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*RESEARCH ARTICLE*

# MINDFUL EATING AS A BEHAVIORAL STRATEGY FOR WEIGHT MANAGEMENT: A NARRATIVE REVIEW WITH IMPLICATIONS FOR PRIMARY CARE IN THE PHARMACOTHERAPY ERA

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## Abstract

**Background:** Obesity remains a leading global health challenge, with prevalence exceeding one billion individuals worldwide. While glucagon-like peptide-1 receptor agonists (GLP-1 RAs) have revolutionized pharmacological obesity management, weight regain following treatment discontinuation highlights the need for sustainable behavioral strategies. Mindful eating, a practice rooted in present moment awareness of eating experiences, has emerged as a promising complementary approach.

**Objective:** This narrative review synthesizes current evidence on the efficacy, mechanisms, and clinical applicability of mindful eating interventions for weight management in adults, and proposes a conceptual framework for integrating mindful eating into primary care alongside modern obesity pharmacotherapy.

**Methods:** A comprehensive literature search was conducted in PubMed, Scopus, Google Scholar, and the Cochrane Library for articles published between January 2014 and March 2026, in accordance with the Scale for the Assessment of Narrative Review Articles (SANRA) guidelines.

**Results:** Randomized controlled trials and meta-analyses demonstrate that mindful eating interventions produce weight loss outcomes comparable to conventional dietary programs while offering superior improvements in binge eating, emotional eating, and dietary self-regulation. Neurobiological evidence suggests that mindful eating modulates prefrontal cortex activity, reward pathways, and stress-related eating through cortisol reduction.



In the context of GLP-1 RA therapy, mindful eating addresses the behavioral and psychological dimensions that pharmacotherapy alone does not target, potentially mitigating weight regain upon medication discontinuation.

**Conclusions:** Mindful eating represents a scalable, low-cost behavioral strategy that complements pharmacological obesity treatment. The proposed Mindful Eating–Pharmacotherapy Integration Model (MEPIM) provides a practical

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framework for primary care implementation. Future pragmatic trials examining the combined efficacy of mindful eating and GLP-1 RA therapy are warranted.

## Introduction:-

Obesity has reached epidemic proportions worldwide. According to a pooled analysis of over 3,600 population-representative studies encompassing 222 million individuals, global obesity prevalence has more than doubled since 1990, with over one billion people now classified as living with obesity [1]. The burden disproportionately affects low- and middle-income countries (LMICs), where the rate of increase has been most pronounced over the past three decades [1]. In Southeast Asia, including Thailand, rising urbanization, dietary westernization, and sedentary lifestyles have accelerated obesity prevalence, placing enormous strain on universal health coverage (UHC) systems [2].The current obesity treatment paradigm follows a stepwise continuum from lifestyle interventions to pharmacotherapy and, for eligible patients, bariatric surgery [3]. The advent of glucagon-like peptide-1 receptor agonists (GLP-1 RAs), notably semaglutide and tirzepatide, has transformed the pharmacological landscape, achieving weight reductions of 15–22% in pivotal clinical trials [4,5]. However, this pharmacological revolution has revealed a critical limitation: weight regain following treatment discontinuation. Meta-analytic evidence indicates that patients discontinuing semaglutide or tirzepatide regain an average of 9.69 kg, while those stopping liraglutide regain approximately 2.20 kg [6].

