



Eating disorders related to image distortion and clinical outcomes of cannabidiol use: a systematic review

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Abstract

Introduction: In the context of eating disorders related to body image distortion, erroneous perception of body image is common in the general population and is also a central component of several serious diseases, including body dysmorphic disorder, anorexia nervosa, bulimia nervosa, and binge eating. Especially for the treatment of eating disorders, cannabidiol (CBD) was identified 50 years ago and has effects that can change mood, sensation, perception, tension, appetite, and pain. **Objective:** This was to analyze, through a systematic review, the main approaches to eating disorders related to body image distortion, as well as the clinical results of the use of cannabidiol for the treatment of this condition. **Methods:** The systematic review rules of the PRISMA Platform were followed. The search was carried out from April to May 2025 in the Scopus, PubMed, Science Direct, Scielo, and Google Scholar databases. The quality of the studies was based on the GRADE instrument and the risk of bias was

analyzed according to the Cochrane instrument.

Results and Conclusion: 123 articles were found. A total of 42 articles were assessed in full and 16 were included and developed in the present systematic review study. Considering the Cochrane tool for risk of bias, the overall assessment resulted in 28 studies with a high risk of bias and 23 studies that did not meet GRADE and AMSTAR-2. Most studies presented homogeneity in their results, with $X^2=84.6\%>50\%$. It was concluded that body image distortion can negatively alter the way someone thinks, feels, and behaves in their social or occupational lives; and is a proposed mechanism for the development of clinical and subclinical patterns of restricted eating or eating disorders. The eating disorders of anorexia nervosa and bulimia have reached epidemic proportions in our population today, especially among adolescent and adult women. Many times, these disorders are not diagnosed (and therefore not treated) because patients rarely disclose their symptoms to their doctor, therapist, or dietitian. There is growing evidence

that cannabidiol acts as an antipsychotic, anxiolytic, and neuroprotective agent. Some studies show weight loss in people with anxiety and binge eating. However, new randomized controlled studies with larger numbers of participants are still needed.

Keywords: Eating disorders. Body image distortion. Cannabidiol.

Introduction

In the context of eating disorders related to body image distortion, it is argued that body image is the subjective image that individuals have of their own body, regardless of what their body looks like. Body image is a complex construct that comprises thoughts, feelings, evaluations, and behaviors related to the body. Misperception of body image is common in the general population and is also a central component of several serious illnesses, including body dysmorphic disorder, anorexia nervosa, bulimia nervosa, and binge eating disorder [1].

In this regard, body image distortions are unpleasant and can have tragic outcomes. Poor body image can affect physical and psychological health and can influence self-esteem, mood, competence, social functioning, and occupational functioning. Understanding neurotypical distortions in healthy cognition and perceptual distortions in clinical settings is essential to addressing body image concerns and enabling suffering individuals to lead more content and productive lives [2].

In this context, eating disorders are common among children and adolescents and are characterized by excessive concerns about physical appearance, distorted body image, and fear of gaining weight. Eating disorders can persist into early adulthood in 40.7% of cases, with a relapse rate of 24.5%. Furthermore, individuals with eating disorders more frequently present a deficit of empathy and comorbid depressive and anxiety disorders. Moreover, eating disorders are chronic and complex disorders, more frequent in women. In most cases, eating disorders reduce the autonomy of individuals who have great difficulty asserting their independence from their parental family [3].

Also, disturbed attitudes towards diet and food in a population with eating disorders have been widely explored. Published in 2013 by the American Psychiatric Association, the updated Diagnostic and Statistical Manual of Mental Disorders (DSM-5) characterizes eating and feeding disorders as a "persistent disturbance of eating or eating-related behaviors that results in altered consumption or absorption of food and that significantly impairs physical health or psychosocial functioning" [4]. Diagnostic criteria were provided for

classic eating disorders, such as anorexia nervosa and bulimia nervosa, in addition to recognizing several new disorders, such as Avoidant/Restrictive Food Intake Disorder, Binge Eating Disorder, and Feeding or Eating Disorder Not Otherwise Specified.

It is noteworthy that there are more than 2.2 billion people who are overweight or obese in the world [5], and Brazil is in fifth place in the world ranking. The prevalence of disordered eating behaviors increases during adolescence and young adulthood, and estimates of involvement in at least one pathological eating behavior reach 60% for adolescents and adults [6]. In this context, a factor associated with eating disorders is anxiety, which affects 33.7% of the general population, high levels of negative affect, and, in particular, difficulty in managing anxiety [7]. Thus, anxiety disorders often precede the onset of eating disorders and clinically significant anxiety persists after treatment of the eating pathology. In addition, higher levels of anxiety are associated with higher body mass index (BMI), longer duration of symptoms increased rates of compensatory behaviors, binge eating, and body dissatisfaction [8,9].

