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Comparative Analysis of Eastern and Western Treatments for Binge Eating Disorder and Their Effects on Insulin Resistance

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Abstract. Binge eating disorder (BED) is a prevalent and complex eating disorder that is often linked to metabolic disturbances, including insulin resistance. This review compares Eastern and Western treatment strategies for BED and their impacts on insulin resistance. Western interventions prioritize rapid symptom control, including psychological therapies like Cognitive behavioral therapy (CBT) and Interpersonal psychotherapy (IPT), alongside pharmacological treatment such as lisdexamfetamine, fluoxetine, and topiramate, which effectively reduce binge episodes, alleviate psychological distress, and yield short-term improvements in blood glucose and weight. In contrast, Traditional Chinese Medicine (TCM) adopts a holistic approach, utilizing acupuncture (targeting Liver, Spleen, and Stomach meridians), herbal therapies, and constitution-based dietary regulation to address root imbalances like Liver Qi stagnation and Spleen Qi deficiency, excelling in long-term metabolic homeostasis by enhancing insulin sensitivity, improving lipid metabolism, and reducing chronic inflammation. Therefore, integrating both approaches may optimize care, combining immediate symptom relief with sustained metabolic health.

Keywords: Binge eating disorder, Insulin resistance, Psychological therapy, Traditional Chinese Medicine, Metabolic health

1. Introduction

Eating disorders (EDs) are severe mental health conditions characterized by significant mental and physical disturbances, affecting both individuals and their families [1]. These disorders include a range of psychological conditions that result in abnormal eating behaviors, often accompanied by a preoccupation with body weight and shape. According to the DSM-5, the most well-recognized eating disorders include Anorexia Nervosa (AN), Bulimia Nervosa (BN), and Binge Eating Disorder (BED). BED is now understood to be the most prevalent eating disorder in many countries, including the United States [2] . Individuals with BED commonly present with both psychiatric and physical comorbidity, making it a complex condition to treat effectively.

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Globally, the lifetime prevalence of BED varies across regions. In the United States, approximately 3.5% of women and 2.0% of men experience BED in their lifetime, making it one of the most common eating disorders in the country [3]. In European populations, BED affects <1-4% of women and 0.3-0.7% of men. While treatment rates have increased overall for eating disorders, healthcare systems detect only approximately one-third of cases [4], highlighting a critical gap in early intervention. Systematic epidemiological data on BED in Asia remain limited, but available studies using DSM-5 criteria suggest lower prevalence rates compared to Western countries. The prevalence of BED in Asia shows certain differences in various countries and regions, which is affected by factors such as culture, lifestyle, and economic development [5]. In China, for example, there is a lack of large-scale national level prevalence survey data on BED. However, some studies on college students have shown certain prevalence. A study in Wuhan found that the prevalence of BED among female college students was 3.53% [6], indicating emerging concerns in younger populations.

Research indicates that approximately 79% of individuals with lifetime BED meet criteria for at least one additional DSM-defined psychiatric disorder, such as mood, anxiety, substance use, or other eating disorders [3]. Clinical samples reveal similarly high rates: 73.8% report a lifetime psychiatric comorbidity, and 43.1% have a current comorbid diagnosis [7]. Thus, clinical management must prioritize integrated care that addresses both binge-eating symptoms and co-occurring psychiatric conditions—such as tailoring therapies to mitigate mood-driven triggers—to break reciprocal symptom cycles and improve long-term recovery.

This review aims to compare treatment approaches for BED across Eastern and Western practices which include diet, exercise, psychological therapies and pharmacotherapy and to explore the physiological linkage between binge eating disorder and the development of insulin resistance. Eastern interventions such as acupuncture and constitution-based diet therapy rooted in Traditional Chinese Medicine (TCM) will be examined alongside Western strategies like the use of lisdexamfetamine, fluoxetine, topiramate, cognitive-behavioral therapy and interpersonal psychotherapy. To contrast the distinctions between Eastern and Western cultures, this review paper shall take the United States and China as representative cases. Western practices prioritize evidence-based pharmacological and psychological interventions, with CBT as a first-line therapy targeting behavioral patterns. Eastern approaches emphasize holistic balance, using TCM's individualized constitution assessment and energy regulation through acupuncture or tai chi. Exploring these cultural differences is critical, as BED prevalence varies across regions, with unique sociocultural triggers. Additionally, investigating the BED-insulin resistance linkage addresses metabolic comorbidities, a growing concern in both populations. This review bridges Eastern and Western perspectives, offering insights to enhance integrative treatment strategies for diverse patient needs.

2. Definition of binge eating disorder

In America, BED is formally defined in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) as a recurrent pattern of binge eating episodes, characterized by consuming an unusually large amount of food in a discrete period (typically within two hours) accompanied by a subjective sense of loss of control overeating [8]. Unlike BN, BED is not followed by inappropriate compensatory behaviors such as purging, fasting, or excessive exercise.

