these past studies implicate decreases in serotonin, that is not the only abnormality that can be found within the serotonin system. More recent studies were able to pin point a clearly picture of these alterations. According to one study, reduced central 5-HT transporter availability was found in women with bulimia (Tauscher et al., 2001) while another study showed reduced central 5-HT transporter availability in those who have recovered from bulimic anorexia (Bailer et al., 2011). In a similar manner, reduced 5HT2a receptor binding (in subgenualcingulate, mesial temporal, and parietal cortical regions) in women recovered from bulimia was concluded by a study performed by Bailer and colleagues (Bailer et al., 2004). All of these different studies clearly demonstrate that serotonergic dysregulation must play a role in the etiology of bulimia.

-Hormones-

Estrogen

Since eating disorders are more prevalent in females than in males it is safe to assume that perhaps female sex hormone signalling may have something to do with the etiology of the disease. According to some experiments that were performed on laboratory animals, it has

been found that estrogen inhibits feeding and in that way affects feeding behaviour (Geary, 2001). Other supporting evidence that is found in humans is that the occurrence of menstrual disturbances is increased in bulimic women (Nilsson et al., 2004). One specific study examined the possible role of the estrogen receptor β (ER β) variants and the relationship with bulimia. The gene for ER β is located on chromosome 14q, a region that was recently identified to meet the criterion for genome-wide suggestive linkage with bulimia. Although one German study did not provide evidence for an association between bulimia and ER β polymorphism (Rosenkranz et al., 2011), Nilsson's study indicated that there is a possible role of ER β polymorphisms in the etiology of bulimia as they are located in the 3'UTR and could affect mRNA stability. Therefore, the ER β most likely does play a role in the etiology of disease in bulimic patients.

Psychological Factors:

Thoughts, feelings and other cognitive characteristics that affect the behaviour and functions of the human mind seem to play a role in the etiology of bulimia. By taking a closer look at the binge-purge cycle through a psychoanalytical view, one can better understand bulimia from this perspective. According to Freud, in his letters to Fliess in 1899, psychogenic vomiting is an oral impregnation fantasy. He defined the self-punishing aspects of vomiting along with their function as a drive-defense compromise formation. From a Freudian or classical perspective, eating has become erotically appealing and bulimia is interpreted as representing a displacement and regression from genital wishes (Chassler, 1997). From an object relations perspective, bulimia has been understood as the semi-symbolic equivalent of the oral mother (Sperling, 1949), a concrete expression of the introjection-projection struggles of early infancy (Jessner & Abse, 1960), and traced to a developmental arrest at the earliest stage of transitional object development (Sugarman &

Kurash, 1982). Other research suggests that anorexia and bulimia are connected to attachment, in particular a disrupted attachment behavioural system (Armstrong & Roth, 1989). According to one study performed by Chassler, a connection exists between anorexia and bulimia and early childhood attachment relationships as conceptualized by John Bowlby's attachment theory. The findings of this study suggest that patients with anorexia and bulimia perceive a more disrupted attachment history in terms of both the nature and the quality of their attachments to primary caretakers. More specifically, results indicated that attachment figures were experienced as untrustworthy, unloving, or rejecting; aversive forms of parental discipline were predominantly used; peer relationships and support was poor; and intense feelings of shame, guilt, and being unwanted was linked to the diseases. The results of this study support the theory that one of the precursors to anorexia and bulimia may lie within family relationships (Chassler, 1997).

Social Factors:

The media's portrayal of the ideal "thin" body shape is thought to be a contributor to the etiology of bulimia. According to Fairburn *et al.'s* cognitive behavioural model, it is this idea, coupled with low self-esteem, which leads individuals to become extremely concerned with weight and shape and as a result, practice rigid and inflexible dietary rules. When there is an eventual "slip" of this diet it is the cognitive distortion that leads the individual to binge. In hopes of counteracting this perceived loss of control, the individual purges (Fairburn & Beglin, 1990). The pattern repeats itself over and over again producing a negative cycle in that patient's life. This cognitive behavioural model is considered to be the gold standard for the etiology of bulimia however, another theory also exists. According to Byrne and Mclean, it is the drive for thinness that is the major cause of purging as a way of controlling weight. As a result, the individual is vulnerable to binging and in this way they argue that it is in fact

a purge-binge cycle (Byrne & Mclean, 2002). Both theories share the common underlying factor of society's unrealistic thin idealization.