Specifically for the treatment of eating disorders, cannabidiol (CBD) was identified 50 years ago and has effects that can change mood, sensation, perception, tension, appetite, and pain [10,11]. In addition, CBD has shown anxiolytic, antipsychotic, neuroprotective, anti-inflammatory, and antiemetic properties [12,13]. In this sense, CBD can alleviate hyperphagia without the side effects of rimonabant (e.g. depression and reduced insulin sensitivity).

Therefore, this systematic literature review study analyzed the main approaches to eating disorders related to body image distortion, as well as the clinical results of the use of cannabidiol to treat this condition.

Methods

Study Design

This study followed the international systematic review model, following the PRISMA (preferred reporting items for systematic reviews and meta-analysis) rules. Available at: <http://www.prisma-statement.org/?AspxAutoDetectCookieSupport=1>. Accessed on: 04/10/2025. The AMSTAR-2 (Assessing the methodological quality of systematic reviews) methodological quality standards were also followed. Available at: <https://amstar.ca/>. Accessed on: 04/10/2025.

Research Strategy and Search Sources

The literature search process was carried out from April to May 2025 and developed based on Scopus, Embase, PubMed, Science Direct, Scielo and Google

Scholar, covering scientific articles from various periods to the present day. The following health science descriptors (DeCS/MeSH Terms) were used: "*Eating disorders. Body image distortion. Cannabidiol*", and the Boolean "and" was used between the MeSH terms and "or" between the historical findings.

Study Quality and Risk of Bias

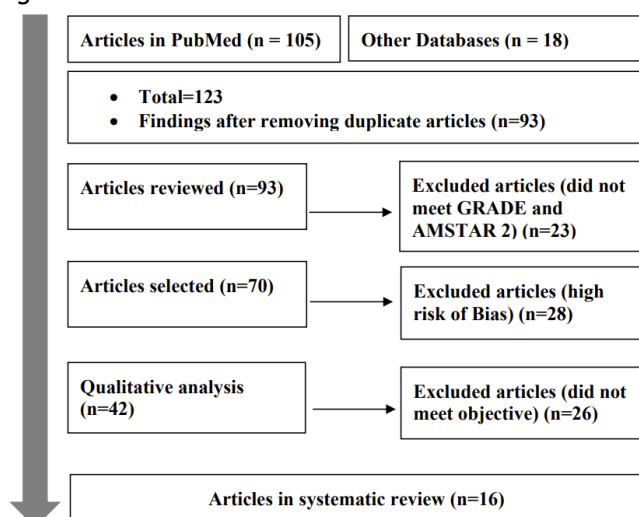
Quality was classified as high, moderate, low, or very low regarding the risk of bias, clarity of comparisons, precision, and consistency of analyses. The most evident emphasis was on systematic review articles or meta-analyses of randomized clinical trials, followed by randomized clinical trials. Low quality of evidence was attributed to case reports, editorials, and brief communications, according to the GRADE instrument. The risk of bias was analyzed according to the Cochrane instrument by analyzing the Funnel Plot graph (Sample size versus Effect size), using Cohen's d test.

Results and discussion

Summary of Findings

A total of 123 articles were found and submitted to eligibility analysis, with 16 final studies selected to compose the results of this systematic review. The studies listed were of medium to high quality (Figure 1), considering the level of scientific evidence of studies such as meta-analysis, consensus, randomized clinical, prospective, and observational. Biases did not compromise the scientific basis of the studies. According to the GRADE instrument, most studies presented homogeneity in their results, with $X^2=84.6\%>50\%$. Considering the Cochrane tool for risk of bias, the overall assessment resulted in 28 studies with a high risk of bias and 23 studies that did not meet GRADE and AMSTAR-2.

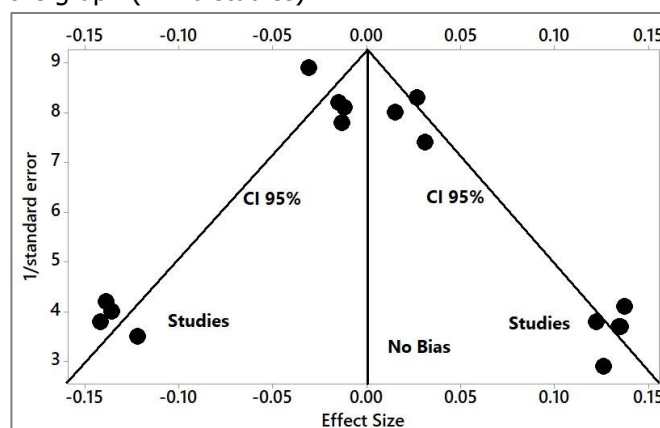
Figure 1. Selection of the articles.