In the STEP 1 extension trial, participants regained approximately two-thirds of lost weight within one year of semaglutide cessation [7]. Furthermore, a large cohort study of over 125,000 patients found that 46.5–64.8% of individuals discontinued GLP-1 RA therapy within one year [8].These findings underscore a fundamental "behavior gap" in obesity management: pharmacotherapy effectively suppresses appetite through biological mechanisms but does not address the psychological and behavioral patterns that drive maladaptive eating behaviors [9]. Sustainable weight management requires strategies that modify the cognitive, emotional, and habitual dimensions of eating behavior—the very domains that mindful eating targets [10].Mindful eating, derived from the broader practice of mindfulness, involves cultivating intentional, non-judgmental awareness of the physical, emotional, and sensory aspects of eating [11]. It encourages individuals to attend to hunger and satiety cues, recognize emotional triggers for eating, and develop a healthier relationship with food [12]. Research interest in mindful eating has grown substantially, with bibliometric analyses reporting an annual growth rate of 17.39% in scientific publications between 2000 and 2025 [13].Despite this growing evidence base, several critical gaps remain. First, no narrative review has systematically examined mindful eating as a complementary strategy specifically within the context of GLP-1 RA pharmacotherapy. Second, existing reviews predominantly focus on eating disorders rather than general weight management in primary care settings [14]. Third, the synthesis of digital and mobile health (mHealth) delivery models for mindful eating interventions remains limited [15].This narrative review aims to: (1) synthesize current evidence on the efficacy of mindful eating for weight management; (2) examine its neurobiological and psychological mechanisms; (3) evaluate its potential as a complementary strategy alongside GLP-1 RA therapy; (4) explore scalable delivery models including digital health platforms; and (5) propose a conceptual framework—the Mindful Eating–Pharmacotherapy Integration Model (MEPIM)—for primary care implementation.

## Methods:-

This narrative review was conducted in accordance with the Scale for the Assessment of Narrative Review Articles (SANRA) guidelines [16] to ensure methodological transparency and rigor. A comprehensive literature search was performed across PubMed/MEDLINE, Scopus, Google Scholar, and the Cochrane Library for articles published between January 2014 and March 2026. The search strategy employed the following keywords and Boolean operators: ("mindful eating" OR "mindfulness-based eating" OR "mindful eating intervention") AND ("weight management" OR "weight loss" OR "obesity" OR "body weight" OR "BMI") AND ("primary care" OR "pharmacotherapy" OR "GLP-1" OR "semaglutide" OR "digital health" OR "mHealth").Inclusion criteria encompassed: (a) studies involving adults aged 18 years or older with overweight or obesity (BMI $\geq$25 kg/m$^2$); (b) interventions involving mindful eating or mindfulness-based eating approaches, either standalone or in combination with other treatments; (c) outcomes including body weight change, BMI, eating behavior traits, or psychological outcomes; and (d) study designs including randomized controlled trials (RCTs), systematic reviews, meta-analyses, prospective cohort studies, and clinical practice guidelines.Exclusion criteria included: (a) studies involving pediatric populations (under 18 years) or pregnant women; (b) general mindfulness interventions without a specific eating component; (c) studies without weight-related outcomes; and (d) case reports, editorials, and conference

abstracts without full-text availability. The reference lists of retrieved systematic reviews were also hand-searched to identify additional relevant studies. A narrative synthesis approach was employed to integrate findings thematically.

**Defining Mindful Eating: Concepts, Constructs, And Measurement:-**

**Conceptual Framework:-**Mindful eating originates from the broader tradition of mindfulness, which can be traced to Buddhist contemplative practices and was adapted for clinical use through Kabat-Zinn's Mindfulness-Based Stress Reduction (MBSR) program [17]. In the eating domain, mindful eating involves bringing deliberate, non-judgmental attention to the entire eating experience, including the taste, texture, aroma, and visual appearance of food; the physical sensations of hunger and fullness; and the emotional states that accompany eating [11,12].The core components of mindful eating include: (a) awareness of internal hunger and satiety cues, enabling individuals to eat in response to physiological rather than emotional or external triggers; (b) non-judgmental observation of food-related thoughts and cravings without automatic reactivity; (c) sensory engagement with the eating experience to enhance satisfaction and reduce overconsumption; and (d) intentional food choice aligned with health goals and personal values [12,18].It is important to distinguish mindful eating from intuitive eating, a related but distinct construct. While both approaches emphasize internal cue responsiveness, intuitive eating encompasses a broader framework that includes unconditional permission to eat, rejection of diet mentality, and body acceptance [19]. Mindful eating more specifically focuses on the quality of attention during the eating experience itself. Research has demonstrated moderate correlations between the two constructs, with path analysis confirming independent effects on BMI [20].

