

Relationship between Binge Eating Disorder (BED) and Development of Metabolic Syndrome (METs): A Systematic Review

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Abstract

Binge Eating Disorder (BED) or uncontrolled food consumption is strongly associated with metabolic syndrome as a significant risk factor for health. Metabolic Syndrome (MetS) is characterized by central adiposity, high-density lipoprotein (HDL) cholesterol, hypertriglyceridemia, hypertension, and increased fasting blood glucose. Approximately 9% of the general population suffer from Binge eating disorder (BED), a significant risk factor for Metabolic Syndrome (MetS). This study evaluates the association between Binge Eating disorder (BED) and Metabolic Syndrome (MetS) development through a systematic review. Through analysis of previous studies, we discovered that 93 percent of those with BED had metabolic syndrome parameters in a series of investigations on BED conducted in general care. This systematic review aims to connect the frequency of binge-eating episodes and the development of metabolic syndrome. We have extracted five major studies (n = 5) through screening following systematic review standards.

Keywords

Binge Eating Disorder (BED), Metabolic Syndrome (METs), Obesity, Hypertriglyceridemia, Hypertension, Hyperglycemia

1. Introduction

Binge eating disorder (BED) negatively impacts human health, as 9% of the gen-

eral population of Western countries, including the US, has been suffering from the described disorder. Its increasing prevalence rate is associated with several psychological and medical issues, including obesity [1]. Binge eating disorder (BED) is characterized by excessive food consumption (more than the body needs) due to uncontrolled eating habits. It may be marked distress exhibited by overeating habits. In other words, binge eating disorder is a condition in which an individual has specific mechanisms that trigger the desire for excessive eating. Self-induced vomiting (misuse of exercises) is mainly observed in bulimia nervosa, although it can be seen in cases of BED [2].

Tentative studies reported that Binge eating disorder is strongly associated with metabolic syndrome [3]. Metabolic syndrome (MetS) is a condition with high levels of central adiposity, high-density lipoprotein (HDL) cholesterol, hypertriglyceridemia, low blood serum levels, hypertension, and increased fasting blood glucose (Figure 1). A cluster of metabolic abnormalities may be associated with overweight triggered by Metabolic syndrome (MetS) [4]. These conditions associated with Metabolic syndrome may increase the risks of other disorders such as diabetes type 2 and cardiovascular disease (CVD), leading consequently to death [5].

The metabolic disorder or syndrome usually occurs between 15.5 and 27.2 years old and lasts for 4 to 8 years [6]. Women have a more significant incidence rate of BED identification than men, although men who are recognized have the same type of impairment. Individuals under the age of 35 are also at a greater risk than those under 30. The prevalence of various ethnicities is a bit hazy, with certain research reporting varied racial/ethnic incidence and others reporting no meaningful difference between whites and blacks.

Binge Eating Disorder is likely more common in people with type 2 diabetes, ranging from 1.4% to 25.6%, 18% (Table 1) with a higher frequency amongst those with a higher body mass index (BMI) [7]. Metabolic syndrome (MetS) is prevalent in adulthood, in 7% - 34% of men and 5% - 22% of women globally [8]. A high prevalence rate of BED and Metabolic Syndrome reported among African Americans consequently leads to an increased risk of hypertension, elevated hemoglobin A1c, fasting glucose, and low levels of high-density lipoprotein [9].

Among children, the prevalence rate of Binge eating disorder and associated metabolic syndrome (MetS) is rare because symptoms of overeating could not meet the criteria of BED and syndrome [10]. Although, overeating behavior among children can lead to excessive weight gain and high adiposity, predicting risk factors of Binge eating disorder and metabolic syndrome [11]. Few studies have evaluated the relationships between binge eating disorder and metabolic syndrome, but no evidence or data proves this relation in children.

