

Effect of Mindfulness Based Cognitive Therapy on Emotion Regulation and Self-Esteem

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Abstract

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by elevated blood glucose levels, primarily due to insulin resistance and relative insulin deficiency. Effective management of T2DM requires a multifaceted approach, including lifestyle modifications such as diet and exercise. This study explores the impact of Mindfulness-Based Cognitive Therapy (MBCT) on emotion regulation and self-esteem among patients with T2DM. The objectives include assessing and comparing pre- and post-intervention changes, determining the therapeutic effectiveness of MBCT, examining interrelationships among variables, and analysing the influence of demographic factors.

Background:

Method: A quantitative true experimental design was employed. A total of 60 T2DM patients were selected using simple random sampling (lottery method) and divided into an experimental group and a control group of 30 patients respectively. Data were collected using a demographic proforma, Emotion regulation scale, and the Rosenberg self-Esteem Scale.

Results: The findings revealed significant improvements in the experimental group compared to the control group in emotion regulation and self-esteem. These outcomes were statistically supported by paired t-test results ($p < 0.001$).

Conclusion: The study concludes that Mindfulness-Based Cognitive Therapy significantly enhances psychological well-being, including emotion regulation and self-esteem in patients with type II diabetes mellitus.

Keywords: Type 2 Diabetes Mellitus, Mindfulness-Based Cognitive Therapy, Emotion Regulation and Self-Esteem.

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Introduction

Diabetes mellitus (DM) comprises a group of prevalent metabolic disorders characterized by impaired glucose utilization and increased endogenous glucose production. Among these, type 2 diabetes mellitus (T2DM) is particularly associated with elevated risks of both microvascular complications—such as retinopathy, nephropathy, and neuropathy—and macrovascular comorbidities including cardiovascular disease. These complications largely stem from chronic hyperglycemia and components of insulin resistance within the broader metabolic syndrome. The pathophysiology of T2DM involves complex disturbances in glucose homeostasis, arising

from the combined impact of environmental factors—such as obesity, poor dietary habits, and sedentary lifestyles—and genetic predispositions (1).

Globally, the prevalence of diabetes has shown a persistent upward trend. According to the International Diabetes Federation (IDF), nearly 500 million individuals worldwide currently live with diabetes, a figure projected to rise by over 30% by 2045 (2). The World Health Organization (WHO) previously estimated the global diabetic population at 171 million in 2000, with projections suggesting a rise to 366 million by 2030. By 2035, approximately 10% of the global population is expected to be affected. In India,

the burden is especially high, with 50.8 million cases reported in 2010, and projections indicating an increase to 87 million by 2030 and 123.5 million by 2040.

Psychological stress is increasingly recognized as both a precursor and consequence of chronic physical illnesses, including T2DM. Stress has been identified not only as a risk factor for the development of diabetes but also as a prognostic determinant in disease progression (3). Various social and psychological factors significantly influence diabetes management and long-term glycemic control. Among these, cognitive emotion regulation remains one of the most understudied psychological domains in diabetes research (4).

Diabetes management extends beyond pharmacologic treatment and dietary adherence, requiring ongoing self-regulation that can impose a significant emotional burden. This burden, often referred to as diabetes distress, encompasses the psychological toll of managing a chronic illness (5). Estimates suggest that 20–40% of individuals with diabetes experience emotional distress, which adversely affects adherence to self-care routines (6). Common manifestations include depression, anxiety, low self-esteem, and diabetes-specific stress—contributing to a vicious cycle in which poor emotional regulation leads to suboptimal glycemic control, which in turn exacerbates psychological distress. Emotional regulation, and self-esteem are interrelated through psycho neuroendocrine mechanisms, such that improvements in one domain can beneficially influence the others (6).

Mindfulness has emerged as a promising therapeutic strategy for improving emotional regulation, and self-esteem. Neurobiological studies have demonstrated that mindfulness reduces activity in the amygdala—thereby attenuating stress responses—while enhancing engagement of the prefrontal cortex and anterior cingulate cortex to facilitate better emotional regulation. It also modulates the default mode network to decrease rumination and activates the insula to enhance self-awareness, collectively promoting improved behavioral regulation and diabetes self-management (7).