**Measurement Tools:-**Several validated instruments have been developed to assess mindful eating. The Mindful Eating Questionnaire (MEQ), developed by Framson and colleagues, evaluates five domains: disinhibition, awareness, external cues, emotional response, and distraction [21]. The Mindful Eating Scale (MES) provides an alternative measurement framework with focus on acceptance, awareness, non-reactivity, routine, and act with awareness during eating [22]. Additionally, the Intuitive Eating Scale-2 (IES-2) is frequently used in comparative studies to assess the overlap between mindful and intuitive eating behaviors [19]. The heterogeneity of measurement instruments across studies represents a notable methodological challenge, as different tools may capture distinct facets of the mindful eating construct, complicating cross-study comparisons [23].

**Types of Mindful Eating Interventions:-**Mindful eating interventions vary considerably in structure, duration, and theoretical orientation (Table 1). Mindfulness-Based Eating Awareness Training (MB-EAT), developed by Kristeller and Wolever, is the most extensively studied program, combining meditation practices with guided eating exercises over multiple group sessions [24]. The Mindful Eating and Living (MEAL) program integrates mindfulness with nutrition education in a structured format [25]. Acceptance and Commitment Therapy (ACT)-based approaches incorporate mindful eating within a broader framework of psychological flexibility [26]. Brief mindful eating inductions, typically single-session laboratory protocols, have been used to examine immediate effects on food intake [27]. More recently, digital and app-based programs have emerged, offering scalable delivery through mobile platforms [28].

**Table 1. Types of Mindful Eating Interventions**

| Intervention | Format | Duration | Key Components | Reference |
|---|---|---|---|---|
| MB-EAT | Group (8–12 sessions) | 8–12 weeks | Meditation, guided eating exercises, inner wisdom | Kristeller & Wolever, 2011 [24] |
| MEAL | Group | 6 weeks | Mindfulness + nutrition education | Dalen et al., 2010 [25] |
| ACT-based | Group/Individual | Variable | Psychological flexibility, values-based eating | Forman et al., 2013 [26] |
| Brief Induction | Individual (lab) | Single session | Raisin exercise, sensory awareness | Allirot et al., 2018 [27] |
| Digital/App | Self-guided (mobile) | Variable | Guided audio, tracking, reminders | Matsuhisa et al., 2024 [28] |
| MBSR + eating | Group | 8 weeks | Standard MBSR with eating modules | Daubenmier et al., 2016 [29] |

**Mechanisms of Action:-**

**Neurobiological Pathways:-**

The neurobiological mechanisms underlying mindful eating involve multiple brain systems implicated in appetite regulation, reward processing, and executive control. Neuroimaging studies have demonstrated that mindfulness practice is associated with increased activation of the prefrontal cortex (PFC), the brain region responsible for top-down cognitive control and decision-making [30]. This enhanced PFC activity may strengthen the capacity for self-regulation in the face of food cues, enabling individuals to override automatic, reward-driven eating responses [31].

Mindfulness practice has also been shown to modulate the mesolimbic dopamine reward pathway. By cultivating non-reactive awareness of food cravings, mindful eating may reduce the hedonic drive to consume highly palatable foods, effectively "decoupling" the stimulus-response chain that characterizes impulsive eating [30,32]. Structural neuroimaging studies suggest that sustained mindfulness practice induces neuroplastic changes, including increased gray matter density in areas associated with self-awareness and emotional regulation [31].

**The Stress–Eating Axis:-**

Chronic stress, mediated by hypothalamic-pituitary-adrenal (HPA) axis dysregulation and elevated cortisol levels, is a well-established driver of emotional eating and visceral adiposity [33]. Cortisol promotes preferential consumption of energy-dense, palatable foods and facilitates abdominal fat deposition [34]. Mindfulness-based interventions have consistently demonstrated reductions in perceived stress and cortisol levels, thereby interrupting the stress–eating cycle [35]. In the context of obesity, Daubenmier and colleagues reported that a mindfulness-based intervention significantly reduced cortisol awakening responses in women with overweight, which was associated with reductions in abdominal fat [29].

