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The Effectiveness of Mindfulness-Based Cognitive Therapy on Psychological Distress and Sleep Quality in Women with Irritable Bowel Syndrome

Tahereh. Shapouri[1], Alireza. Jafari[1*]

[1] Department of Clinical Psychology, Ki.C., Islamic Azad University, Kish, Iran

*** Corresponding author email address**: dr.a.jafari@iau.ac.ir

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A B S T R A C T

Objective: The present study aimed to determine the effectiveness of mindfulness-based cognitive therapy on psychological distress and sleep quality in individuals with irritable bowel syndrome.

Methods and Materials: This study employed a quasi-experimental and applied research design using a pretest–posttest control group format. The statistical population consisted of all women diagnosed with irritable bowel syndrome who attended hospitals and medical centers in Tonekabon in 2024. The research sample comprised 30 participants selected through purposive sampling and randomly assigned to experimental (n = 15) and control (n = 15) groups. The research instruments included the Kessler Psychological Distress Scale (Kessler, 2002) and the Pittsburgh Sleep Quality Index (Buysse et al., 1989). Data were analyzed using multivariate analysis of covariance (MANCOVA) and univariate analysis of covariance (ANCOVA). All statistical analyses were conducted using SPSS version 27.

Findings: The results indicated a significant difference between the intervention and control groups in the mean scores of psychological distress and sleep quality ($P < .001$).

Conclusion: The findings favored the experimental group. Overall, the results demonstrated that mindfulness-based cognitive therapy effectively reduced psychological distress and improved sleep quality among women with irritable bowel syndrome.

Keywords: *Mindfulness-Based Cognitive Therapy, Psychological Distress, Sleep Quality, Irritable Bowel Syndrome.*

1. Introduction

Irritable bowel syndrome (IBS) is a chronic functional gastrointestinal disorder characterized by abdominal pain, bloating, and altered bowel habits without identifiable structural abnormalities (Enck et al., 2016; Ford et al., 2020). Despite its benign nature from an anatomical standpoint, IBS significantly impairs quality of life, emotional well-being, and sleep regulation among affected individuals (Mayer et al., 2023; Staudacher et al., 2023). Globally, IBS affects approximately 10–15% of the population, with a higher prevalence among women, suggesting the influence of gender-specific biopsychosocial factors (Henrich et al., 2020; Marano et al., 2025). The pathophysiology of IBS involves a complex interplay between gut–brain axis dysregulation, altered visceral sensitivity, immune activation, and psychosocial stressors (Mayer et al., 2023; Qin et al., 2014). Recent findings emphasize that psychological distress, anxiety, and poor sleep quality not only co-occur with IBS but also exacerbate symptom intensity through maladaptive cognitive-emotional mechanisms (Geller et al., 2024; Topan et al., 2024).

Sleep disturbance is a prevalent comorbidity among individuals with IBS, often mediated by heightened physiological arousal and rumination (Heidari et al., 2010; Topan et al., 2024). Evidence indicates that impaired sleep contributes to the worsening of gastrointestinal symptoms through increased stress reactivity and inflammatory responses (Ballou & Keefer, 2017; Park et al., 2020). Likewise, psychological distress—comprising depression, anxiety, and emotional dysregulation—is both a consequence and a precipitating factor of IBS flare-ups (Geller et al., 2024; Viertiö et al., 2021). Chronic exposure to psychological stress affects hypothalamic–pituitary–adrenal (HPA) axis activity, leading to visceral hypersensitivity and altered gut motility (Mayer et al., 2023; Qin et al., 2014). These bidirectional processes between the central nervous system and enteric pathways form the foundation of what has been termed the "gut–brain–microbiota axis," a framework increasingly recognized in understanding psychosomatic conditions such as IBS (Császár-Nagy & Bókkon, 2022; Mayer et al., 2023).