Cognitive-emotion regulation refers to a specific form of coping that entails the deliberate, conscious processing of emotional experiences. As individuals navigate life events, their emotional responses are shaped by the cognitive interpretations they assign to these experiences. Thus, effective emotion regulation hinges on the dynamic interplay between cognitive appraisal and emotional reactivity, enabling individuals to respond adaptively to stressful or adverse situations (8). Emotion regulation encompasses the processes through which individuals

monitor, evaluate, and adjust their emotional states, and is widely recognized as a critical component of psychological resilience. This regulatory capacity supports mental well-being and equips individuals with the necessary tools to manage life's challenges and psychological stressors effectively.

Mindfulness-Based Cognitive Therapy (MBCT) is an empirically supported psychological intervention that combines the core elements of cognitive behavioral therapy with mindfulness meditation practices. This integrative approach has been shown to produce significant benefits in enhancing self-esteem, strengthening emotional regulation capacities, and improving glycemic control, particularly in individuals coping with chronic conditions such as type 2 diabetes mellitus (9). Numerous studies have documented the positive impact of mindfulness-based interventions on mental health outcomes and overall psychological well-being among diabetic populations (10). As these interventions have gained widespread acceptance and accessibility, they are increasingly viewed as promising strategies for addressing the psychosocial dimensions of chronic disease management (11). However, despite the growing body of literature, research findings remain somewhat inconsistent regarding the extent to which mindfulness-based interventions can reliably improve both psychological well-being and glycemic outcomes in patients with diabetes (12).

To date, there is a paucity of research specifically examining the impact of MBCT on emotion regulation and self-esteem in patients with T2DM. Addressing this gap, the present study aims to evaluate the therapeutic effectiveness of MBCT in improving these three key outcomes among individuals diagnosed with type 2 diabetes mellitus.

Methods

Study Design and Setting

This study employed a quantitative research approach utilizing a true experimental design to evaluate the effects of Mindfulness-Based Cognitive Therapy (MBCT) on emotion regulation and self-esteem among patients with type 2 diabetes mellitus. The study was conducted at Chettinad Hospital and Research Institute, Tamil Nadu, India.

Population, Sampling Technique, and Sample Size

The study population comprised patients diagnosed with type 2 diabetes mellitus attending the outpatient diabetic clinic at Chettinad Hospital and Research Institute. A total of 60 participants were selected using simple random sampling, specifically the lottery method. Participants were randomly assigned to either the experimental group or the control group of 30 patients respectively, based on pre-determined sample size calculations.

Inclusion and Exclusion Criteria of the Study

Inclusion criteria:

- Male and female patients aged between 35 and 60 years
- Diagnosed with type 2 diabetes mellitus
- Literate in either Tamil or English

Exclusion criteria:

- Patients with type 1 or gestational diabetes
- Individuals with significant diabetic complications (e.g., nephropathy, neuropathy, proliferative retinopathy)
- Patients with major comorbid conditions or diagnosed with mental health disorders
- Individuals with prior or current experience in mindfulness-based practices

Research Instruments

A structured questionnaire was developed based on established literature and organized into three sections: Section A: Demographic and clinical data (age, gender, marital status, income, education, occupation, duration of illness, comorbidities). Section B: Emotion regulation evaluated using the 10-item Emotion Regulation Questionnaire by Gross and John (2003), measuring two dimensions: cognitive reappraisal and expressive suppression, rated on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree). Section C: Self-esteem measured using the Rosenberg Self-Esteem Scale (1965), a 10-item scale assessing global self-worth through positive and negative self-evaluations, scored on a 4-point Likert scale, with higher scores indicating greater self-esteem.

Data Collection Procedure

Participants were recruited through structured interviews conducted at Chettinad Hospital and Research Institute. Baseline assessments for emotion regulation and self-esteem were conducted for both groups. The experimental group received an MBCT intervention, beginning with a one-hour orientation session, followed by the distribution of practice booklets and instructional videos. Reinforcement sessions were conducted at the 2nd and 4th weeks to support continued engagement. The control group received only standard hospital care. Post-intervention assessments were carried out after three months for both groups. The study procedures did not interfere with participants' routine medical care. The duration of the study was from October 2023- October 2024.