Overlap of Genetic and Environmental Factors:

Familial Aggregation

Although few studies have been done to examine the etiology of bulimia in terms of both genetic and environmental factors, those that were provide suggestive evidence of familial aggregation. By performing twin studies in the past thirty years, a definite relationship has been established between genetics and the etiology of eating disorders. For example, the heritability of bulimia was found to range from 28% to 83% (Peterson et al., 2015). One specific study that was performed attempted to find the relationship between the patterns of SIV and the incidence amongst twins. As a side note, SIV is an eating disorder symptom that can be observed in bulimia and anorexia. However, as previously mentioned, it is the most reliably assessed behavioural feature of bulimia. This study, performed by Dr. Peterson and her colleagues, assessed SIV initiation and progression. The results showed that genetic factors that influenced liability to SIV progression were shared with SIV initiation however; a small proportion of liability to SIV progression was attributed to environmental factors that were unique to SIV progression and not shared with initiation. In other words, genetic factors play an important role for initiation yet; environmental factors are more responsible for progression. In a similar way, another study performed by Wade and colleagues suggested that individual-specific environmental factors are important in the progression to bulimia once binge eating is initiated (Wade et al., 2000). What can be concluded by these studies is that genetic vulnerability to thin ideal internalization might set the stage for a chain reaction increasing the risk for SIV initiation and progression yet; it is

the environmental factors that influence the transition to regular behaviour (Peterson et al., 2015).

6. CLINICAL PICTURE AND DIAGNOSIS

Bulimia commonly has an onset after puberty till about the age of forty. It is thought to commence in adolescence where the binge eating frequently begins during or after an episode of dieting to lose weight (DSM-5). This episode of binge eating can be defined as eating, in a discrete period of time, an amount of food that is definitely larger than most individuals would eat in a similar period of time under similar circumstances (DSM-5). The diagnosis of bulimia should be considered in these patients who in addition, meet all the specific criteria for the disease. Essentially, there are three fundamental features of bulimia: recurrent episodes of binge eating (Criterion A), recurrent inappropriate compensatory behaviours to prevent weight gain (Criterion B), and self-evaluation that is unduly influenced by body shape and weight (Criterion D). In order to make the diagnosis of bulimia, the binge eating and inappropriate compensatory behaviours must occur at least once per week for three months (Criterion C) (DSM-5). These compensatory behaviours include self-induced vomiting, misuse of laxatives, diuretics, or other medications; fasting; or excessive exercise.

When making the diagnosis of bulimia it is also important to specify severity of the disease. The level of severity correlates to the frequency of inappropriate compensatory behaviours but may be increased to reflect other symptoms and the degree of functional disability (DSM-5). Mild disease is characterized by 1-3 episodes of inappropriate compensatory behaviours per week. Moderate disease has an average of 4-7 episodes of inappropriate compensatory behaviours per week. Sever disease has an average of 8-13 episodes of inappropriate compensatory behaviours per week. Finally, patients suffering from extreme disease show an average of 14 or more episodes of inappropriate compensatory behaviours per week.