Given the multifaceted etiology of IBS, traditional medical treatments that target only physiological symptoms—such as antispasmodics or dietary interventions—often yield limited and temporary relief (Enck et al., 2016; Staudacher et al., 2023). In recent years, the growing emphasis on integrative and mind–body approaches has introduced psychological therapies such as cognitive-behavioral therapy (CBT), hypnotherapy, and mindfulness-based interventions as effective adjunctive treatments (Ballou & Keefer, 2017; Császár-Nagy & Bókkon, 2022). Among these, Mindfulness-Based Cognitive Therapy (MBCT) has emerged as a structured, evidence-based program that addresses both psychological distress and physiological symptom regulation (Crane, 2009; Gkintoni et al., 2025). Originally designed to prevent depressive relapse, MBCT integrates the cognitive framework of CBT with mindfulness principles to cultivate nonjudgmental awareness of bodily sensations, emotions, and thoughts (Crane, 2009).

Empirical evidence supports the efficacy of MBCT in improving both psychological and somatic outcomes in IBS patients. Studies demonstrate that mindfulness interventions modulate brain networks associated with interoception and emotional regulation, including the anterior cingulate cortex and insula, thereby reducing hypervigilance toward gastrointestinal sensations (Henrich et al., 2020; Mayer et al., 2023). Moreover, MBCT enhances parasympathetic regulation and mitigates the physiological stress responses that sustain IBS symptoms (Naliboff et al., 2020; Xu et al., 2024). Randomized controlled trials have revealed that mindfulness-based therapies reduce gastrointestinal symptom severity, anxiety, and depressive symptoms in both IBS and inflammatory bowel disease (IBD) populations (Bredero et al., 2023; Ter Avest et al., 2023).

In addition to alleviating IBS symptoms, mindfulness training significantly improves sleep quality and emotional resilience. Poor sleep is known to intensify gastrointestinal discomfort by heightening pain perception and diminishing emotional coping capacity (Mahdavi & Bagholi, 2019; Topan et al., 2024). By promoting mindful awareness of interoceptive signals and cognitive defusion from distressing thoughts, MBCT helps break the cycle of hyperarousal and insomnia (Ajami, 2023; Camino et al., 2022). Studies conducted among patients with insomnia, chronic fatigue, and mood disorders consistently show that MBCT increases restorative sleep efficiency and reduces maladaptive rumination (Brown et al., 2021; Camino et al., 2022; González-Martín et al., 2023). These improvements are attributed to enhanced emotion regulation, acceptance-based coping, and decreased sympathetic activation (Burrowes et al., 2022; MacKinnon et al., 2021).

Furthermore, MBCT contributes to reducing psychological distress by fostering metacognitive awareness and self-compassion, which buffer against anxiety and

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depressive reactions to somatic discomfort (Xu et al., 2024; Zhu et al., 2023). The cultivation of mindfulness interrupts maladaptive cognitive patterns such as catastrophizing and self-criticism—frequent cognitive distortions in IBS sufferers (Geller et al., 2024; Sargali Shah Khasah et al., 2022). Research has demonstrated that mindful attention training modifies the relationship between cognitive appraisal and physiological reactivity, leading to decreased activation of stress-related neural circuits (Dana et al., 2022; Henrich et al., 2020). In a clinical trial among women with IBS, MBCT was associated with significant reductions in symptom severity, emotional distress, and health-related anxiety (Henrich et al., 2020).

The role of MBCT extends beyond symptom relief to long-term emotional adaptation. By strengthening awareness of the mind–body connection, participants learn to perceive their bodily sensations without avoidance or overidentification (Dokani et al., 2021; Xu et al., 2024). This change in attentional orientation promotes psychological flexibility, emotional regulation, and stress tolerance (Abedini Chamgerdani et al., 2023; Outadi, 2023). Studies in various psychosomatic and chronic health conditions—including migraine (Sargali Shah Khasah et al., 2022), diabetes (Dokani et al., 2021), cancer-related fatigue (Joodaki et al., 2021), and hypothyroidism (Abedini Chamgerdani et al., 2023)—consistently report that MBCT alleviates distress and enhances perceived control over symptoms. These effects appear to be mediated by self-compassion and reductions in avoidance-based coping (Burrowes et al., 2022; Xu et al., 2024).