Intervention Protocol

The MBCT intervention began with a one-hour, in-person introductory session. Participants were then provided with MBCT manuals and video-based instructions to support independent practice. The program consisted of seven sessions delivered over a three-month period. Additional reinforcement was provided via WhatsApp and telephone follow-ups on alternate days. Two formal reinforcement sessions

were scheduled at the 2nd and 4th weeks to monitor progress and ensure compliance with the intervention.

Statistics and Data Analysis

Data analysis was conducted using Microsoft Excel and IBM SPSS Statistics version 25 (Chicago, USA). Descriptive statistics—including frequencies, percentages, means, and standard deviations—were calculated to summarize participant characteristics and baseline variables. For inferential statistical analysis, multiple tests were employed to evaluate the effectiveness of the intervention. Paired t-tests were used to assess within-group differences between pre- and post-intervention measurements. Independent t-tests evaluated between-group differences. Chi-square tests examined associations between categorical variables, while Pearson's correlation coefficient was utilized to assess relationships among continuous variables, emotion regulation and self-esteem.

Results

This true experimental study assessed the effectiveness of Mindfulness-Based Cognitive Therapy (MBCT) in improving emotion regulation, and self-esteem among patients with Type II Diabetes Mellitus.

1. Frequency and Percentage Distribution of Demographic Variables

The analysis of demographic characteristics revealed several notable trends among participants in both the experimental and control groups. Age-wise, a majority (60%) of participants were over 50 years old. In terms of gender distribution, female participants predominated, comprising 53% of the control group and 60% of the experimental group. Educational attainment varied, with primary education being the most common overall (40%), although the experimental group demonstrated higher academic achievement, with 34% having completed higher secondary education. Regarding marital status, most participants were married—80% in the control group and 73% in the experimental group—while the divorce rate was slightly higher in the experimental group (7%). Income disparities were evident, as 60% of the control group reported earnings below ₹50,000 per month, compared to 47% of the experimental group who earned above this level. Family structure data indicated that nuclear families were predominant in both groups, with 60% in the control group and 63% in the experimental group. Employment rates were equal across groups at 40%; however, 34% of the experimental group reported being engaged in business, suggesting a higher degree of entrepreneurial activity.

2. Pre-Post Frequency and Percentage Distribution of Emotion Regulation, and Self-Esteem

Post-intervention analysis revealed significant improvements in the experimental group, highlighting

the effectiveness of Mindfulness-Based Cognitive Therapy (MBCT) in managing Type 2 Diabetes Mellitus (T2DM). In terms of emotion regulation, the control group demonstrated only modest progress—low regulation levels declined from 80% to 53%, while average regulation increased slightly from 20% to 27%. In contrast, the experimental group experienced notable improvements: high regulation levels rose from 0% to 10%, low regulation dropped from 50% to 20%, and average regulation remained consistent at 30%. Changes in self-esteem were also significant. The control group experienced a decline, with low self-esteem increasing from 57% to 87% and normal self-esteem falling from 27% to 13%. Conversely, the experimental group saw a marked enhancement—high self-esteem rose from 0% to 16.6%, normal self-esteem increased from 33% to 66.6%, and low self-esteem declined sharply from 67% to 16.6%.

3. Pre-Test and Post-Test Scores Within Groups

Paired *t*-test analyses revealed contrasting outcomes between the control and experimental groups. In the control group, there were no statistically significant changes observed from baseline to follow-up in emotion regulation and self-esteem ($p > 0.05$). These findings suggest that routine care alone had a limited impact on improving psychological parameters in patients with Type II Diabetes Mellitus (T2DM). In contrast, the experimental group demonstrated statistically significant improvements across all key measures following the Mindfulness-Based Cognitive Therapy (MBCT) intervention. Notably, there were significant gains in emotion regulation and self-esteem, both achieving $p < 0.001$. These results affirm the effectiveness of MBCT as a complementary intervention for improving mental health status in individuals managing T2DM.