Identifying patients that may have bulimia can be a challenging process for physicians. In saying so, there are some physical signs that are helpful to look for. However,

some of these signs are similar to those seen in anorexia and that is why it is important to differentiate between the two diseases. Patients with bulimia may present with: lethargy, complaints of feeling bloated, constipation, abdominal pain, heart conduction abnormalities, irregular menstruation, tetany, and even occasional swelling of hands and feet (Collier et al., 2009). Other specific problems related to purging include: metabolic alkalosis, hypochloraemia, hypokalaemia, metabolic acidosis (if laxative use), other electrolyte abnormalities, esophageal erosions, esophageal/gastric perforation, gastric/duodenal ulcers, pancreatitis, dental erosion, calluses on the back of the hands (Russell's sign) and leucopenia/lymphocytosis (Semple & Smyth, 2009). There are also some associated features that can support the diagnosis. For example, individuals with bulimia are typically within the normal weight or overweight range with a BMI of > 18.5 and <30 in adults (DSM-5).

In addition to examining the physical signs and symptoms, it is also important to examine the psychological health of the patient. Self-esteem has been shown to be a contributing factor in the etiology of bulimia. In saying so, one study found that women who are high in perfectionism and who consider themselves overweight exhibit bulimic symptoms only if they have low self-esteem (i.e., if they doubt they can attain their high body standards). On the other hand, high self-esteem women with the same diathesis-stress conditions are less likely to exhibit bulimic symptoms (Vohs et al., 1999). Therefore, a patient's self esteem level can also help the physician when considering a diagnosis of bulimia. In a similar manner, perfectionism seems to play a role as well in bulimic symptomatology.

Additional questionnaires can be given to patients to act as screening tools for eating disorders. An example of this includes the SCOFF questions which are usually used in primary care. They have a low sensitivity yet; have still been proven to be useful. A score of at least 2 (meaning 2 yes answers) indicates that further more detailed history is indicated

before considering treatment or referral. Some of the SCOFF questions include: do you make yourself sick because you feel uncomfortably full, do you worry you have lost control over how much you eat, and do you believe yourself to be fat when others say you are too thin? (Semple & Smyth, 2009). Early identification of disease is very important for treatment success in patients with bulimia.

7. DIFFERENTIAL DIAGNOSIS

There are a number of diseases that can mimic bulimia and should be considered as a differential diagnosis. Out of these conditions, anorexia is usually the most closely-related to bulimia, specifically the binge-eating/purging type. In general, anorexia is an eating disorder that is characterized by low weight, fear of gaining weight, a strong desire to be thin, and food restriction. Individuals who have anorexia are underweight with a BMI that is usually in the range of 17- <15 depending on the severity of disease. This is one of the major differences between the two diseases because patients with bulimia, as previously stated, are not underweight. According to DSM-5, individuals whose binge-eating behaviour occurs only during episodes of anorexia are given the diagnosis anorexia nervosa, binge-eating/purging type. A diagnosis of bulimia should only be given when all criteria for bulimia have been met for at least 3 months and when the individual no longer meets the full criteria for anorexia. This being said, it is important to note that crossover between anorexia and bulimia is also a common occurrence. According to one 7 year follow-up study performed by Eddy and his colleagues, 72.73% of participants with an intake diagnosis of anorexia experienced diagnostic crossover with 34.09% of those being from anorexia to bulimia. Notably, approximately half of the patients with anorexia who crossed over to bulimia did so in the course of progressing to partial or full recovery, whereas the other half who experienced crossover to bulimia were likely to cross back over into anorexia. Furthermore, they found that women with bulimia were unlikely to develop anorexia during follow-up (Eddy et al., 2008). This study clearly demonstrates the possible crossover that can occur between the two diseases in a single patient.

Sometimes patients may present with the classic bulimic symptom of binge-eating however, they may lack the other diagnostic criteria for bulimia. In such patients, a differential diagnosis of binge-eating disorder (BED) should be considered. Patients with this

disorder binge eat but do not engage in regular inappropriate compensatory behaviours (DSM-5). A supplementary difference that can be seen between the two conditions involves the BMI of the patients. According to one study performed by Striegel-Moore and her colleagues, obesity (BMI >30) was more commonly associated with BED than with bulimia (Striegel-Moore et al.,2001). Negative psychological and social problems are also associated with BED. However, comparisons of individuals with BED and individuals with bulimia have found that individuals with BED exhibit less comorbid psychopathology and report less subjective distress and better social adjustment than those with bulimia (Fichter, Quadflieg, & Brandl, 1993).