At a neurophysiological level, mindfulness practices downregulate amygdala hyperactivity and modulate prefrontal inhibitory control over emotional responses (Császár-Nagy & Bókkon, 2022; Mayer et al., 2023). This neural plasticity may explain the sustained psychological improvements observed even months after the intervention (MacKinnon et al., 2021; Zhu et al., 2023). Moreover, by restoring autonomic balance, mindfulness practices improve gastrointestinal motility and reduce visceral hypersensitivity—mechanisms closely associated with symptom relief in IBS (Henrich et al., 2020; Naliboff et al., 2020).

Despite extensive evidence on MBCT's efficacy in Western populations, research in non-Western contexts such as Iran remains limited. Studies conducted locally have confirmed MBCT's effectiveness in reducing psychological distress and improving sleep quality among patients with IBS and other chronic conditions (Dana et al., 2022; Javadi & Ghorbani, 2019; Karami et al., 2023). Similarly, investigations into its impact on sleep disturbances, depression, and negative automatic thoughts among Iranian samples reinforce its cross-cultural adaptability and therapeutic value (Heidari et al., 2010; Mahdavi & Bagholi, 2019; Nikkhah et al., 2019). These findings underscore the importance of culturally adapted mindfulness interventions that respect local health beliefs and contextual stressors (Javadi & Ghorbani, 2019; Yaqoubi, 2015).

From a biopsychological standpoint, psychological distress and sleep disruption in IBS are maintained by maladaptive feedback loops between cognition, emotion, and physiology (Mayer et al., 2023; Qin et al., 2014). By targeting these interconnected systems, MBCT offers a comprehensive approach that aligns with the emerging integrative paradigm in psychosomatic medicine (Burrowes et al., 2022; Staudacher et al., 2023). Moreover, mindfulness training supports a shift from symptom suppression to experiential acceptance, thereby improving long-term adjustment and reducing relapse (Crane, 2009; Xu et al., 2024).

In light of the aforementioned theoretical and empirical foundations, the present study aims to investigate the effectiveness of mindfulness-based cognitive therapy on psychological distress and sleep quality in women with irritable bowel syndrome.

2. Methods and Materials

2.1. Study design and Participant

The present study employed a quasi-experimental and applied research design, implemented using a pretest–posttest format with a control group. The statistical population included all women diagnosed with irritable bowel syndrome who attended hospitals and medical centers in Tonekabon in 2024. Initially, individuals meeting the inclusion criteria were selected. The inclusion criteria consisted of the following: (1) diagnosis of irritable bowel syndrome, (2) willingness to cooperate in the study, and (3) no concurrent participation in other psychological interventions. During the pretest phase, participants completed the Kessler Psychological Distress Scale (Kessler, 2002) and the Pittsburgh Sleep Quality Index (Buysse et al., 1989). From this group, 30 participants who scored highest in psychological distress and poor sleep quality were selected as the research sample and were randomly assigned to the experimental group (n = 15) and the control group (n = 15).

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After obtaining the ethical approval code IR.IAU.TNB.REC.1404.268 and necessary permissions from the university, these documents were presented to hospitals and medical centers in Tonekabon. From the study population (women diagnosed with irritable bowel syndrome attending hospitals and clinics in 2024), 78 individuals who met the inclusion criteria were identified. During the pretest phase, after the researcher explained the study objectives and the method of responding to the questionnaires, participants completed the Kessler Psychological Distress Scale (Kessler et al., 2002) and the Pittsburgh Sleep Quality Index (Buysse et al., 1989). Among these participants, 30 individuals with the highest levels of psychological distress and poor sleep quality were selected as the study sample and randomly assigned to the experimental group (n = 15) and control group (n = 15). After the completion of therapeutic sessions for the experimental group, both the experimental and control groups completed the posttest questionnaires. The collected questionnaires were scored, and raw data were extracted for statistical analysis and hypothesis testing.