Eating disorders are linked to several other medical issues that must be thoroughly diagnosed and handled as soon as feasible to enhance long-term consequences [12]. Binge eating disorders have been associated with other medical

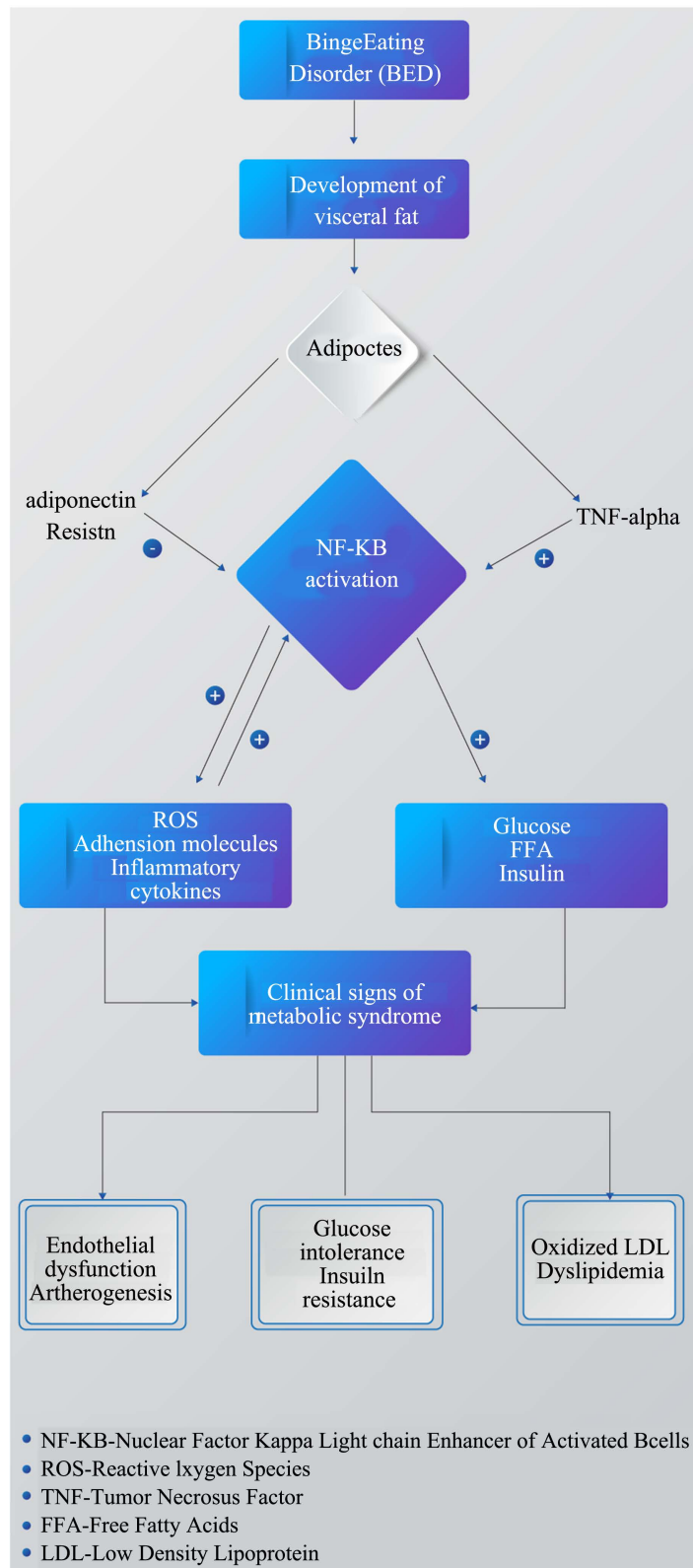


Figure 1. Shows the link between Binge Eating (BED) and Metabolic Syndrome (METs) [15]. TNF-alpha: Tumor Necrosis Factor alpha; NF-KB: Nuclear Factor Kappa-light-chain-enhancer of activated B cells; ROS: Reactive Oxygen Species; Oxidized LDL: Oxidized Low-Density Lipoprotein.

Table 1. Studies that discuss the outcome of Binge Eating Disorder (BED).

Study (Author, year)	Population	Age	Findings	Outcome
Solmi F <i>et al.</i> , 2021 [18]	15,500 binge eating population	34 - 75 years old	All were overweight.	People with Binge eating disorder (BED) are at higher risk of becoming obese.
McCune-Wurst, A <i>et al.</i> , 2017 [6]	Not confirmed	Adult population	Obese.	There is a strong association of binge eating disorder (BED) with metabolic syndrome.
Alciati A, <i>et al.</i> 2013 [19]	135 Obese males and females	Adult population. Mean age was 43.8%	All were overweight.	31% population with binge eating were suffering from Metabolic disorder.
Tanofsky-Kraff, <i>et al.</i> , 2012 [7]	180 children with Binge eating behavior	5 - 12 year-old children	Overweight.	Binge eating behavior may lead to development of metabolic disorder due to increased triglycerides.
Hudson <i>et al.</i> , 2010 [5]	268 individuals	Adult population	All had high BMI, overweight. All had hypertension. 60% had Hyperglycemia.	Binge eating disorder may trigger the risk factors of Metabolic syndrome (METs).