Source: Own authorship.

Figure 2 presents the results of the risk of bias of the studies using the Funnel Plot, showing the calculation of the Effect Size (Magnitude of the difference) using Cohen's Test (d). Precision (sample size) was determined indirectly by the inverse of the standard error (1/Standard Error). This graph had a symmetrical behavior, not suggesting a significant risk of bias, both among studies with small sample sizes (lower precision) that are shown at the base of the graph and in studies with large sample sizes that are shown at the top.

Figure 2. The symmetrical funnel plot suggests no risk of bias among the studies with small sample sizes that are shown at the bottom of the graph. Studies with high confidence and high recommendation are shown above the graph (n=16 studies).



Source: Own authorship.

Clinical Results

A systematic review published in 2019 estimates the lifetime prevalence of eating disorders at 8.4% for women and 2.2% for men, with peak incidence in adolescence [14]. Another consideration is that the hallmark of many eating disorders is the presence of body image disturbances. Body image, which can be defined as "the image we hold in our minds of the size, shape, and form of our bodies and our feelings about these characteristics," has been shown to influence many areas of life, including self-esteem and mood. Body image disturbance is a core psychopathological symptom in the DSM-5 for the diagnosis of anorexia nervosa, but it can be present in any of the eating disorders [4].

As such, body image disturbance can negatively alter the way someone thinks, feels, and behaves in their social or occupational lives; and it is a proposed mechanism for the development of clinical and subclinical patterns of restricted eating or eating disorders [15]. Among adolescents and adults, restrictive eating patterns, in general, are strongly associated with an increased incidence of eating

disorders, including anorexia nervosa and bulimia nervosa [16]. Indeed, a significant diagnostic feature of these eating disorders is the existence of restricted eating patterns.

In addition, adolescents and adults reported feeling as if their bodies were “defective” and were found to have integrated their food allergy as a stable facet of their identities. Furthermore, food allergy was overwhelmingly associated with the prevalence of eating disorders and eating disorder-like symptoms. Disturbed body image was found to be a mediating variable for the development of disordered eating patterns in food-allergic individuals [17].

In one study, 179 male and female college and high school students and 26 patients with eating disorders measured body image distortion using computer-based image analysis of redrawn images of standardized human figures. Statistical analysis indicated that body image distortion was the same for all groups. The results suggest that this assessment of body image distortion produces a reliable quantitative measure of weight status, but also suggest that the technique, and possibly the measurement of body image distortion in general, may not be a valid discriminator between people with eating disorders and normal people [18].

A study analyzed the differences between two groups of girls, models and ballerinas (with risk factors - experimental group) and young students (control group), in body image perception, body mass index, neurotic perfectionism, body image distortion, and symptoms of eating disorders. The research was conducted with 91 participants divided into two groups, a control group - of 55 students, and an experimental group - of 13 professional ballerinas, and 23 professional models. Statistically significant differences were observed between these two groups of girls that were related to body image perception and objective position on the body mass index chart. All 91 participants considered themselves to be obese. Statistically significant differences occur in body image distortion and eating disorder symptoms in the experimental group, who have high scores in body image distortion, the eating disorder inventory, and symptoms of neurotic perfectionism [19]. In this context, Immersive Virtual Reality (IVR) has shown promise in the assessment, understanding, and treatment of eating disorders, providing a dynamic platform for clinical innovation. A review study evaluated 20 studies with a primary focus on Anorexia Nervosa (AN), Bulimia Nervosa (BN), and Binge Eating Disorder (BED). The application of IVR was categorized into three areas: assessment, understanding, and treatment. IVR was found to be an effective tool in assessing body image distortions and emotional responses to food, providing insights that are

less accessible through traditional methods. In addition, IVR offers innovative treatment approaches by facilitating exposure therapy, modifying body-related biases, and enabling emotional regulation through embodied experiences. Studies demonstrate the potential of IVR to improve body image accuracy, reduce food-related anxieties, and support behavioral changes in patients with eating disorders [20].