In contrast, TCM doesn't include an equivalent diagnostic to BED. In TCM views disordered eating behaviors such as binge eating as symptomatic manifestations of deeper physiological and emotional imbalances. Specifically, BED-like behaviors are often interpreted as signs of "Liver Qi stagnation", "Spleen Qi deficiency", and disruption in the balance of Yin and Yang. Uncontrollable

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cravings, emotional eating, and physical discomfort after overeating are seen as outcomes of disrupted zang-fu (organ) functions, particularly involving the Spleen (digestive processing), Liver (emotional regulation), and Heart (mental-emotional integration) [9]. For a TCM perspective, the formation of BED is caused both by internal and external factors. Internally, emotional distress such as frustration, sadness, or anxiety may lead to stagnation of Liver Qi and impairment of the Spleen's ability to transport and transform nutrients. Externally, environmental factors such as irregular meal times, consumption of improper food types, or seasonal imbalances may exacerbate this dysfunction [10]. Therefore, BED is not viewed as a discrete illness, but rather as a reflection of systemic imbalance and disharmony in the individual.

2.1. Background (differences in dietary culture)

Eastern and Western societies approach eating from fundamentally different philosophical and cultural frameworks [11].

The lifetime prevalence of BED in the United States is approximately 0.85%. The twelve-month prevalence in the United States is 0.44% for BED. These rates are higher than those for AN and BN, making BED the most common formally diagnosed eating disorder in the country [2]. While eating disorders can occur across the lifespan, adolescence is widely recognized as a peak window of vulnerability. Notably, BED shows two onset peaks: one occurring shortly after puberty, around the mean age of 14, and another in late adolescence or emerging adulthood, between ages 18 and 20 [1].

The American diet increasingly centers on food prepared away from home (FAFH), which, according to the U.S. Department of Agriculture, accounted for 58.5% of total food expenditures in 2023—surpassing food-at-home (FAH) spending, which constituted 41.5% [12] Lin and Guthrie [13] observed that between 1977 and 2008, the share of total caloric intake from FAFH increased steadily, while the nutritional quality of such meals consistently lagged food prepared at home. Analysis by Todd et al. [14] confirms earlier findings by Lin and Guthrie, showing that FAFH typically contains higher levels of energy, saturated fat, and sodium, yet falls short in essential micronutrients and dietary fiber—resulting in notably poorer diet quality. Similarly, Ayala et al. [15] found that frequent FAFH consumption was positively associated with obesity risk, particularly among Latino families, and that contextual factors such as time constraints and family structure influenced the frequency and type of FAFH consumed. Although neither study directly addressed binge eating behavior, the environmental and nutritional characteristics of FAFH—such as high caloric density and limited nutrient value—may have implications for individuals vulnerable to BED. The increased availability and normalization of energy-dense foods in the FAFH setting could contribute to overconsumption patterns, which are central to the pathology of BED. Thus, existing evidence on FAFH offers valuable context for understanding broader cultural and dietary factors that may influence the development or maintenance of BED.

In Traditional Chinese dietary philosophy is deeply integrated into the principles of TCM. The concept of "medicine and food sharing the same origin [16] "underscores the therapeutic role of diet in maintaining health and preventing disease. Foods are classified according to their energetic properties (e.g., hot, cold, warm, cool) and flavors (e.g., sweet, bitter, pungent), each having specific effects on internal organ systems. For instance, individuals with Spleen deficiency are advised to consume warm, tonifying foods such as Chinese yam (shan yao) and red dates (da zao) to support digestion and Qi production, whereas those with internal heat are prescribed cooling foods such as lotus seeds and lily bulbs. Furthermore, TCM emphasizes eating habits that align with natural rhythms and individual constitution. Guidelines such as "eat until 70% full" and "avoid late-night eating" are promoted to protect the digestive system. Seasonal and regional adaptations [17] are also

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integral: in humid southern climates, diets favor lighter, heat-clearing foods, while in cold northern regions, warming, Yang-enhancing foods are preferred. Slow, mindful eating and emotional regulation during meals are encouraged as preventive measures against digestive and emotional disorders.

However, modernization has disrupted these traditional practices. In contemporary urban Chinese society, increasing workloads, high academic and career pressure, and widespread availability of processed and fast food have contributed to irregular eating patterns. Emotional stress, late-night snacking, and over-reliance on convenience foods have led to a rise in BED-like behaviors, particularly among younger populations. These shifts reflect a growing divergence between traditional dietary wisdom and modern lifestyle demands.

2.2. Management strategies for Binge-Eating Disorder (BED)

The treatment for obese patients with Binge-Eating Disorder (BED) typically involves a combination of approaches that include dietary interventions, exercise, psychotherapy particularly CBT and IPT and pharmacological options such as lisdexamfetamine, fluoxetine, and topiramate [18] in America.