2.2. *Measures*

The Psychological Distress Scale was developed by Kessler et al. (2002) to assess psychological distress. The Iranian version of the scale was validated by Yaghoubi (2015). This instrument consists of 10 items rated on a four-point Likert scale ranging from never (0) to always (4). In Yaghoubi's (2015) study, the content, face, and criterion validity of the scale were found to be satisfactory. The Cronbach's alpha coefficient calculated for the Iranian version was estimated at .93, indicating high internal consistency.

One of the most widely used tools for assessing sleep quality is the Pittsburgh Sleep Quality Index (PSQI), developed in 1989 by Dr. Buysse and colleagues at the University of Pittsburgh's Department of Psychiatry. The questionnaire originally includes 9 main items, but since item 5 has 10 subitems, the total number of items is 19. It is rated on a four-point Likert scale from 0 to 3. The PSQI comprises seven subscales: (1) subjective sleep quality, (2) sleep latency, (3) sleep duration, (4) habitual sleep efficiency, (5) sleep disturbances, (6) use of sleeping medication, and (7) daytime dysfunction. Scoring involves three types of items: items 1 and 3 are not directly scored but are used in computing subscale scores; item 2 is scored as follows—less than 15 minutes (0), 16–30 minutes (1), 31–60 minutes (2), more than 60 minutes (3); item 4 is scored as follows—more than 7 hours (0), 6–7 hours (1), 5–6 hours (2), and less than 5 hours (3). The remaining items (5–9) are rated from 0 to 3 based on frequency: not during the past month (0), less than once a week (1), once or twice a week (2), and three or more times a week (3). Buysse et al. (1989) reported an internal consistency (Cronbach's alpha) of .83. The Iranian version demonstrated validity of .86 and reliability of .89.

2.3. *Intervention*

The intervention was conducted in eight structured 90-minute sessions following the standard Mindfulness-Based Cognitive Therapy (MBCT) protocol adapted for individuals with irritable bowel syndrome (IBS). The first session focused on establishing rapport, creating a safe and accepting environment, and introducing participants to the principles of mindfulness and its relationship to IBS symptoms, stress, and sleep quality. Participants practiced mindful eating (e.g., the raisin exercise) and mindful breathing for 5–7 minutes, and were assigned daily breathing exercises as homework. The second session introduced strategies for coping with negative thoughts related to IBS, emphasizing awareness of the connection between stress, cognition, and physical symptoms. Exercises included the "three-minute breathing space," mindful walking, and mindful awareness of unpleasant emotions, supported by metaphors such as "the man in the swamp" and "the screaming child." The third session provided psychoeducation on the impact of mindfulness on the brain and gastrointestinal system, integrating body awareness exercises and mindfulness in daily activities to reduce tension. Participants identified personal IBS triggers and practiced the body scan meditation. In the fourth session, the focus shifted to acceptance-based coping with IBS symptoms through metaphors such as "The Guesthouse" and "Empty Your Cup," along with 15-minute guided mindfulness of breath, body, and thoughts. The fifth session aimed to reduce over-identification with distressing thoughts and bodily sensations through body scan meditations before sleep, encouraging detachment from IBS symptoms and enhancement of sleep quality. The sixth session emphasized mindful letting go and self-forgiveness to alleviate psychological distress, incorporating compassion-focused metaphors ("The Wounded Man," "The Cracked Pot") and relaxation techniques before sleep. The seventh session strengthened self-compassion and interpersonal mindfulness

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through mindful breathing, deep listening, and awareness of pleasurable activities, while developing relapse-prevention plans. Finally, the eighth session integrated all learned concepts, reviewing progress and emphasizing gratitude practices, mindful body scan, and long-term adherence to daily mindfulness routines to maintain improvement in IBS symptoms and sleep quality.