Major depressive disorder, with atypical features, is considered to be another possible differential diagnosis for bulimia. It is characterized by at least two weeks of low mood that is present across most situations and is accompanied by low self-esteem, low energy, and loss of interest in enjoyable activities. Overeating is common in major depressive disorder, with atypical features, but individuals do not engage in inappropriate compensatory behaviours and do not exhibit excessive concern with body shape and weight (DSM-5). Patients with bulimia can exhibit symptoms similar to those seen in major depressive disorder. According to Dr. Casper, symptoms of depression and anxiety are commonly reported by bulimia patients who apply to speciality clinics, with 56% of women scoring 20 on the Beck Depression Inventory (BDI) (Casper, 1998). Comorbidity with mental disorders is actually common in individuals with bulimia, with most experiencing at least one other mental disorder and many experiencing multiple comorbidities (DSM-5). Therefore, it is important to note that if criteria are met for another condition both diagnoses should be given.

There are numerous other conditions where a patient can exhibit a disturbed eating behaviour. Kleine-Levin syndrome, a condition that is characterized by persistent episodic hypersomnia and cognitive or mood changes, can also present with hyperphagia. Binge-

eating behaviour is also included in the impulsive behaviour criterion that is part of the definition of borderline personality disorder (DSM-5).What these other conditions do share in common is the lack of over concern with body shape and weight.

8. TREATMENT

As with any other psychiatric condition, a full assessment is one of the essential things to do before deciding on any treatment. This assessment includes a full psychiatric history, a full medical history, and a physical examination. At this point, routine and focused blood tests can also be performed, as well as an ECG. Patients with bulimia are usually managed as outpatients. Admissions are only for suicidality, physical problems, extreme refractory cases, or if pregnant (Semple & Smyth, 2009). Treatment primarily consists of pharmacotherapy and psychotherapy. According to the oxford handbook of psychiatry, combined approaches improve the outcome.

Pharmacotherapy:

-SSRIs-

Fluoxetine

The gold standard for bulimia treatment is considered to be 60mg of fluoxetine. It has been successful in reducing binge/purge frequency as well as eating disorder cognitions including weight concern, food preoccupation, restraint, and drive for thinness. In addition, it has shown to be well tolerated and superior to 20mg of fluoxetine (Brown & Keel, 2012). Therefore, fluoxetine is very effective in the acute management of bulimia. One study, performed by Romano and colleagues, examined whether continuation of pharmacotherapy with fluoxetine provided protection from relapse. The results of this study demonstrated that fluoxetine-treated patients exhibited a longer time to relapse than placebo-treated patients. More specifically, 52 weeks of 60mg fluoxetine significantly reduced relapse rate compared to placebo (33% vs. 51%, respectively) and increased time to relapse (i.e., was associated with sustained remission) (Romano et al., 2002). On the other hand, there has been mixed support for fluoxetine's efficacy in reducing depressive symptoms in patients with bulimia.

Some studies found no difference between fluoxetine and placebo while others favoured fluoxetine (Brown & Keel, 2012). Overall however, for fluoxetine a category grade A evidence exists with a good risk-benefit ratio (Aigner et al., 2011). Therefore, although fluoxetine is very effective in reducing binge/purge frequency and eating-related symptoms, it is not that efficacious for reducing depressive symptoms.