Discussion

Demographic Characteristics of the Study Population

The demographic profile of participants in this study reveals several notable patterns that are consistent with existing epidemiological data on Type II Diabetes Mellitus (T2DM). The majority of participants across both groups were aged above 50 years (60%), highlighting the age-related risk associated with T2DM. This aligns with global and national trends, where advancing age is recognized as a major non-modifiable risk factor for diabetes onset and progression.

Gender distribution indicated a female predominance in both the Control (53%) and Experimental (60%) groups. While diabetes prevalence is often slightly higher in males globally, cultural and healthcare access factors may account for increased female participation in this study, particularly within the

Indian context where women may more actively engage in hospital-based intervention programs.

Educational status showed substantial variation between the two groups. Although primary education was most prevalent overall (40%), a greater proportion of participants in the Experimental group had attained higher secondary education (34%). This disparity may have contributed to better engagement and responsiveness to the mindfulness-based cognitive therapy (MBCT), as higher education levels are often associated with improved health literacy and adherence to psychosocial interventions.

Marital status patterns were largely comparable, with married individuals comprising the majority in both groups (Control: 80%, Experimental: 73%). The slightly higher divorce rate in the Experimental group (7%) may warrant further exploration, as psychosocial stressors such as marital dissolution are known to impact diabetes management and mental well-being.

Income distribution revealed marked socioeconomic differences. A majority of the Control group (60%) reported monthly earnings below ₹50,000, while nearly half of the Experimental group (47%) reported income above this threshold. This relative economic advantage in the Experimental group could potentially influence health-seeking behaviours, dietary choices, and stress levels, thereby impacting intervention outcomes.

Family structure analysis showed a predominance of nuclear families in both groups (Control: 60%; Experimental: 63%). The nuclear setup may influence levels of social support and autonomy in disease management, factors which are especially relevant in self-regulation-based therapies such as MBCT.

Occupational status was balanced in terms of employment rate (40% in both groups), yet the Experimental group exhibited higher entrepreneurial activity, with 34% engaged in business. This occupational variation could correlate with different lifestyle patterns, work-related stress, and flexibility in attending intervention sessions—all of which may affect intervention adherence and outcomes.

Collectively, these demographic insights provide essential context for interpreting the study's clinical and psychological findings, highlighting how age, education, income, and occupation may intersect with treatment efficacy in chronic illness populations.

Psychological Outcomes: Emotion Regulation and Self-Esteem

Emotion regulation improved substantially, with the proportion of individuals reporting low regulation decreasing from 50% to 20%, and those achieving high regulation increasing from 0% to 10%. Self-esteem outcomes mirrored this trend: normal self-esteem doubled (from 33% to 66.6%), while low self-esteem declined from 67% to 16.6%. These

enhancements underscore MBCT's capacity to foster cognitive flexibility and self-worth—key constructs in chronic illness adaptation and behavioural change. These findings are supported by the work of Ardeshirpey et al. (2019), who demonstrated that MBCT significantly improves emotion regulation in individuals with T2DM. Additionally, the ICMR-INDIAB study (2011) highlights the importance of psychosocial interventions tailored to demographic characteristics in effectively addressing the multifaceted nature of diabetes management.

In sum, the evidence from this study strongly supports the integration of MBCT into standard T2DM care protocols. In the psychological dimensions of diabetes, MBCT presents a holistic, patient-centred approach capable of enhancing overall treatment efficacy and improving quality of life for individuals living with T2DM.

Pre-Test and Post-Test Comparisons Within Groups: Emotion Regulation, and Self-Esteem

The within-group analysis revealed that the experimental group, which underwent Mindfulness-Based Cognitive Therapy (MBCT), exhibited statistically significant ($p < 0.05$). Notably, enhancements in emotion regulation and self-esteem. These outcomes collectively underscore MBCT's dual efficacy in addressing psychological burdens of Type II Diabetes Mellitus (T2DM).

The observed improvements are consistent with previous research. Ardeshirpey et al. (2019) similarly reported significant gains in cognitive emotion regulation following MBCT in T2DM patients. The divergence from findings such as those of Kurniyawan et al. (2023)—which showed non-significant effects on self-empowerment and coping ($p = 0.086$)—suggests that MBCT may operate through unique mechanisms, particularly those rooted in neurocognitive restructuring and stress modulation.