TCM offers a comprehensive and individualized treatment system for addressing symptoms resembling BED. Rather than targeting the symptom of binge eating directly, TCM focuses on correcting the internal imbalances that drive such behavior. Treatment modalities include dietary therapy, physical exercise, psychotherapy, and pharmacotherapy.

2.2.1. Dietary therapy

According to the Academy for Eating Disorders (AED) Guidebooks for Nutrition treatment EDs, dietary therapy plays a central role in the multidisciplinary treatment of BED. The approach emphasizes structured meal patterns (typically three meals and two snacks daily), normalization of eating behaviors, and reducing dietary restraint. The goals are to stabilize metabolic function, improve satiety regulation, and address the psychological drivers of binge episode [19].

TCM dietary therapy adheres to the principle of “syndrome differentiation”, where food prescriptions are tailored according to the patient’s constitution and current pathological state. Individuals with Spleen Qi deficiency may benefit from consuming easily digestible, warm-natured foods like Chinese yam, lentils, and lotus seed porridge. These foods are believed to strengthen the Spleen, replenish Qi, and alleviate food stagnation. Meanwhile, TCM dietary therapy emphasizes moderation, regularity, and seasonal alignment. Following the doctrine of “preventing disease before it arises”, it recommends a dietary pattern of a hearty breakfast, moderate lunch, and light dinner, with avoidance of late-night eating. Medicinal food products, such as Poria cakes, are used to regulate appetite, tonify the digestive system, and promote long-term metabolic equilibrium [20].

2.2.2. Physical exercise

While CBT is a first-line treatment for BED, research indicates that complementary exercise programs can provide significant additional benefit. Meta-analysis shows that structured exercise (aerobics or yoga) significantly reduces binge symptoms (SMD ≈ 0.94) and, when paired with CBT, leads to greater reductions in depression [21, 22]. Of note, the physical exercise and dietary therapy (PEDt) demonstrated comparable symptom remission to CBT alone, but with faster improvement in psychological outcomes [23]. Consistent with these findings, lifestyle guidelines suggest

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≥150 min/week of moderate aerobic activity, plus 3 weekly resistance training, if possible, to optimize both metabolic and psychological outcomes in BED [24].

In TCM, Exercise [25] is seen as a method of nourishing life through movement. Gentle yet regular exercise modalities such as Baduanjin (Eight Brocades), Tai Chi, or brisk walking are recommended. These practices are believed to harmonize Lung Qi, invigorate the circulation of Qi and Blood, aid digestion, and stabilize emotional states. TCM thinks that developing an individualized, sustainable exercise routine helps reduce emotional overeating by enhancing both physical vitality and psychological resilience.

2.2.3. Psychotherapy

According to the American Psychiatric Association (2023), individuals with BED should receive eating disorder–focused psychotherapy, such as CBT or IPT, which may be delivered in either individual or group formats [26].

CBT, especially its enhanced version (CBTE), stands as the evidence-based first-line psychological treatment for BED. CBT for BED typically involves helping individuals establish regular eating patterns, monitor their food intake and emotional triggers, and challenge maladaptive beliefs about food, body image, and self-worth. These components are central to enhanced CBT models and have been supported by a wide body of clinical research [27-29]. Through cognitive restructuring and behavioral strategies, CBT aims to reduce binge-eating episodes and improve emotional regulation. Grilo et al. demonstrated impressive efficacy of CBT in patients unresponsive to prior acute treatments, with 61% achieving remission compared to only 7.7% in control conditions [30]. Further, Melisse et al. reported that guided self-help CBTE delivered online significantly reduced binge episodes—from an average of 19 to 3 during the last four weeks of treatment—and led to a 40% full recovery rate, with a large effect size (~d=1.0) [31].

IPT is a structured, time-limited therapy originally developed for depression by Gerald Klerman and Myrna Weissman [32]. It focuses on improving interpersonal functioning and addressing current relational issues (e.g., role disputes, grief, interpersonal deficits), under the premise that improving relationships can reduce psychological symptoms like depression or disordered eating [33]. IPT aims to reduce the frequency and severity of binge eating. Research has demonstrated that IPT is as effective as CBT in reducing binge episodes, with some studies suggesting more stable long-term outcomes. By improving interpersonal functioning and emotional regulation, IPT reduces the frequency and severity of binge episodes. A randomized controlled trial by Wilfley et al. found that group IPT (20 sessions) was as effective as group CBT in achieving abstinence: 73% for IPT vs. 79% for CBT at posttreatment and 62% vs. 59% at one-year follow-up [34]. Furthermore, a four-year follow-up study demonstrated sustained long-term gains, with full recovery (no binge episodes in the past month) in 64.4% of IPT participants and stable or improved eating disorder symptoms over time—even as CBT participants experienced slight symptom worsening [35].