Fluvoxamine

Fluvoxamine functions both as an SSRI and as a σ_1 receptor agonist. It is primarily used in the treatment of obsessive-compulsive disorder (OCD) and as a result, relatively few studies have focused on its use in bulimia. However, of those studies that did, fluvoxamine has been shown to be superior to placebo for reducing binge/purge frequency (Brown & Keel, 2012). More specifically, 200mg of fluvoxamine/ day, administered for 12 weeks, showed a statistically significant reduction in the number of binge-eating crises and purging episodes compared with placebo (Milano et al., 2005). Not only is fluvoxamine effective for acute bulimia, it has also been shown to prevent relapse as well. According to one study performed by Fichter and colleagues, the following scales showed fluvoxamine to have a significant effect in reducing the return of bulimic behaviour: (1) self-ratings: Eating Disorder Inventory (EDI)-bulimia, urges to binge in previous week and the number of actual binges in the previous week; (2) expert ratings: Psychiatric Status Rating Scales for Bulimia nervosa, Structured Interview for Anorexia and Bulimia nervosa (SIAB)-"total score," SIAB-subscale "fasting," and SIAB-subscale "vomiting" (Fichter et al., 1996). Therefore, fluoxetine is effective at controlling the binge/purge cycle as well as preventing relapses.

Sertraline

Like the aforementioned drugs from the SSRI class, sertraline has also been shown to be effective in the treatment of bulimia. One study, performed by Sloan and colleagues,

showed significant reductions in eating disorder psychopathology, including the number of binges and purges per week, as well as significant reductions in depressive symptoms. In addition, participants did not experience significant weight gain or any other sertraline side effect assessed at the end of the trial compared with baseline (Sloan et al., 2003). In another study, conducted by Milano and colleagues, patients received sertraline 100 mg/day for 12 weeks. Results showed that the group treated with sertraline had a statistically significant reduction in the number of binge eating crises and purging compared with the placebo group (Milano et al., 2004). Both of these studies confirm that sertraline is well tolerated and effective in reducing binge-eating crises and purging in patients with bulimia.

-Tricyclic Antidepressants-

Imipramine

Given that affective disturbances have been commonly associated with bulimia, early pharmacological treatments focused on tricyclic antidepressants (TCA) and showed efficacy in decreasing binge episodes compared to placebo (Brown & Keel, 2012). These medications, however, were associated with adverse side effects and thus, current pharmacotherapy no longer has them as first line treatment. Imipramine is a TCA of the dibenzazepine group. Although it is mainly used for major depression and enuresis, it has been shown to be effective in bulimia as well. In saying so, for tricyclic antidepressants a grade A evidence exists with a moderate-risk-benefit ratio (Aigner et al., 2011). According to one placebo controlled double blind study with imipramine in 22 patients with bulimia, imipramine was associated with significant reduction in binge eating and other measures of eating behaviour (Pope at al., 1983). On the other hand, other studies did not find the same results. According to Mitchell and colleagues, who performed a 12 week comparison study of imipramine and structured group psychotherapy, imipramine did not significantly improve eating behaviour over placebo, but reduced symptoms of depression and anxiety (Mitchell et al., 1990).

Therefore, although this drug is said to be effective in the majority of articles, there are others that state otherwise.

-Anticonvulsants-

Topiramate

Although topiramate is an anticonvulsant drug, it has interestingly enough also been approved by the FDA, in combination with phentermine, for weight loss. In addition to these indications, topiramate is also used in the treatment of bulimia and a grade 2 recommendation can be made (Aigner et al., 2011). According to one 10 week randomized, double blind, placebo controlled trial performed by Hoopes and colleagues, there was significant reduction in binge and purge symptoms seen in bulimic patients taking topiramate (Hoopes et al., 2003). When Hedges and colleagues analysed this same sample, they also found that there was a significant reduction in other behavioural and psychopathological dimensions (Hedges et al., 2003). On the other hand, side effects of this drug have also been reported. In one study performed by Nickel and colleagues, patients receiving topiramate treatment were noted to also exhibit sedation, dizziness, headaches, and parasthesia, but there were no psychotic symptoms, nor serious side effects (Nickel et al., 2005). Therefore, although it may be effective, side effects can limit its use.