**Cognitive and Self-Regulatory Mechanisms:-**

Beyond neurobiological pathways, mindful eating operates through several cognitive and psychological mechanisms. "Decentering," the capacity to observe thoughts and cravings as transient mental events rather than imperatives for action, is considered a key mechanism [36]. This metacognitive shift enables individuals to experience food cravings without automatically acting on them, creating a "space" between stimulus and response. Additionally, mindful eating enhances interoceptive awareness—the ability to perceive internal bodily signals such as hunger and satiety—which is often impaired in individuals with obesity [37]. Self-compassion, increasingly recognized as a mediator of sustained behavior change, is also cultivated through mindfulness practice, reducing the cycle of self-criticism and compensatory overeating that frequently accompanies failed dietary attempts [38].

**Evidence for Weight Management Outcomes:-**

**Randomized Controlled Trial Evidence:-**

Several RCTs have examined the direct effects of mindful eating interventions on weight-related outcomes. A landmark RCT published in the British Journal of Nutrition randomized 138 women with obesity to three groups: mindful eating plus moderate caloric restriction (ME+MCR), moderate caloric restriction alone (MCR), and mindful eating alone (ME). While significant weight loss was observed across all groups, no statistically significant between-group differences were found, suggesting that mindful eating alone produced comparable weight reduction to conventional caloric restriction [39]. Notably, the ME group demonstrated significantly greater reductions in emotional eating and uncontrolled eating compared to the dietary restriction groups [39].Morillo-Sarto and colleagues conducted an RCT in primary care settings examining mindful eating added to treatment as usual (TAU) compared with TAU alone in patients with overweight or obesity. The mindful eating program was more effective for reducing emotional eating patterns, with significant improvements in external eating, binge episode frequency, and self-compassion, although BMI changes did not reach statistical significance [40]. This finding underscores a recurring theme: mindful eating may exert its primary effects on eating behavior quality rather than on weight loss per se.Minari and colleagues evaluated mindful eating effects in patients with obesity and binge eating disorder (BED), demonstrating reductions in binge eating episodes and improvements in dietary habits and body image [41].

A pilot RCT by Matsuhisa and colleagues examined a mindfulness mobile application combined with a comprehensive lifestyle intervention for individuals with metabolic syndrome, reporting promising feasibility and preliminary evidence of weight loss at 26 weeks [28].

**Meta-Analytic Evidence:-**

The meta-analytic literature provides further insight into the magnitude and consistency of mindful eating effects. Artiles and colleagues conducted a systematic review and meta-analysis comparing mindful eating programs with conventional diet programs, concluding that both approaches produced comparable weight reductions [42]. This

parity is noteworthy given that mindful eating programs typically do not impose caloric restriction, suggesting that awareness-based mechanisms can achieve weight outcomes similar to prescriptive dietary approaches.An updated systematic review and meta-analysis by Liu and colleagues focusing on mindfulness-based interventions for binge eating found significant reductions in binge eating frequency, with moderate-to-large effect sizes [43]. Kudlek and colleagues published a comprehensive systematic review and meta-analysis examining the impact of all types of behavioral weight management interventions on eating behavior traits, finding evidence that interventions increased mindful and intuitive eating scores (SMD 0.23; 95% CI 0.04–0.43) at intervention end [44]. A critical review by Aoun and colleagues, analyzing 94 articles including 33 RCTs, concluded that mindfulness-based interventions demonstrated positive effects on binge eating disorder, weight loss, emotional eating, and diabetes-related outcomes [14].

**Table 2. Summary of Key Meta-Analyses on Mindful Eating and Weight-Related Outcomes**

| Study | Design | N Studies | Key Finding |
|---|---|---|---|
| Artiles et al., 2019 [42] | SR & MA | 18 | Mindful eating comparable to conventional diets for weight loss |
| Liu et al., 2025 [43] | SR & MA | Updated | Significant reduction in binge eating (moderate–large ES) |
| Kudlek et al., 2025 [44] | SR & MA | Multiple arms | Increased mindful eating scores (SMD 0.23; 95% CI 0.04–0.43) |
| Aoun et al., 2024 [14] | Critical review | 94 (33 RCTs) | Positive impact on BED, weight, emotional eating |
| Tapper, 2022 [23] | Narrative review | Comprehensive | Multi-component MBIs beneficial; single strategies need more evidence |

**Effects on Eating Behavior Traits:-**

Across the reviewed literature, mind ful eating interventions consistently demonstrate stronger effects on eating behavior modification than on weight loss alone. Key behavioral outcomes include: (a) significant reductions in binge eating episodes and frequency [41,43]; (b) decreased emotional eating, whereby individuals learn to distinguish emotional hunger from physical hunger [39,40]; (c) reduced external eating, defined as eating in response to food-related environmental cues rather than internal signals [40]; (d) improved dietary quality, with participants making more conscious food choices aligned with nutritional goals [14]; and (e) enhanced body image satisfaction and self-compassion, reducing the psychological distress often associated with obesity [38,40].