TCM don’t use Western-style psychotherapies like CBT (Cognitive Behavioral Therapy). It focused on emotional harmony and spiritual well-being. So, in TCM BED associated with Liver Qi stagnation and Spleen Qi deficiency caused by unresolved emotional tension.

Regulate emotion include quiet sitting, breath regulation, and guided self-reflection to promote the inner clam. At the same time, it can also be consumed in combination with Ganmai Dazao Decoction [36], which is used to nourish the heart, calm the mind, soothe the liver, strengthen the spleen and relieve the urge to eat.

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2.2.4. Pharmacotherapy

Based on research into treatment development indicates that a range of pharmacological interventions may alleviate symptoms of BED.

1) Lisdexamfetamine Dimesylate (Vyvanse) is the only FDA-approved medication for moderate-to-severe adult BED (approved 2015). Multiple randomized trials and meta-analyses in adults show robust efficacy: LDX significantly reduces binge-eating frequency and related symptoms. For example, a systematic review found "consistent evidence" that LDX reduces BED symptoms and patient weight [37]. In a large trial (N≈418) of adults with moderate–severe BED, continued LDX treatment dramatically lowered relapse risk (3.7% vs 32.1% on placebo) over 6 months [38]. While LDX has consistently demonstrated efficacy in reducing binge-eating episodes in adults with BED, its impact on body weight remains somewhat controversial. Some clinical trials and meta-analyses report significant weight loss as a secondary benefit of LDX treatment. McElroy et al. conducted a multicenter, 11-week, randomized doubleblind, placebocontrolled trial of lisdexamfetamine (50–70 mg/day) and found that the 70 mg group experienced a mean weight loss of approximately 4.3 kg, compared with placebo ($p<0.001$) [39]. Similarly, a systematic review and meta-analysis pooling three RCTs found LDX led to statistically significant weight loss compared to placebo [40].

However, regulatory authorities such as the U.S. FDA do not endorse LDX as a weight-loss drug, and caution that weight reduction is not a primary treatment goal. Variability in patient characteristics, trial duration, and study endpoints may contribute to differing findings regarding weight outcomes. Thus, while weight loss may occur in some individuals, LDX should primarily be viewed as a treatment for binge-eating symptoms rather than a weight-loss intervention.

As a stimulant, LDX commonly causes insomnia, anxiety, dry mouth, and gastrointestinal upset. One network meta-analysis (high-certainty evidence) noted that LDX had the highest odds of adverse events among BED drugs, including anxiety, insomnia, diarrhea, and headache [41]. It raises heart rate and blood pressure and carries a risk of abuse; thus, it is contraindicated in uncontrolled cardiovascular disease. Other limitations include cost and the need for monitoring. Nonetheless, most trials report that LDX was "generally well tolerated" [38].

2) Fluoxetine (Prozac) – a selective serotonin reuptake inhibitor (SSRI) – is not FDA-approved for BED. Evidence for fluoxetine in BED is mixed and less robust than for LDX. Early RCTs showed some benefit: in a 6-week trial fluoxetine (dose ~70 mg/day) led to significantly greater reductions in binge frequency, weight, and illness severity compared to placebo [42]. More recent systematic analyses suggest modest efficacy: a 2022 network meta-analysis of SSRIs (9 RCTs) found that fluoxetine and sertraline both significantly reduced binge episodes vs placebo, and fluoxetine produced the largest improvement in depression scores [43]. Common side effects include insomnia, nausea, diarrhea, headache, and sexual dysfunction—consistent with SSRI profiles—and fluoxetine is considered similarly tolerated to other SSRIs [44]. That analysis also found SSRIs did not produce weight loss [43]. Overall, fluoxetine may reduce binge frequency and improve mood, but effect sizes appear smaller than with LDX or topiramate.

3) Topiramate (Topamax), which is an anticonvulsant, has been studied in BED but is not FDA-approved for it. It is often used off-label in BED, especially when obesity is a concern. Meta-analyses confirm topiramate's efficacy: a 2021 systematic review of RCTs (N≈528) found topiramate significantly reduced binge episodes and days per week, and reduced body weight by ~4.9 kg relative to placebo [45]. Similarly, a 2025 network meta-analysis found topiramate produced the largest effect on binge reduction (mean difference ~–1.72 episodes/week) and the highest odds of remission (OR ~3.99) compared to other treatments [41]. These results suggest that topiramate can be very effective for BED symptoms and weight loss. Topiramate's use in BED is limited by

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safety and tolerability concerns. In trials, topiramate users had significantly higher dropout rates due to adverse events [45]. Common side effects include cognitive slowing, memory or concentration problems, paresthesia, taste changes, dizziness, and mood effects [46]. It can also cause metabolic acidosis and kidney stones. Cognitive impairment can be problematic, especially with higher doses. Because of these issues, many experts reserve topiramate for severe BED cases where obesity is a major problem and typically use low doses with slow titration [47].