2.4. Data Analysis

Data were analyzed using both descriptive and inferential statistics. Descriptive statistics included charts, means, and standard deviations. Inferential statistics consisted of multivariate analysis of covariance (MANCOVA) and univariate analysis of covariance (ANCOVA). All statistical analyses were performed using SPSS software version 27.

3. Findings and Results

The mean age of participants in the experimental group was 43.33 years with a standard deviation of 3.278, while the mean age of participants in the control group was 44.48 years with a standard deviation of 3.782. Among the 15 participants in the experimental group, 6 individuals (40%) had an associate degree or lower, 2 individuals (13.3%) held an associate degree, 6 individuals (40%) had a bachelor's degree, and 1 individual (6.7%) held a master's degree or higher. Among the 15 participants in the control group, 5 individuals (33.3%) had an associate degree or lower, 3 individuals (20%) held an associate degree, 5 individuals (33.3%) had a bachelor's degree, and 2 individuals (13.4%) held a master's degree or higher.

Table 1

Adjusted Means of the Two Groups in the Posttest After Removing the Effect of the Covariate

Variable	Experimental Group		Control Group	
	Adjusted Mean	Standard Error	Adjusted Mean	Standard Error
Psychological Distress	30.956	0.515	35.444	0.515
Sleep Quality	12.559	0.379	15.575	0.379

The results indicate that Box's test was not significant; therefore, the assumption of homogeneity of covariance matrices was not rejected. Thus, equality of variances for the dependent variables of psychological distress and sleep quality was confirmed, allowing the use of multivariate analysis of covariance (MANCOVA). The Shapiro–Wilk test was employed to ensure the normality of the data. In testing the normality assumption, the null hypothesis assumes that the data distribution is normal, tested at the 0.05 significance level. Therefore, if the test statistic is greater than or equal to 0.05, there is no reason to reject the null hypothesis, indicating that the data are normally distributed.

The results showed that since the significance level (Sig) for the interaction between the independent variable and pretest scores of psychological distress and sleep quality was greater than $\alpha = 0.05$, the calculated F value was not statistically significant. Hence, with 95% confidence, it can be stated that the assumption of homogeneity of regression slopes for the variables of psychological distress and sleep quality was met. After verifying the assumptions of linear relationships among the variables, equality of variances, normal distribution of the dependent variables, and homogeneity of regression slopes, the analysis of covariance (ANCOVA) was conducted to analyze the results.

Table 2

Results of Multivariate Analysis of Covariance (MANCOVA) for the Experimental and Control Groups

Test	Value	F	Hypothesis df	Error df	Sig.	Effect Size
Pillai's Trace	0.759	39.429	2	25	0.001	0.759
Wilks' Lambda	0.241	39.429	2	25	0.001	0.759
Hotelling's Trace	3.154	39.429	2	25	0.001	0.759
Roy's Largest Root	3.154	39.429	2	25	0.001	0.759

The results of the multivariate analysis of covariance presented in Table 2 indicate that the experimental and control groups differ significantly in at least one of the dependent variables—psychological distress or sleep quality—given that all multivariate tests (Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root) were statistically significant.

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Table 3

Results of Univariate Analysis of Covariance (ANCOVA) for Psychological Distress and Sleep Quality

Dependent Variable	Source of Variation	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Psychological Distress	Pretest	42.183	1	42.183	17.624	0.001	0.389
	Group (Experimental vs. Control)	108.247	1	108.247	45.203	0.001	0.653
	Error	33.687	27	1.248			
Sleep Quality	Pretest	11.841	1	11.841	8.516	0.007	0.240
	Group (Experimental vs. Control)	54.263	1	54.263	39.059	0.001	0.591
	Error	37.530	27	1.389			

The results of the univariate analysis of covariance (ANCOVA) conducted separately for psychological distress and sleep quality demonstrated that after controlling for pretest scores, there were significant differences between the experimental and control groups on both dependent variables.