**Long-Term Maintenance:-**

Long-term maintenance of weight loss remains the most significant challenge in obesity management. Preliminary evidence suggests that mindful eating may offer advantages for sustained behavior change. A systematic review noted that mindfulness may be effective for maintaining weight loss and healthy eating behaviors following an active intervention period [28,45]. However, the evidence base for long-term outcomes beyond 12 months remains limited, and most studies suffer from high attrition rates and small sample sizes [23]. The durability of mindful eating skills, once acquired, represents a theoretical advantage over pharmacotherapy, which requires continuous administration to maintain effects [6,7].

**Mindful Eating In The Pharmacotherapy Era:-**

This section presents the novel contribution of this review, examining the rationale and potential for integrating mindful eating with modern obesity pharmacotherapy—a topic not previously addressed in the narrative review literature.

**The GLP-1 RA Revolution and Its Limitations:-**

GLP-1 receptor agonists have fundamentally altered the obesity treatment landscape. Semaglutide 2.4 mg weekly demonstrated a mean weight reduction of 14.9% versus 2.4% with placebo in the STEP 1 trial [4], while tirzepatide achieved weight reductions of up to 22.5% at the highest dose in the SURMOUNT-1 trial [5]. These agents

primarily act by enhancing satiety signaling, slowing gastric emptying, and modulating central appetite pathways [46].However, several limitations constrain the long-term impact of pharmacotherapy alone. First, weight regain upon discontinuation is substantial: a systematic review and meta-analysis reported pooled mean weight regain of 9.69 kg for semaglutide/tirzepatide after cessation [6], and the STEP 1 extension showed approximately two-thirds of lost weight regained within one year [7]. A more recent meta-analysis further confirmed rapid metabolic rebound following GLP-1 RA withdrawal, with significant increases in body weight, waist circumference, and systolic blood pressure [47]. Second, discontinuation rates are high: a study of over 125,000 patients found that 46.5% with and 64.8% without type 2 diabetes discontinued within one year [8]. Third, pharmacotherapy addresses the biological dimension of appetite but does not fundamentally alter the psychological and behavioral patterns—emotional eating, external eating, mindless consumption—that contribute to long-term weight regain [9].

**Complementary Mechanisms: Why Behavioral Strategies Remain Essential:-**

The rationale for combining mindful eating with GLP-1 RA therapy rests on the complementarity of their mechanisms. GLP-1 RAs operate primarily through biological appetite suppression—reducing hunger at the neurohormonal level. Mindful eating, by contrast, targets the cognitive, emotional, and behavioral dimensions of eating [10,12]. This complementarity can be conceptualized along three axes: (a) while GLP-1 RAs reduce "how much" an individual desires to eat, mindful eating improves "how" they eat—enhancing awareness, food choice quality, and eating pace; (b) GLP-1 RAs do not address emotional eating triggers, whereas mindful eating directly targets stress-related and emotion-driven consumption [35,40]; and (c) the behavioral skills acquired through mindful eating training are portable and enduring, whereas pharmacological appetite suppression is contingent on continued medication use [6,7].A joint advisory from the American College of Lifestyle Medicine, the American Society for Nutrition, the Obesity Medicine Association, and The Obesity Society published in 2025 emphasized the importance of nutritional and lifestyle support during GLP-1 RA therapy, recommending behavioral strategies to optimize dietary quality and prevent muscle mass loss [48]. This emerging consensus aligns with the "Food Is Medicine" framework, which advocates for sustainable dietary behavior change as a necessary complement to pharmacological interventions [49].