Acupuncture [48, 49] is a central modality in TCM and has shown promising results in addressing symptoms related to BED. It involves the stimulation of specific acupoints to regulate the flow of Qi, balance organ function, and harmonize the mind and body. For BED patients, acupuncture treatment typically targets points related to the Liver, Spleen, and Stomach meridians to reduce food cravings, improve digestion, and stabilize emotional states.

For example, Zusanli (ST36), a major point on the Stomach meridian, is known to strengthen the Spleen and Stomach, regulate Qi, and alleviate digestive discomfort such as bloating and fullness. Sanyinjiao (SP6), an intersection point of the Spleen, Liver, and Kidney meridians, is frequently used to regulate endocrine function, stabilize emotions, reduce stress-related cravings, and improve sleep [50].

Studies have indicated that acupuncture can modulate neurotransmitters such as serotonin and dopamine, which are associated with mood regulation and appetite control. It may also influence the hypothalamic-pituitary-adrenal (HPA) axis and the autonomic nervous system, contributing to reduced stress-related eating behaviors. Regular acupuncture sessions, often combined with herbal therapy and lifestyle adjustments, provide a non-pharmacological, holistic intervention aimed at restoring physiological and emotional balance in BED patients.

3. The physiological link between binge eating and insulin resistance

3.1. Core function of insulin in metabolism regulation

Insulin, produced by pancreatic β-cells, is an essential hormone serves as a central regulator of energy homeostasis by stimulating glucose uptake into insulin-sensitive tissues and balancing postprandial blood glucose levels. Insulin triggers signal that translocate GLUT4 transporters to cell surface in skeletal muscles and adipose tissue, thereby increasing glucose uptake [51].

In patients with BED, frequent episodes of high-glycaemic food intake can lead to exaggerated fluctuations in blood glucose and insulin level [52, 53]. This frequent simulation activate insulin signaling pathways excessively therefore potentially causing receptor desensitisation and in long-term insulin resistance [54]. Moreover, reactive hypoglycaemia subsequent a drop in blood glucose following a high insulin surge that can trigger hunger and reinforce bingeing cycle [55]. Thus the imbalanced function a glucose metabolism is not just a consequence of binge eating but may also be a physiological driver of the repetitive consumption of highly processed food and disordered eating behaviour [52].

3.2. Disruption of balanced energy homeostasis

Binge eating disorder disrupts normal metabolic regulation by suppressing satiety signals and facilitating the overconsumption of high-calorie foods. Unlike physiological eating behaviour that is controlled by regulated neuroendocrine feedback loops, binge episodes often involve hyperpalatable and highly processed foods that stimulate excessive dopaminergic activity and reduce inhibitory

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control [53]. This bingeing cycle often leading to overweight and obesity, which are highly associated with insulin resistance [56].

The exaggerated response of insulin and glucose levels in BED patients can leads to reactive hypoglycaemia [52]. These abnormal fluctuations increase metabolic stress of the patients and due to the triggered hunger through hormonal feedback by the mechanism involving ghrelin and glucagon-like peptide-1(GLP-1), the repeated cycle of binge eating and metabolic rebound could establish a physiological loop that contributes insulin resistance and long-term energy dysregulation [52, 56].

3.3. Neuroendocrine feedback involving insulin

3.3.1. Disruption in insulin-leptin axis

The insulin-leptin axis plays an essential role in regulating energy balance and appetite. Under normal physiological conditions, postprandial insulin acts on the hypothalamus suppresses appetite, while leptin that is secreted by adipocytes provides long-term feedback to inhibit the consumption of excessive foods. However, in individuals with binge eating disorder (BED), the repeated episodes of binge eating causes chronic overnutrition that lead to constantly high insulin and leptin levels, which may results in central resistance to both hormones [57].

This hormonal resistance weakens hypothalamic satiety signaling, allows hunger to stay despite sufficient or excessive energy took in. As a result, patients with BED may experience increased reward-driven eating, reduced cognitive control while food intake, and dysregulated energy homeostasis, all of which reinforce the binge-restrict cycle and worsen metabolic stress [53].

3.3.2. Dopaminergic pathways and hedonic overeating

In addition to homeostatic appetite regulation, hedonic eating is also driven by the brain's reward system which plays a key role in binge eating disorder (BED). This involves hyperactivation of dopaminergic pathways and regulates the motivational and rewarding aspects of food intake [53].

In individuals with BED, highly processed, energy-dense foods provide an exaggerated dopamine response in key regions such as the ventral regimental area, worsening the compulsive eating patterns. In the long term this hyper-responsively contributes to neuroadaptive changes. Including reduced D2 receptor availability which has been linked to less flexible reward-driven in BED and obesity [58].