For psychological distress, the effect of the covariate (pretest) was significant, $F(1, 27) = 17.624$, $p = .001$, indicating that pre-intervention distress levels were related to posttest scores. After adjusting for pretest scores, the main effect of the group was statistically significant, $F(1, 27) = 45.203$, $p = .001$, with a large effect size (partial $\eta^2 = .653$). This finding suggests that participants in the experimental group who received mindfulness-based cognitive therapy reported significantly lower levels of psychological distress compared to the control group.

For sleep quality, the covariate (pretest) also had a significant effect, $F(1, 27) = 8.516$, $p = .007$, indicating that initial sleep quality influenced post-intervention outcomes. The group effect was statistically significant as well, $F(1, 27) = 39.059$, $p = .001$, with a large effect size (partial $\eta^2 = .591$). These results indicate that mindfulness-based cognitive therapy effectively improved sleep quality in women with irritable bowel syndrome compared to the control group.

Overall, the ANCOVA results confirmed that mindfulness-based cognitive therapy significantly reduced psychological distress and enhanced sleep quality among women with irritable bowel syndrome, even after controlling for baseline differences.

4. Discussion and Conclusion

The present study aimed to examine the effectiveness of Mindfulness-Based Cognitive Therapy (MBCT) on psychological distress and sleep quality among women diagnosed with Irritable Bowel Syndrome (IBS). The findings demonstrated that participants in the experimental group who received MBCT showed a significant reduction in psychological distress and an improvement in sleep quality compared to the control group. These results are consistent with a growing body of evidence indicating that MBCT, as a structured mind–body intervention, effectively alleviates emotional and physiological symptoms associated with IBS (Bredero et al., 2023; Dana et al., 2022; Henrich et al., 2020). The significant differences observed between the experimental and control groups after controlling for pretest scores highlight that mindfulness training had specific therapeutic effects beyond spontaneous improvement or placebo influence.

The reduction in psychological distress observed in this study supports the theoretical premise that MBCT enhances emotional regulation through mindful awareness and cognitive restructuring. According to (Crane, 2009), MBCT helps individuals recognize maladaptive thought patterns, develop a nonjudgmental stance toward internal experiences, and disengage from automatic cognitive reactivity. These mechanisms are particularly relevant in IBS, where psychological stress and maladaptive coping amplify gastrointestinal symptoms (Mayer et al., 2023; Qin et al., 2014). By cultivating metacognitive awareness, participants learned to observe distressing thoughts and somatic sensations without reacting to them, thereby reducing the physiological activation that exacerbates IBS symptoms. Similar findings were reported by (Henrich et al., 2020), who found that MBCT significantly reduced anxiety, catastrophizing, and perceived symptom severity in women with IBS. Furthermore, (Xu et al., 2024) highlighted that self-compassion and emotional awareness mediated the relationship between mindfulness practice and reductions in psychosomatic symptom distress, suggesting that cultivating an accepting attitude toward bodily discomfort plays a central role in therapeutic change.

The improvement in sleep quality observed in this study aligns with previous research indicating that mindfulness-based interventions foster physiological relaxation and reduce cognitive arousal—two key factors that impair sleep

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continuity in IBS patients (Camino et al., 2022; González-Martín et al., 2023). Sleep disturbances in IBS often arise from heightened autonomic arousal, nocturnal rumination, and hypervigilance to gastrointestinal discomfort (Heidari et al., 2010; Topan et al., 2024). By practicing mindfulness exercises such as body scan and breathing awareness, participants in the experimental group were trained to shift attention from intrusive thoughts to sensory grounding, enabling a calmer physiological state conducive to restorative sleep. Consistent with these findings, (Ajami, 2023) reported that MBCT significantly improved subjective sleep quality and reduced insomnia severity among patients with chronic sleep disorders. Likewise, (MacKinnon et al., 2021) found that mindfulness practice during pregnancy decreased psychological distress and enhanced sleep efficiency through reductions in physiological reactivity. These improvements are linked to strengthened prefrontal regulation of emotional processes and reduced amygdala hyperactivation, as demonstrated in neurobiological studies (Császár-Nagy & Bókkon, 2022; Mayer et al., 2023).