Psychotherapy:

-Cognitive behavioural therapy-

Cognitive behavioural therapy (CBT) is a goal-oriented treatment modality that takes a practical approach to problem-solving. The main goal in CBT is to change the patterns of thinking and behaviour that are behind the patient's difficulties. In the past five years, numerous articles have emerged that reinforce and extend the place of CBT as the leading approach in the treatment of eating disorders in adults (Waller, 2016). In bulimia specifically,

CBT is delivered in 16-20 sessions over 4-5 months and has received an "A" grade by the National Institute for Clinical Excellence (NICE) in the UK (Brown & Keel, 2012). The efficacy of this mode of treatment may be due to the well-developed symptom maintenance models for bulimia. Within the CBT model, binge eating and subsequent purging are consequences of extreme dietary restraint; thus, reducing dietary restraint by regularizing the patient's meal pattern results in reductions in binge/purge frequency (Brown & Keel, 2012).

According to Brown and Keel, there is less support for CBT improving secondary symptoms such as depression, social adjustment, self-esteem, interpersonal problems, and global psychiatric symptoms, beyond alternative treatments (Brown & Keel, 2012). On the other hand, the National Collaborating Centre for Mental Health (UK) states that there is strong evidence suggesting that there is a clinically significant difference between CBT and wait-list control with CBT being superior with regard to the mean depression score by the end of treatment (N = 3; *n* = 87; Random Effects SMD = −1.19; 95 per cent CI, −1.99 to −0.39). Further, a meta-analysis of treatments in bulimia found that CBT had larger effect sizes than medication for reducing binge frequency (CBT = 1.28, medication = 0.66), purge frequency (CBT = 1.22, medication = 0.39), disordered eating attitudes (CBT = 1.35, medication = 0.71), and depression (CBT = 1.31, medication = 0.73) (Brown & Keel, 2012). In conclusion, the weight of evidence as measured in terms of the strength and consistency of the findings and the number of relevant studies indicates that CBT (delivered on a one-to-one basis) is the most effective treatment for bulimia (National Collaborating Centre for Mental Health (UK)).

-Family- based treatment-

Family- based treatment (FBT) for bulimia is adapted from FBT for anorexia and like its predecessor, is designed for adolescents. The term FBT specifically refers to the treatment modality developed at the Maudsley Hospital in London, England. According to the

American society of clinical psychology, this treatment modality consists of 3 phases. In the first phase, parents are responsible for helping their child re-establish a healthy eating pattern and prevent binge eating and purging episodes. The second phase begins once the acute symptoms have abated and a regular pattern of eating is established. At this time, control over eating is returned to the adolescent. Finally, in the third phase of treatment, issues of family structure and normal adolescent development are addressed. According to one study performed by Le Grange and colleagues, 20 sessions of family based therapy was superior to supportive psychotherapy on remission rates, and reductions in compensatory behaviours, dietary restraint, and eating, weight, and shape concerns (Le Grange, 2007) In addition, it should be noted that FBT has the more immediate benefit when compared directly with CBT for adolescents with bulimia, although it was not statistically superior to CBT at follow-up (Waller, 2016). Therefore, in the adolescent age group, CBT should be considered as an alternative that can be used only where FBT is not possible or indicated or where FBT has failed to be effective (Waller, 2016).

-Interpersonal psychotherapy-

Interpersonal psychotherapy (IPT) is a type therapy that focuses on resolving interpersonal problems and on symptomatic recovery. It is a treatment alliance in which the therapist empathically engages the patient, helps the patient to feel understood, arouses affect, presents a clear rationale and treatment ritual, and yields success experiences (Markowitz & Weissman, 2004). According to the National Collaborating Centre for Mental Health (UK), IPT appears to be as effective as CBT at eight to 12-month post-treatment follow-up (i.e. one year after starting treatment). Prior to this time, CBT is more effective. As a result, ITP should be considered as an alternative to CBT. In addition, there is evidence suggesting that it is unlikely there is a clinically significant difference between CBT and IPT on mean frequency of binge eating by the end of treatment (N = 2; n = 262; SMD = −0.24; 95 per cent

CI, −0.48 to 0.01) (NICE). According to another study, at 1-year and 5-year follow up, IPT was as effective as CBT in facilitating remission and ameliorating secondary symptoms, including general psychiatric symptoms, social adjustment, and depressive symptoms (Brown & Keel, 2012).Therefore, IPT appears to be effective for achieving long-term remission, yet CBT facilitates remission more rapidly.