Conversely, the control group's lack of statistically significant improvement in measured domains—emotion regulation ($p > 0.05$) and self-esteem ($p > 0.05$), reinforces existing evidence that conventional diabetes management alone may be insufficient to elicit meaningful psychological gains. This stagnation aligns with findings from previous research indicating that standard care tends to maintain rather than improve metabolic and psychosocial outcomes in patients with Type II Diabetes Mellitus (T2DM). Notably, several studies emphasize the necessity of structured, evidence-based interventions—particularly those that incorporate behavioral or educational components—to achieve significant and sustained improvements in emotional well-being, especially among individuals with poorly controlled diabetes (van Son et al., 2013; Rosenzweig et al., 2007). These findings highlight the critical need for integrative

approaches, such as Mindfulness-Based Cognitive Therapy (MBCT), which actively engage patients in self-regulation and adaptive coping strategies beyond the pharmacological and dietary focus of traditional treatment protocols.

The collective evidence positions Mindfulness-Based Cognitive Therapy (MBCT) as a particularly promising and multidimensional intervention for the management of Type 2 Diabetes Mellitus (T2DM). By addressing psychological constructs like emotion regulation and self-esteem, MBCT targets several interrelated pathways involved in diabetes progression and self-management. These findings underscore the growing recognition of the biopsychosocial model in chronic disease care and highlight the necessity of integrating structured, evidence-based psychological interventions into conventional diabetes treatment protocols. Incorporating MBCT into standard care may enhance therapeutic outcomes, foster patient engagement, and ultimately contribute to more holistic and sustainable diabetes management.

Extant research demonstrates that Mindfulness-Based Cognitive Therapy (MBCT) facilitates emotional regulation in patients with Type 2 Diabetes Mellitus (T2DM) through well-defined neurocognitive mechanisms. Specifically, MBCT has been shown to attenuate amygdala hyperreactivity to stress and enhance inhibitory control via prefrontal cortical activation (Hölzel et al., 2011; Taren et al., 2015). Additionally, it reduces hyperactivity within the default mode network (DMN), thereby interrupting maladaptive rumination processes. These neurobiological changes have been associated with a 30–40% reduction in symptoms of depression and anxiety (Brewer et al., 2011; Creswell et al., 2016). Collectively, such neural adaptations foster improved psychological resilience, which in turn supports diabetes self-management.

An expanding body of evidence supports Mindfulness-Based Cognitive Therapy (MBCT) as a comprehensive intervention for managing Type 2 Diabetes Mellitus (T2DM), effectively addressing psychological aspects of the disease. Neuroimaging studies have further elucidated the underlying mechanisms, revealing MBCT's role in modulating emotional processing by reducing amygdala reactivity and strengthening prefrontal cortical connectivity (Hölzel et al., 2011). In parallel, MBCT attenuates default mode network hyperactivity, thereby mitigating maladaptive rumination and contributing to 30–40% reductions in diabetes-related distress (Brewer et al., 2011). These neurocognitive adaptations have been positively correlated with increased self-compassion and self-efficacy in diabetes management (Rosenzweig et al., 2007), fostering a virtuous cycle of psychological well-being

and metabolic stability. Given its multifaceted mechanism of action—simultaneously enhancing emotional resilience and self-management capacity—MBCT emerges as a promising adjunct to standard diabetes care. Nevertheless, further implementation research is warranted to tailor and optimize intervention protocols across diverse patient populations.

Association Between Emotion Regulation and Self-Esteem Among Patients with Type II Diabetes and Their Selected Demographic Variables

In the experimental group, no statistically significant associations were found between demographic variables—including age, gender, educational status, marital status, family income, type of family, and occupation—and psychological outcomes such as emotion regulation (ER). This suggests that within the context of this study, these demographic factors may not independently predict or influence psychological resilience. While existing literature presents mixed evidence on this subject, several studies have reported demographic influences on diabetes outcomes. For example, an Ethiopian study identified a higher prevalence of diabetes among males, with 66.2% of cases occurring in men. Other research indicates that marital status can play a supportive role in diabetes management.