**The Mindful Eating–Pharmacotherapy Integration Model (MEPIM):-**

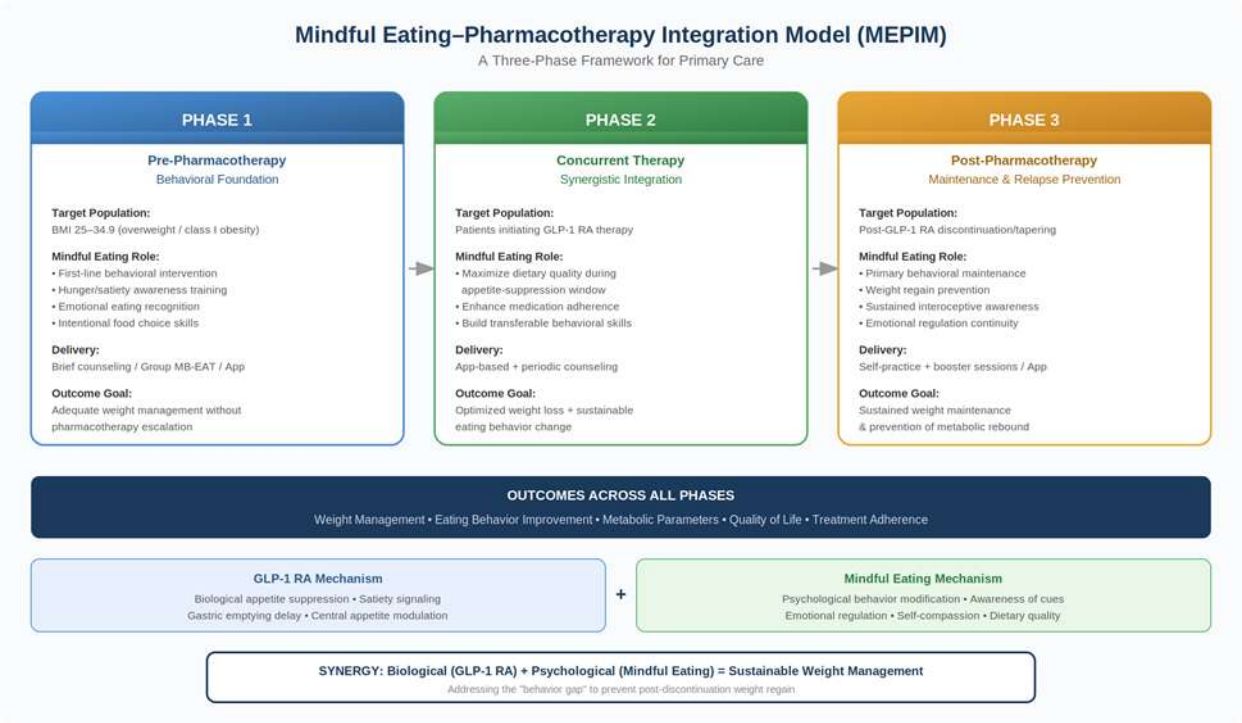
Based on the synthesized evidence, this review proposes the Mindful Eating–Pharmacotherapy Integration Model (MEPIM), a three-phase framework for incorporating mindful eating into the obesity care continuum in primary care settings (Figure 1).

**Phase 1 – Pre-Pharmacotherapy (Behavioral Foundation):** For patients presenting with overweight or class I obesity, mindful eating is introduced as a first-line behavioral intervention alongside standard lifestyle counseling. This phase establishes the foundational skills of hunger and satiety awareness, emotional eating recognition, and intentional food choice. Patients who achieve adequate weight management through behavioral strategies alone may not require pharmacotherapy escalation.

**Phase 2 – Concurrent Therapy (Synergistic Integration):** For patients initiating GLP-1 RA therapy, mindful eating is delivered concurrently to maximize dietary quality during the active weight loss phase. During this phase, the appetite-suppressive effects of GLP-1 RAs create a unique "window of opportunity" in which reduced hunger may facilitate the adoption of mindful eating practices. Mindful eating training during pharmacotherapy aims to enhance dietary quality, improve medication adherence through conscious engagement with the treatment process, and build behavioral skills that will persist beyond the pharmacotherapy period.