Combining pharmacotherapy with psychotherapy:

Given the effectiveness of psychotherapy and also pharmacotherapy as treatments for bulimia it is acceptable to assume that a combination of these two modalities would produce even better results. According to Hall and colleagues, a Cochrane review of 17 RCTs involving 827 patients reported three separate meta-analyses that evaluated the comparative effectiveness of antidepressants and psychotherapy for bulimia. The outcome for effectiveness was full remission of bulimic symptoms (binge and purge episodes). Although psychotherapy alone was more effective than antidepressants alone, combination therapy was superior to either option alone (Hall et al., 2008). On the other hand, according to Brown and Keel, no differences have emerged between combined treatments and CBT alone for reducing binge/purge frequency. However, there has been some evidence that the addition of antidepressant medication may improve depressive symptoms above CBT alone (Brown & Keel, 2012). Other studies have suggested this as well. According to a study performed by Goldbloom and colleagues, there is limited support for the superiority of the fluoxetine- CBT condition over fluoxetine and no statistically significant evidence that the combination of pharmacotherapy and psychotherapy is superior to psychotherapy alone (Goldbloom et al., 1997). Yet, Goldbloom also states that the results of the study are compatible with those of Agras et al. (1992) and according to Agras et al. there is superiority of the combined method over a number of outcome parameters (Goldbloom et al., 1997). Therefore, when it comes to

the effectiveness of combining pharmacotherapy and psychotherapy there seems to be a lot of discrepancies among literature. While some authors and studies suggest it to be more effective than either modality alone, other studies suggest otherwise.

Light therapy:

There are conflicting views about light therapy and its effectiveness in treating bulimia. In one study conducted by Lam and colleagues, bright white light (BWL) (10.000 lux for 30 min/day) or dim red light (DRL) (500 lux 30 min/day) was administered to17 female patients with bulimia. The results of the study showed that BWL therapy is an effective short term treatment for both mood and eating disturbances associated with bulimia with great efficacy, if there is a seasonal pattern (Lam at al. 1994). In a similar manner, a double blind placebo controlled study with the objective to determine the effects of winter bright light therapy on binge and purge frequencies and depressive symptoms in subjects with bulimia, found that the mean binge frequency decreased significantly more from baseline to the end of treatment for the bright light group than for the placebo group (Braun et al., 1999). On the other hand, other studies did not show such positive results with light therapy. In a study performed by Blouin and colleagues, no effect of light therapy was found on the frequency, size, or content of binge-eating episodes. However, subjects in the bright light condition showed a significant improvement in depressed mood during light exposure, as measured by both the Beck Depression Inventory (BDI) and the Structured Interview Guide for the Hamilton Depression Rating Scale-Seasonal Affective Disorder Version (SIGH-SAD). Yet, there was a return to pre-treatment levels of depression after withdrawal of light exposure (Blouin et al., 1996). What is constant in all of these studies however, is that light therapy is very effective in the treatment of mood.

9. PROGNOSIS

The prognosis of patients who have bulimia is generally considered to be good. However, if there is significant issues of low self-esteem or evidence of a sever personality disorder the prognosis can be tremendously affected (Semple & Smyth, 2009). In a similar manner, duration of illness also affects the prognosis. According to one study performed at the Department of Psychology at Louisiana State University, good outcome in bulimia and subthreshold bulimia was associated with a shorter duration of illness, which was defined as the time between onset of symptoms and first treatment intervention. If participants were initially treated within the first few years of the illness, the probability of recovery was above 80%. On the other hand, if they were initially treated 15 years or more after the onset of illness, the probability of recovery fell below 20% (Rheas et al., 1999). This study indicates the importance of early identification and treatment of patients with bulimia.

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12. BIOGRAPHY

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