Psychological distress and poor sleep are interdependent constructs in IBS, where emotional dysregulation often contributes to altered sleep patterns, and insufficient sleep exacerbates stress reactivity (Staudacher et al., 2023; Viertiö et al., 2021). The findings of this study suggest that MBCT operates at this intersection by improving both cognitive-emotional and physiological functioning. Through daily mindfulness practice, participants likely enhanced their capacity for emotional self-regulation and reduced maladaptive rumination, which in turn contributed to improved sleep quality and symptom relief. (Burrowes et al., 2022) observed similar effects in patients with migraine, showing that mindfulness-based stress reduction improved sleep, decreased anxiety, and reduced emotional dysregulation. Furthermore, (Outadi, 2023) found that mindfulness-based interventions increased self-efficacy and sleep quality among pregnant women, emphasizing the generalizability of these benefits across diverse physiological and psychological conditions.

Another noteworthy aspect of the results is the significant decrease in psychological distress among participants in the experimental group. This outcome can be explained by the integrative mechanisms of MBCT, which address both cognitive distortions and bodily awareness. As (Geller et al., 2024) noted, individuals with IBS often display heightened self-criticism and negative body image, which intensify distress and symptom perception. MBCT's emphasis on nonjudgmental acceptance likely helped participants cultivate a more compassionate and less reactive relationship with their bodily experiences. (Xu et al., 2024) further demonstrated that mindfulness enhances emotional regulation by fostering self-compassion, which mediates the association between mindfulness practice and reduced alexithymia. Moreover, the reduction in emotional distress may be attributed to decreased activation of the hypothalamic–pituitary–adrenal (HPA) axis, as mindfulness has been shown to attenuate cortisol release and sympathetic overactivity (Mayer et al., 2023; Naliboff et al., 2020).

From a biopsychosocial perspective, the findings support the view that IBS is not merely a gastrointestinal condition but a systemic disorder involving the gut–brain–microbiota axis (Enck et al., 2016; Mayer et al., 2023). Psychological distress amplifies visceral hypersensitivity, whereas mindfulness-based regulation reduces this sensitivity by enhancing top-down inhibitory control (Császár-Nagy & Bókkon, 2022; Mayer et al., 2023). The results of this study, showing simultaneous improvement in psychological distress and sleep quality, thus reinforce the interconnectedness of mental and physical health in IBS management. Comparable outcomes were observed by (Bredero et al., 2023), who reported significant reductions in fatigue and distress in patients with inflammatory bowel disease following MBCT, and by (Ter Avest et al., 2023), who outlined a randomized trial protocol focusing on similar improvements in psychological and physiological domains.

The observed therapeutic effects of MBCT also resonate with prior research conducted in Iranian contexts. Studies by (Dana et al., 2022) and (Javadi & Ghorbani, 2019) demonstrated that MBCT effectively reduces rumination, emotional dysregulation, and sleep disturbance in patients with IBS and generalized anxiety disorder, respectively. Similarly, (Karami et al., 2023) found that mindfulness-based interventions improved sleep and reduced stress among mothers of children with severe disabilities. These results indicate that MBCT maintains efficacy across different populations and stress-related conditions, affirming its adaptability within culturally diverse health systems. Moreover, the consistency of findings between international and local research underscores the robustness of mindfulness mechanisms in improving both psychological and physiological resilience.