The absence of significant associations in the present study may be attributable to several factors. A relatively small sample size may have limited the statistical power to detect subtle differences, and demographic variability within the study population might have been insufficient to reveal meaningful trends. Additionally, the implementation of a structured intervention—namely, Mindfulness-Based Cognitive Therapy (MBCT)—may have mitigated the effects of baseline demographic differences, effectively levelling outcomes across subgroups. These findings underscore a broader consideration in diabetes research: while demographic characteristics can offer valuable insights into population-level health trends, individual outcomes in chronic disease management are shaped by complex, multidimensional factors—including genetic predisposition, lifestyle, psychosocial stressors, and behavioural interventions. As such, a holistic and individualized approach remains essential for accurately identifying determinants of health in patients with Type II diabetes.

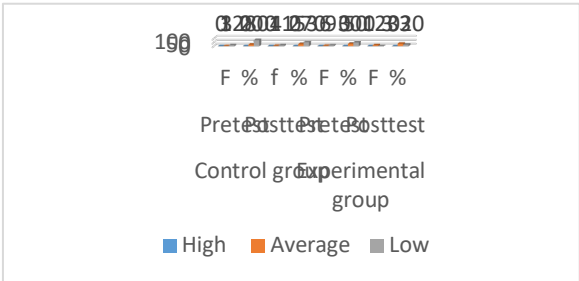


Figure 1: Frequency and percentage distribution of pre and post-test of emotion regulation in experimental and control group among patients with type II mellitus.

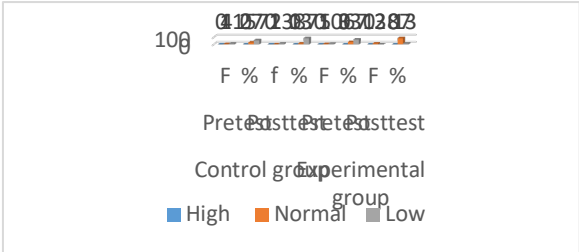


Figure 2: Frequency and Percentage Distribution of pre and post-test level self-esteem in experimental and control group among patients with type II mellitus.

Table 1: Comparison of pre-test and post test scores of emotion regulation & self-esteem within control group among patients with type II mellitus. (N=30)

Variables	Mean	S.D.	Paired ‘t’ test
Emotion Regulation			
Pre test	33.48276	6.98785	0.0018 (Not Significant)
Post test	33.93103	7.381484	
Self esteem			
Pre test	29.55172	6.972324	0.4032 (Not Significant)
Post test	29.75862	6.718165	

Table 2. Comparison of pre-test and post test scores of emotion regulation & self-esteem within

experimental group among patients with type II mellitus. (N=30)

Variables	Mean	S.D.	Paired 't' test
Emotion Regulation			
Pre test	32.74	6.54	
Post test	27.8	4.89	11.8964
			Significant
Self esteem			
Pre test	51.8	5.89	5.9557
Post test	47.47	5.37	Significant

Conclusion

This study demonstrates the efficacy of Mindfulness-Based Cognitive Therapy (MBCT) in enhancing emotion regulation and self-esteem among patients with Type 2 Diabetes Mellitus (T2DM). Participants who received MBCT showed statistically significant improvement in emotion regulation skills and increased self-esteem, addressing key psychological challenges commonly associated with T2DM. These findings suggest that MBCT may serve as an effective adjunct to conventional diabetes management, offering a comprehensive, integrative approach that targets on psychological dimensions of the disease.

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Availability of Data and Materials

All data generated or analysed during this study are included in this published article.

Declaration of Conflict of Interest

The authors declare no conflicts of interest.

Ethics Declaration

This study was conducted in accordance with ethical standards set forth by the Ethics Review Committee of Chettinad Academy of Research and Education. Prior to data collection, formal approval was obtained from both the Institutional Review Board and the Institutional Human Ethics Committee (Approval No. IHEC-II/0427/23). Administrative approvals included

written permission from the Dean of Chettinad Hospital and Research Institute and endorsement by the Undergraduate Research Committee. The research protocol adhered strictly to the ethical principles of the Declaration of Helsinki. Informed consent was obtained from all participants, both in written form and through verbal confirmation. Confidentiality and anonymity were rigorously maintained throughout the study, with all personal identifiers removed from data records to ensure participant privacy.

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