and clinical complications such as starvation, cardiac muscle wasting, euthyroid sick syndrome, constipation, Gastric, and esophageal rupture, osteopenia, high cholesterol levels, Hypophosphatemia, irregular balance hormone, Dental enamel erosion, Mallory-Weiss tears and Pseudo-Bartter's syndrome [13]. Other well-reported medical and clinical complications resulting from binge eating behaviors are obesity, and uncontrolled weight gain, which are the root causes of many other disorders such as heart stroke, CVD, hypertension, and osteoporosis. Medical issues of anorexia and bulimia disorders may make it easier to make the first communication with a doctor and receive treatment. Calorie control, weight management, and the elimination of purging habits can successfully treat most medical issues associated with eating disorders.

A cohort study of obese youngsters considering weight-loss therapy showed no significant metabolism variations among those who binge ate and those who did not [14]. Improper eating practices, such as snacking, are related to MetS occurrence, according to studies of people with and without BED. Psychological and behavioral treatments, medication treatments, and a combination of the two are common therapeutic techniques.

However, very few studies have revealed the association between binge eating disorder and metabolic disorder (MetS) development in a population with a high BMI ratio and other related risk factors. We review, the association of Binge eating behavior and other risk factors with the development of metabolic syndrome among the adult population.

Binge Eating commonly leads to the development of visceral fat, after which the adipocytes (fat cells) of the visceral fat increase plasma levels of TNF-alpha

and alter levels of other substances (e.g., adiponectin, resistin). TNF-alpha has been shown to cause the production of inflammatory cytokines, which activate NF-KB (Nuclear Factor Kappa Light chain of activated B cells.), a transcription regulator [16]. NF-KB regulates the expression of an extensive array of genes involved in different aspects of atherosclerosis as shown in **Figure 1**. This progression from visceral fat formation to increased TNF-alpha to insulin resistance parallels the development of metabolic syndrome (METs). Increased adipose tissue also increases the number of immune cells that play a role in inflammation. Chronic inflammation contributes to the increased risk of hypertension, atherosclerosis, and diabetes.

2. Method

2.1. Research Strategy

The research papers based on binge eating disorder, associated risk factors, and the development of Metabolic syndrome (MetS) were extracted from different databases; PubMed, NEJM, and MEDLINE, databases. The MeSH (medical sub-heading) keywords used include “Binge eating disorder (BED)”, “risk factors”, “obesity”, “abdominal fat”, “overeating” and “development of metabolic syndrome” to extract data for this systematic review under standards [3]. The research data from January 2010 to December 2021 were included in our systematic review. This includes metabolic syndrome (MetS) patients diagnosed with Binge eating behavior (BED), binge eating disorder following American Psychiatric Association criteria, overweight, obesity, high adiposity, emotional eating, randomized controlled clinical studies, physical health, and other associated risk factors.

2.2. Exclusion Criteria

The exclusion criteria for the recent systematic review were non-randomized trials of participants with obesity but not with Binge eating disorder (BED). The studies that included only obesity, overweight, diabetes type 2, excessive eating, and surgical intervention were excluded.

2.3. Outcome Measures and Data Analysis

Based on trial results, the obesity ratio, binge eating disorder (BED), and Developmental process of metabolic syndrome (MetS) were examined. Prior therapy information could not be retrieved from trial papers. The data used in the systematic review included both Binge eating disorder (BED) and metabolic disorder (MetS). Standard rules of systematic review were followed while reporting the findings.

3. Results

3.1. Results of Literature Research and Selection

Approximately 50 related research papers on Binge eating disorders and the de-

velopment of metabolic syndrome (MetS) were extracted through the aforementioned databases. Following standards of research, 40 papers were observed to be relevant and authentic according to the standards mentioned above. Among 40, about 30 research articles were excluded due to repetition. 10 papers were up-to-mark according to mentioned standards.

3.2. Measurement of Metabolic Syndrome (MetS)

Metabolic syndrome and its development among obese individuals were associated with Binge eating behavior, and all research in this systematic review proved this fact with the confidence interval (95% = CL). BED is classified as a unique eating disorder in the 5th edition of the DSM [17].