**Phase 3 – Maintenance and Post-Pharmacotherapy:** Following pharmacotherapy discontinuation or dose tapering, mindful eating serves as the primary behavioral strategy for weight maintenance. The skills acquired during Phases 1 and 2—interoceptive awareness, emotional regulation, conscious food choice—provide a sustainable framework for preventing weight regain. Preliminary evidence from a study presented at the European Congress on Obesity suggested that gradual GLP-1 RA dose tapering combined with lifestyle coaching (including mindful eating elements) was associated with weight stability post-discontinuation [50].

**Figure 1. The Mindful Eating–Pharmacotherapy Integration Model (MEPIM) for Primary Care.**




**Delivery Models and Digital Health Applications:-**

**Face-to-Face Programs:-**

Traditional face-to-face delivery remains the most extensively studied modality for mindful eating interventions. Group-based programs such as MB-EAT typically involve 8–12 weekly sessions of 90–120 minutes, facilitated by trained instructors [24]. These programs offer the advantages of social support, guided practice, and real-time feedback. However, they require trained facilitators, dedicated clinical time, and participant commitment to regular attendance, which may limit scalability in resource-constrained primary care settings [14].

**Digital and Health Delivery:-**

Digital delivery of mindful eating interventions represents a rapidly evolving frontier with significant implications for scalability. Matsuhisa and colleagues demonstrated the feasibility of a mindfulness mobile application (MMA) combined with a comprehensive lifestyle intervention for individuals with metabolic syndrome, with acceptable adherence rates and preliminary evidence of effectiveness [28]. App-based mindful eating programs typically offer guided audio exercises, meal logging with awareness prompts, and behavioral tracking features. The advantages of digital delivery include: (a) accessibility across geographic and socioeconomic barriers; (b) self-paced engagement accommodating individual schedules; (c) lower cost per participant compared to group programs; and (d) potential for integration with existing mHealth platforms for NCD management [15,28].Remotely delivered mindful eating interventions using pre-recorded audio files have also shown promise. A recent RCT protocol examined the effects of a two-week remotely delivered mindful eating course in conjunction with standard diet therapy for adults with overweight or obesity and comorbid anxiety, representing an innovative low-resource delivery model [51].

**Primary Care Integration Strategies:-**

For mindful eating to achieve broad clinical impact, integration into routine primary care practice is essential. Brief mindful eating interventions (5–10 minutes) can be incorporated into standard NCD screening and lifestyle counseling visits. Practical strategies include: (a) training primary care providers in brief mindful eating counseling techniques, such as the “STOP” technique (Stop before eating, Take a breath, Observe hunger level, Proceed with awareness); (b) incorporating mindful eating modules into existing chronic disease management programs; (c) utilizing printed or digital patient handouts with simple mindful eating exercises; and (d) referring patients to structured group programs or digital platforms for more intensive training [52].

**Table 3. Comparison of Delivery Models for Mindful Eating Interventions**

| Model | Format | Duration | Cost | Evidence Level | Scalability |
|---|---|---|---|---|---|
| Group (MB-EAT) | Face-to-face | 8–12 weeks | Moderate | Strong (multiple RCTs) | Limited |
| Individual counseling | Face-to-face | Variable | High | Moderate | Low |
| Mobile app | Self-guided digital | Flexible | Low | Emerging (pilot RCTs) | High |
| Telehealth | Remote (video/audio) | Variable | Low–Moderate | Emerging | High |
| Brief primary care | In-clinic | 5–10 min/visit | Minimal | Limited | Very High |
| Hybrid (group + app) | Blended | Variable | Moderate | Limited | Moderate–High |

## Discussion:-

### Evidence Synthesis:-

This narrative review reveals a convergent body of evidence supporting the role of mindful eating as a viable behavioral strategy for weight management. The evidence converges on several key findings: (a) mindful eating interventions produce weight loss comparable to conventional dietary restriction, despite not prescribing caloric limitation [42]; (b) the primary strength of mindful eating lies in its superior effects on eating behavior modification, particularly emotional eating, binge eating, and external eating [39,40,43]; (c) neurobiological evidence supports plausible mechanisms through prefrontal cortex engagement, reward pathway modulation, and cortisol reduction [29–31]; and (d) the transferable, skill-based nature of mindful eating provides a theoretical advantage for long-term maintenance compared to pharmacotherapy-dependent approaches [6,7].