Together, these metabolic and neuroendocrine disruptions illustrate how BED not only contributes to insulin resistance but is also reinforced by it, which forming a self-repeating cycle of dysregulation

4. Comparative effects of eastern and western treatments on insulin resistance in binge eating disorder

4.1. The impact of eastern treatment strategy on insulin resistance

4.1.1. Acupuncture

BED is often accompanied by obesity and metabolic disorders, which can induce insulin resistance. Studies on obese patients with BED aged 18-40 show that acupuncture (especially electroacupuncture combined with cognitive therapy) has positive effects on improving metabolic

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indicators [48, 59]. After 12 weeks of electroacupuncture combined with cognitive therapy, patients' fasting blood glucose significantly decreased ($P<0.05$), while fasting insulin decreased without statistical significance [48]. Additionally, acupuncture reduces anxiety in BED patients (improved STAI-State scores, $p=0.017$) and decreases cravings for high-calorie foods, thereby reducing binge eating frequency and alleviating insulin resistance pressure [59]. It also improves metabolism and body composition: electroacupuncture combined with cognitive therapy reduces total cholesterol and triglycerides, increases high-density lipoprotein ($P<0.05$) to improve dyslipidemia [48], and leads to significant decreases in patients' weight, BMI, and body fat percentage, while regulating gastrointestinal function to reduce metabolic burden after overeating [48, 59]. However, acupuncture may indirectly affect insulin resistance in BED patients by improving blood glucose, emotion, dietary behavior, lipid metabolism, and body composition, but its direct regulatory effect on insulin is unconfirmed. Limitations include lack of core insulin resistance indicators (e.g., HOMA-IR) and small sample size, so larger studies are needed to verify long-term mechanisms [48, 59].

4.1.2. Herbal approaches

Herbal approaches offer effective interventions for insulin resistance. A study [60] demonstrated that the spleen-kidney supplementing formula alleviates insulin resistance in type 2 diabetic rats induced by a high-fat diet combined with streptozotocin by improving glucose metabolism (reducing fasting blood glucose (FBG) and glycosylated hemoglobin (HbA1c), enhancing insulin sensitivity in a dose-dependent manner) and activating the AKT/GSK-3β pathway (upregulating hepatic AKT protein expression and GSK-3β phosphorylation, strengthening insulin signal transduction, and promoting glucose uptake and glycogen synthesis to relieve resistance). Another study [61] confirmed Yi-Qi-Zeng-Min-Tang (YQZMT)'s multi-dimensional effects on insulin resistance: it enhances insulin sensitivity (decreasing the homeostasis model assessment of insulin resistance (HOMA-IR) by 41.5% in the high-dose group compared to the model group ($P<0.05$), with improved glucose tolerance), regulates lipid metabolism (reducing total cholesterol (TC) and triglycerides (TG), increasing high-density lipoprotein cholesterol (HDL-c); the high-dose group showed a 56.3% reduction in TG ($P<0.01$), and inhibits inflammation (lowering serum pro-inflammatory factors such as tumor necrosis factor-α (TNF-α) and interleukin-6 (IL-6), alleviating chronic inflammation-induced interference with insulin signaling, without weight gain unlike rosiglitazone).

4.2. The impact of western treatment strategy on insulin resistance

4.2.1. Cognitive behavioral therapy

CBT has multi-dimensional impacts on insulin resistance, working indirectly by relieving psychological stress and depression and potentially benefiting through blood glucose and lipids, with effects varying by age and intervention strategies. Psychologically, CBT reduces psychological stress, breaking the cycle of insulin resistance exacerbated by hypercortisolemia ("stress-elevated cortisol - worse insulin resistance"): psychological stress activates the HPA axis, increasing cortisol and interfering with insulin signaling, while CBT relieves stress through cognitive restructuring and behavioral training to aid in improving insulin resistance. This effect is more evident in adolescents: studies show that after CBT relieves adolescent depression, those with high baseline depression have significantly lower fasting insulin [62], and overweight adolescents have reduced BMI z-scores and improved insulin resistance after 6-month of CBT [63]; in adults, however, CBT improves depression but not insulin resistance [64]. Metabolically, though not directly measuring insulin

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resistance indicators, CBT's improvement in blood glucose and lipids provides indirect clues [65, 66]: it optimizes glycemic control (reducing HbA1c by 0.14%-0.275% and fasting glucose by 15.48 mg/dl, reducing pancreatic burden and indirectly alleviating insulin resistance, consistent with lower insulin in adolescents) and regulates lipid metabolism (lowering total cholesterol by 0.182 mmol/L [66], improving dyslipidemia and reducing damage to insulin sensitivity). Limitations include that most studies do not directly measure core insulin resistance indicators (with conclusions mostly indirect [65, 66]and that the "psychological-metabolic" interaction mechanism is unclear, so future studies need longer intervention cycles and diverse populations to clarify CBT's role in insulin resistance management.