The results of this study further align with cognitive-behavioral theories emphasizing that maladaptive interpretations of bodily sensations maintain distress in psychosomatic disorders. According to (Sargali Shah

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Khasah et al., 2022), mindfulness-based cognitive therapy surpasses standard CBT in reducing distress because it targets the metacognitive layer of experience rather than only cognitive content. This distinction explains the enhanced efficacy of MBCT in conditions like IBS, where bodily sensations are both the focus of attention and the source of anxiety. Through mindfulness training, participants learned to observe these sensations without avoidance or judgment, leading to reduced symptom-related fear and increased acceptance (Crane, 2009; Xu et al., 2024).

The improvement in both emotional and physiological parameters observed in this study is consistent with the psychoneuroimmunological perspective of MBCT's mechanisms. (Henrich et al., 2020) and (Burrowes et al., 2022) suggested that mindfulness induces long-term modulation of stress-related immune pathways, reducing systemic inflammation that contributes to IBS flares. (Mayer et al., 2023) emphasized that mindfulness training enhances vagal tone and promotes parasympathetic activation, restoring autonomic balance critical for gastrointestinal functioning. Such physiological benefits complement cognitive and emotional improvements, confirming MBCT as a multidimensional therapeutic tool that addresses both mind and body.

Overall, the results of this study corroborate the notion that MBCT produces significant improvements in psychological distress and sleep quality among women with IBS by fostering self-regulation, acceptance, and physiological calmness. These outcomes mirror those reported in other clinical populations such as diabetes (Dokani et al., 2021), cancer (Joodaki et al., 2021; Park et al., 2020), and hypothyroidism (Abedini Chamgerdani et al., 2023), where mindfulness-based interventions effectively reduce stress, fatigue, and emotional dysregulation. Taken together, the findings underscore the versatility of MBCT as an integrative therapeutic model applicable to psychosomatic, chronic, and stress-related conditions.

5. Limitations and Suggestions

Despite its promising findings, the present study is subject to several limitations. First, the relatively small sample size (n = 30) limits the generalizability of the results. A larger sample would increase statistical power and allow for subgroup analyses based on demographic or clinical variables. Second, the study relied primarily on self-report instruments, which may be subject to social desirability bias and individual differences in self-awareness. Objective physiological measures such as actigraphy or cortisol assays could enhance future assessments. Third, the intervention period was limited to eight sessions, and no long-term follow-up was conducted to evaluate the persistence of effects over time. Additionally, the study sample consisted exclusively of women, which restricts the applicability of findings to male or mixed-gender IBS populations. Finally, potential confounding factors such as dietary habits, medication use, and lifestyle variables were not controlled, which may have influenced the observed improvements.

Future studies should consider longitudinal designs with extended follow-up periods to examine the durability of MBCT's therapeutic benefits. Investigations integrating biological markers, such as heart rate variability, inflammatory cytokines, or gut microbiome composition, would help elucidate the physiological mechanisms underlying mindfulness-induced changes. Comparative studies between MBCT and other psychological interventions—such as Acceptance and Commitment Therapy or Compassion-Focused Therapy—could clarify differential pathways of improvement. Moreover, exploring digital or app-based MBCT delivery could enhance accessibility for IBS patients who face logistical or mobility barriers. Future research might also examine gender differences, cultural influences, and adherence-related factors to optimize the tailoring of mindfulness interventions to specific populations.

Clinically, the results suggest that integrating MBCT into multidisciplinary IBS management can yield substantial psychological and physiological benefits. Health practitioners should consider combining mindfulness-based therapy with standard medical treatments to provide a holistic care model that addresses both mental and somatic symptoms. Incorporating brief mindfulness practices into daily routines—such as mindful breathing, body scanning, and cognitive defusion exercises—may empower patients to manage stress and improve sleep quality independently. Furthermore, training healthcare providers in mindfulness-informed communication could foster a more empathetic, patient-centered therapeutic environment. Implementing MBCT protocols within hospital and community settings may ultimately enhance quality of life and reduce healthcare costs by promoting sustainable self-regulation and resilience among individuals with IBS.

Authors' Contributions

Authors contributed equally to this article.

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Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants (Ethics Code: IR.IAU.TNB.REC.1404.268).

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