### Limitations of Current Evidence:-

Several limitations must be acknowledged. First, considerable heterogeneity exists across mindful eating interventions in terms of content, duration, intensity, and theoretical orientation, complicating direct comparisons [23]. Second, many RCTs are underpowered, with sample sizes often below 100 participants per arm [14]. Third, follow-up periods are typically short, with the majority of studies assessing outcomes at 12 weeks to 6 months; long-term data beyond 12 months are scarce [23,45]. Fourth, the measurement of mindful eating is inconsistent, with different studies employing MEQ, MES, or IES-2, each capturing somewhat different constructs [21,22]. Fifth, the evidence base is predominantly derived from Western, high-income populations, with limited data from LMICs and Asian contexts where dietary cultures and healthcare systems differ substantially [14]. Sixth, blinding is inherently challenging in behavioral intervention trials, introducing potential performance and detection bias.

### The Mepim Framework: Clinical Implications:-

The Mindful Eating–Pharmacotherapy Integration Model (MEPIM) proposed in this review addresses a critical gap in current obesity management guidelines. As GLP-1 RA therapy becomes increasingly prevalent, the need for complementary behavioral strategies to prevent post-discontinuation weight regain has never been more urgent [6–8,47]. The MEPIM framework offers primary care clinicians a structured approach to integrating mindful eating across the treatment continuum, from initial behavioral intervention through concurrent pharmacotherapy support to post-medication maintenance.The practical relevance of MEPIM is particularly significant for primary care and UHC systems in LMICs, where access to GLP-1 RA therapy may be limited by cost and availability, but where mindful eating can be delivered at minimal cost through digital platforms or brief clinical encounters. The model is also consistent with the growing emphasis on “lifestyle medicine” as a foundational pillar of chronic disease management [52].

### Future Research Directions:-

Several priority research areas emerge from this review. First, pragmatic RCTs examining the combined efficacy of mindful eating and GLP-1 RA therapy versus GLP-1 RA therapy alone are urgently needed to validate the MEPIM

framework. Second, head-to-head trials comparing mindful eating with other behavioral interventions (such as cognitive behavioral therapy for obesity) during pharmacotherapy would clarify its relative value. Third, cultural adaptation studies are needed to tailor mindful eating interventions for non-Western dietary contexts, including Southeast Asian populations. Fourth, long-term studies with follow-up periods of 24 months or more are essential to establish the durability of mindful eating effects. Fifth, cost-effectiveness analyses comparing different delivery models (group, digital, hybrid) in primary care settings would inform implementation decisions. Finally, research on digital biomarker-integrated mindful eating programs—leveraging wearable devices to provide real-time feedback on eating patterns—represents an innovative frontier.

## Conclusion:-

Mindful eating represents a clinically promising, evidence-based behavioral strategy for weight management that addresses the psychological and behavioral dimensions of obesity often overlooked by pharmacological approaches alone. The current evidence demonstrates that mindful eating produces weight outcomes comparable to conventional dietary restriction while delivering superior improvements in eating behavior traits, emotional regulation, and dietary self-awareness. In the era of GLP-1 RA pharmacotherapy, the complementarity between biological appetite suppression and behavioral eating modification creates a compelling rationale for integrated treatment approaches.

The Mindful Eating–Pharmacotherapy Integration Model (MEPIM) proposed in this review offers a structured, three-phase framework for primary care implementation, addressing the critical challenges of weight regain following pharmacotherapy discontinuation and the need for sustainable, scalable behavioral strategies. As obesity management evolves toward multimodal, patient-centered care, mindful eating deserves recognition as a valuable tool in the clinician's armamentarium—one that empowers patients to develop lasting awareness and control over their eating behaviors.Future research should prioritize pragmatic trials of combined mindful eating and GLP-1 RA therapy, cultural adaptation for diverse populations, and long-term follow-up studies to establish the durability of benefits. Ultimately, integrating mindful eating into routine primary care has the potential to enhance obesity treatment outcomes, reduce healthcare costs, and improve the quality of life for individuals living with obesity worldwide.

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