In the context of anxiety and binge eating and the consequent increase in the incidence of obesity, activation of CB1 receptors improves eating by modulating the activity of hypothalamic neurons and, subsequently, the release of orexigenic and anorexigenic neuropeptides. In addition, CB1 receptor signaling affects reward and reinforcement circuits in the mesolimbic system, leading to a preference for highly palatable foods [21,22]. Furthermore, the CB1 receptor is also present in peripheral organs important for the control of metabolism, and activates anabolic pathways, favoring energy storage [18]. In white adipocytes, activation of the CB1 receptor increases fatty acid synthesis, improves triglyceride accumulation, and reduces lipolysis, while in brown adipose tissue, the CB1 receptor counteracts the uncoupling of respiration from ATP production. Furthermore, the CB1 receptor enhances hepatic lipogenesis and drives defective oxidative metabolism through impaired mitochondrial oxidative phosphorylation in skeletal muscle [23].

Thus, in obesity, the endocannabinoid system (ECS) is generally downregulated in central and peripheral tissues, as indicated by high and/or overexpression of the CB1 receptor. The exact underlying mechanisms are unclear, however, ECS are lipid mediators and their biosynthesis may be directly influenced by dietary fat intake, contributing to greater fat accumulation, increasing food intake favoring lipogenesis, and reducing energy expenditure in peripheral organs. Thus, both pharmacological and genetic blockade of the CB1 receptor reduces body weight in animal models of obesity [24].

A recent surge in scientific publications has found clinical and preclinical evidence documenting the value of CBD in some neuropsychiatric disorders, including epilepsy, anxiety, and schizophrenia. Evidence suggests a calming effect of CBD on the central nervous system. Interest in CBD as a treatment for a wide variety of disorders has exploded, although there are few clinical studies of CBD in the psychiatric literature. Thus, one study analyzed a large retrospective case series in a psychiatric clinic involving the clinical application of CBD for complaints of anxiety and sleep as an adjunct to usual care. The retrospective chart review included monthly documentation of anxiety and sleep quality in 103 adult patients. Sleep and anxiety scores, using

validated instruments, were obtained at baseline and after CBD treatment. The final sample consisted of 72 adults who presented with primary concerns of anxiety ($n = 47$) or poor sleep ($n = 25$). Anxiety scores decreased within the first month in 57 patients (79.2%) and remained decreased throughout the study. Sleep scores improved within the first month in 48 patients (66.7%), but fluctuated over time. CBD was well tolerated in all patients. Therefore, CBD is beneficial for anxiety-related disorders [25].

A growing body of evidence suggests that CBD acts as an antipsychotic and anxiolytic, and several reports suggest neuroprotective effects. Furthermore, CBD attenuates the detrimental effects of tetrahydrocannabinol (THC), both acutely and chronically, including psychotogenic, anxiogenic, and deleterious cognitive effects. This suggests that CBD may improve the illness trajectory of individuals with early psychosis and comorbid cannabis misuse in particular [26].

Accordingly, studies show that CBD reduces anxiety via 5-HT_{1A} and cannabinoid receptor activation. In this regard, a literature review study demonstrated the anxiolytic effects of CBD before focusing on studies investigating its effects on various fear and drug memory processes. Understanding how CBD regulates emotion and emotional memory processing may lead to its use as a treatment for anxiety-related disorders and substance abuse [27].

Finally, although both men and women experience eating disorders such as anorexia nervosa and bulimia nervosa, there are differences in how the eating disorder can present [28]. Body dissatisfaction or body dysmorphia in men may be more related to a desire for muscularity than thinness. Muscle dysmorphic disorder (also known as muscle dysmorphia) is a form or subtype of body dysmorphia characterized by an extreme desire for muscularity and a preoccupation with the idea that one's physique is too small or not muscular enough. It is more common in men than in women and is associated with distorted body image, excessive exercise routines, muscularity-oriented disordered eating, and the use of drugs that enhance appearance and performance, such as anabolic androgenic steroids. Risk factors for muscle dysmorphic disorder include peer pressure (including conforming to gender stereotypes) and low self-esteem. The condition has negative psychological, physical, relationship, and financial effects [1,2].

Conclusion

It has been concluded that body image distortion can negatively alter the way a person thinks, feels, and behaves in their social or occupational lives; and is a

proposed mechanism for the development of clinical and subclinical patterns of restricted eating or eating disorders. The eating disorders of anorexia nervosa and bulimia have reached epidemic proportions in our population today, especially among adolescent and adult women. These disorders often go undiagnosed (and therefore untreated) because patients rarely disclose their symptoms to their physician, therapist, or dietitian. Increasing evidence indicates that cannabidiol acts as an antipsychotic, anxiolytic, and neuroprotective. Some studies show weight reduction in people with anxiety and binge eating. However, new randomized controlled trials with larger numbers of participants are still needed.

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Application of Artificial Intelligence (AI)

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