4.2.2. Lisdexamfetamine

Lisdexamfetamine impacts insulin resistance through multiple pathways. It significantly reduces body weight in patients with BED [39, 67], and since obesity is a key driver of insulin resistance, LDX-induced weight loss may indirectly alleviate insulin resistance by reducing body fat [68]. Additionally, LDX decreases total food intake (including high-calorie snacks) [68]; as excessive intake of high-fat/high-sugar foods disrupts glucose and lipid metabolism and promotes insulin resistance, LDX's suppression of binge eating may lower such risks [67]. Moreover, LDX enhances catecholaminergic (dopamine, norepinephrine) and serotonergic neurotransmission [67], and these neurotransmitters are involved in appetite and peripheral metabolic regulation (e.g., glucose uptake, lipid metabolism), potentially affecting insulin action indirectly [66].

4.2.3. Fluoxetine

Fluoxetine exerts effects on insulin resistance primarily through two mechanisms. It significantly reduces the frequency of binge-eating and vomiting episodes in patients with bulimia nervosa BN and BED [69, 70]; since excessive calorie intake from binge eating disrupts glucose and lipid metabolism—a key driver of insulin resistance—suppressing such behaviors may indirectly reduce postprandial hyperglycemia and hyperlipidemia, lowering the risk of insulin resistance. Additionally, fluoxetine alleviates depressive symptoms commonly comorbid with BN and BED [69, 70]; chronic stress and elevated cortisol (often associated with depression) can impair insulin signaling, so reducing depressive symptoms may mitigate stress-induced metabolic dysfunction, indirectly benefiting insulin resistance.

4.2.4. Topiramate

Topiramate alleviates insulin resistance through weight loss and reduced binge-eating. It (alone or combined with phentermine) significantly reduces body weight: the topiramate group lost an average of -4.6 ± 2.3 kg [71], while the phentermine-topiramate ER group lost -5.8 kg [72], far exceeding placebo. Since obesity, a key driver of insulin resistance, involves chronic inflammation from excess fat, topiramate-induced weight loss may indirectly improve insulin sensitivity by reducing adiposity. At the same time, topiramate reduces binge episodes and days: the topiramate group had greater reductions in weekly binge episodes (-5.0 ± 0.6 vs. placebo's -3.3 ± 1.2) and days (-3.5 ± 0.6 vs. placebo's -2.3 ± 0.7), and a crossover trial confirmed that phentermine-topiramate ER lowered objective binge days from 16.2 to 4.2 per 4 weeks [72]. As excessive calorie intake from binge-eating disrupts glucose/lipid metabolism and promotes insulin resistance, suppressing binge-eating may reduce postprandial metabolic fluctuations.

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4.2.5. Interpersonal therapy

Interpersonal therapy improves insulin resistance through dual pathways targeting eating disorders and interpersonal stress. Uncontrolled eating like bingeing causes blood glucose fluctuations and fat buildup, inducing insulin resistance, but studies confirm IPT indirectly improves insulin sensitivity by alleviating eating disorders: it reduces eating disorder scale scores with stable short-to-long-term effects [73], maintains or increases long-term abstinence rates in binge-eating disorder patients [74], and reduces anxiety-induced bingeing to lower blood glucose fluctuations—more effective in younger groups (SMD=0.43) and those with low BMI [73, 74]. Additionally, chronic stress raises cortisol and impairs insulin signaling, but IPT mitigates this by improving interpersonal function: it lowers Inventory of Interpersonal Problems scores (SMD=0.32), reducing stress from social conflicts and role changes [73, 74], and relieves anxiety and depression (especially in younger groups), lessening stress hormones' metabolic impact [73, 74].

4.3. Sino-western treatment strategies: comparison and interaction

4.3.1. Western medicine vs eastern medicine (China)

Western treatment strategies are more direct and rapid in reducing blood glucose in the short term: medications (e.g., fluoxetine, topiramate) reduce excessive calorie intake by suppressing binge-eating, thereby quickly lowering postprandial hyperglycemia [69], and CBT can reduce fasting blood glucose and glycosylated hemoglobin (HbA1c) in the short term, with particularly significant effects in adolescent populations [65, 66]. In contrast, Chinese strategies excel in maintaining long-term metabolic balance through multi-target regulation: traditional Chinese medicine formulas like the spleen-kidney supplementing formula enhance insulin sensitivity via the AKT/GSK-3β pathway [60], and YQZMT improves lipid metabolism, inhibits inflammation, and reduces HOMA-IR, addressing the root causes of metabolic disorders [61]; acupuncture, when combined with cognitive therapy, improves blood glucose, lipid levels, body composition, and emotional states after 12 weeks, reducing metabolic burden and preventing the recurrence of metabolic imbalances [48, 59].