According to the analysis of previous research and American Heart Association guidelines; the occurrence of metabolic disorder (MetS) was diagnosed by the following standard or criteria;

High BMI or waist circumference (≥ 90 cm in males and ≥ 80 cm in females), hypertension or high blood pressure (blood pressure $\geq 130/85$ mmHg), high blood glucose levels or hyperglycemia (≥ 100 mg/dl or use of oral hypoglycemic drugs or insulin), hypertriglyceridemia or high levels of adipose (TAG ≥ 150 mg/dl or use of drugs to inhibit elevated triglycerides), low levels of HDL cholesterol (< 40 mg/dl for men and < 50 mg/dl for women or drugs for reduced HDL-C). We also utilized a factor that indicated the number of metabolic syndrome elements at follow-up (range: 0 - 5) and each metabolic syndrome element independently as outcome measures. Approximately 90% of included studies have proved the association between Binge eating disorder, overweighting, and other risk factors.

3.3. Binge Eating Disorder (BED) and Its Measurement

“Some individuals, at a certain time, eat a significant quantity of food instantly, in a short period (up to 2 hours)” respondents were invited at the baseline evaluation. They believe they have malfunctioned over their eating and cannot stop themselves from eating once they start. Binge eating was considered prevalent when individuals reported episodes of binge eating occurring at least only once a week, according to DSM-5 clinical guidelines for bulimia nervosa and binge eating disorder. Never, less than once a week, once a week, or twice a week are acceptable options.

4. Discussion

This systematic review emphasized the link between metabolic syndrome and obesity in a cohort of obese BED patient participants were selected from outpatient clinics. However, only the research report focuses on eating, and the recent review's weight-related psychological and behavioral corresponds to metabolic syndrome [5]. This study contributed to the existing knowledge on a cohort of obese individuals who binge and are at significant risk for metabolic syndrome,

which is helpful for doctors and other healthcare providers concerning internal practice and family practice settings. Although there were several significant differences in chronological eating/weight factors, including prevailing emotional eating psychopathy and symptoms of depression, people without metabolic syndrome who start dieting at a younger age managed to spend more of their adulthood dieting [16].

Current research findings suggest this particular subgroup could be at increased risk of developing a range of metabolic syndrome elements. Overage, a better knowledge of the incidence and implications of metabolic syndrome in obese individuals with BED is especially relevant. For BED patients treated at specialist clinics, the overall 43.2 percent rate of metabolic syndrome reported ranges between two prior reports (23 percent and 60 percent).

A systematic review identified a connection between the frequency of binge-eating episodes and the development of metabolic syndrome. The lack of metabolic syndrome, on the other hand, was linked to more time spent dieting and signs of present dieting.

5. Clinical Points

A common complication of obesity and binge eating disorder (BED) is metabolic syndrome. Obese patients should be informed that there are specific pharmacological and behavioral treatments that have shown effectiveness for BED by their primary care providers. Dieting duration may buffer the development of metabolic syndrome within obese individuals with BED, according to preliminary research [20].

6. Economic Implications of Metabolic Syndrome

The rise in the incidence and prevalence of metabolic syndrome has led to an increased number of hospital visits; this increases the burden on our healthcare industry. Patients become less productive, affecting their quality of life and their ability to contribute to economic growth. Increased awareness about metabolic syndrome prevention and control methods, including lifestyle modification, will further reduce the occurrence of hospital visits.

7. Clinical Implications of Metabolic Syndrome

Complications of metabolic syndrome, including heart disease, diabetes, stroke, and atherosclerosis, can lead to debilitating health and mental distress to the patient, longer clinic wait times for other patients, decreased quality of life, and financial drain. Almost \$173 billion is spent annually on healthcare due to obesity in the US [15]. Health education about prevention and proper management will be beneficial for patients and hospitals as regards the management of resources.

8. Limitations of Study

In the recent systematic review, we have evaluated the development of Metabolic

syndrome (MetS) by Binge eating disorder (BED) through analysis of previous research. Nevertheless, this study lacks a significant number of published researches that may prove our research question about the development of MetS from Binge eating. Moreover, other medical complications such as obesity and associated risks for other disorders were not well discussed.

9. Conclusion

People with binge eating disorder (BED) are at risk of developing metabolic syndrome (METs) as shown by parameters in a series of investigations on binge eating disorder) BED, conducted. Complications of metabolic syndrome (METs) are significant healthcare problems in recent times. Further studies are needed with larger diverse populations to substantiate the role binge eating plays in the development of metabolic syndrome.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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