4.3.2. Applicable population

Traditional Chinese Medicine-based strategies have specific applicable populations: acupuncture is suitable for obese patients with BED aged 18-40, especially those with comorbid anxiety or dyslipidemia [48, 59]; the spleen-kidney supplementing formula is applicable to type 2 diabetic rats with insulin resistance induced by a high-fat diet [60]; and YQZMT is suitable for populations with insulin resistance accompanied by dyslipidemia and chronic inflammation [61]. Western strategies also target specific groups: CBT is more effective for adolescents with insulin resistance related to psychological stress or depression, as well as overweight adolescents needing BMI reduction [62, 63]; Lisdexamfetamine and Topiramate are suitable for BED patients requiring weight loss and reduced binge-eating [67, 71]; Fluoxetine is preferred for patients with bulimia nervosa BN or BED comorbid with depression [69]; and IPT is more effective for younger individuals and those with low BMI, improving metabolic disturbances caused by interpersonal stress [73, 74].

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5. Conclusion and outlook

5.1. Conclusion

BED is a globally prevalent and clinically complex condition characterized by high psychiatric comorbidity, cultural variability in prevalence, and a strong bidirectional association with metabolic disturbances, particularly insulin resistance. This review systematically compares Eastern and Western treatment paradigms, highlighting their complementary strengths in addressing the multifactorial nature of BED.

Western interventions, as exemplified by practices in the United States, emphasize evidence-based symptom reduction through pharmacological agents (e.g., lisdexamfetamine, topiramate) and structured psychotherapies (CBT, IPT). These approaches demonstrate efficacy in reducing binge frequency, alleviating comorbid mood and anxiety symptoms, and achieving short-term improvements in weight and glycemic control. In contrast, Eastern strategies rooted in TCM adopt a holistic framework, targeting underlying imbalances such as Liver Qi stagnation and Spleen Qi deficiency through acupuncture, herbal therapies, constitution-based dietary regulation, and gentle exercise (e.g., Tai Chi). TCM interventions excel in promoting long-term metabolic homeostasis by enhancing insulin sensitivity, improving lipid metabolism, and mitigating chronic inflammation—key pathways in insulin resistance.

The physiological linkage between BED and insulin resistance is mediated by disruptions in neuroendocrine regulation, including dysfunctions in the insulin-leptin axis, dopaminergic reward pathways, and stress-responsive HPA axis. Binge eating episodes drive metabolic stress through excessive calorie intake and glucose fluctuations, while insulin resistance may reinforce compulsive eating behaviors, creating a self-perpetuating cycle. Both Eastern and Western treatments interrupt this cycle, albeit through distinct mechanisms: Western approaches focus on behavioral and neurotransmitter regulation, while TCM targets systemic balance to restore metabolic and emotional harmony.

5.2. Outlook

Despite progress in BED research, critical gaps remain that warrant future investigation. First, epidemiological data in Asian populations, particularly large-scale national studies in China, are still limited. While preliminary data (e.g., 3.53% prevalence among female college students in Wuhan) signal emerging concerns, broader studies are needed to clarify regional variations, sociocultural risk factors (e.g., urbanization, dietary transitions), and age-specific trends to inform targeted public health strategies.

Second, mechanistic research on the BED-insulin resistance axis requires refinement. Most existing studies rely on indirect markers of insulin resistance; future work should prioritize direct measurements (e.g., HOMA-IR, hyperinsulinemic-euglycemic clamps) to quantify how specific treatments—especially TCM modalities like acupuncture and herbal formulas (e.g., Yi-Qi-Zeng-Min-Tang)—modulate insulin signaling pathways. Additionally, the interaction between dopaminergic dysfunction and insulin resistance could identify novel therapeutic targets, bridging psychological and metabolic regulation.

Third, the potential of integrative approaches remains underexplored. Combining Western therapies (e.g., CBT for behavioral restructuring) with TCM interventions (e.g., acupuncture for metabolic regulation) may synergistically improve both short-term symptom relief and long-term

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metabolic outcomes. Rigorous randomized controlled trials are needed to evaluate such combinations, with a focus on safety, tolerability, and cost-effectiveness across diverse populations.

Finally, addressing disparities in detection and access to care is critical. With only one-third of BED cases identified in clinical settings globally, efforts to enhance screening tools, train clinicians in cross-cultural assessment, and develop culturally tailored interventions (e.g., digital CBT adapted to TCM principles) are essential. Expanding research on understudied populations and scaling evidence-based practices could reduce the global burden of BED and its metabolic sequelae.

In summary, advancing BED management requires integrating cultural perspectives, strengthening mechanistic insights, and prioritizing personalized, holistic care. By bridging Eastern and Western knowledge, future research and clinical practice can move beyond symptom control to achieve sustained recovery, addressing both the psychological and physiological dimensions of this multifaceted disorder.

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