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Effectiveness of Cognitive Behavioral Techniques for Diabetes Distress in Patients Presenting With Diabetes Related Distress at a Tertiary Care Hospital

Salahudin Mahmood[1], Iqra Fatima[2*], Shahzad Alam Khan[1], Mamoon Ahmed[3], Fatima Zubair[2], Fatima Arshad[2] and Muhammad Tahir[4]

[1]Department of Medicine and Endocrinology Nishtar Hospital, Multan, Pakistan
[2]Department of Community Medicine, Combined Military Hospital Lahore Medical College, Lahore, Pakistan
[3]Department of Internal Medicine, Sanford Health, Sioux Falls, South Dakota, United States
[4]Department of Medicine, Nishtar Medical University/Hospital, Multan, Pakistan

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***Corresponding Author:**
Iqra Fatima
Department of Community Medicine, Combined Military Hospital Lahore Medical College, Lahore, Pakistan
dr.iqraahmed29@gmail.com

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ABSTRACT

Diabetes-related distress is a common psychological issue among diabetic patients, often affecting their ability to manage the condition effectively. **Objective:** To determine the effectiveness of cognitive behavioral techniques for diabetes distress in patients presenting with diabetes related distress at a tertiary care hospital. **Methods:** This study was conducted in the General Medicine Department at Nishtar Medical University and Hospital, Multan, a tertiary care hospital, over a period of 12 months. It was a Quasi Experimental Study. Sample size was 64 patients with diabetes related distress, (32 in each group) calculated by using sample size formula for comparing two proportions. Sampling technique was non probability consecutive sampling. **Results:** The mean age of patients experiencing diabetes-related distress was 51.45 ± 8.34 years, with an age range of 37 to 65 years. Among the 64 participants, only 20 (31.3%) had controlled diabetes, while 41 (64.1%) had uncontrolled diabetes. Efficacy was observed in 23 (35.9%) of the study cases. Specifically, 17 (53.1%) participants in group an exhibited efficacy, compared to 6 (18.8%) in group B (P=0.004). **Conclusions:** The findings of the study supported cognitive behavioral techniques for the management of diabetes related distress as these techniques were found effective and reliable in the management of diabetes related distress. Effectiveness of therapy was significantly higher among experimental group as compared with control group.

INTRODUCTION

Diabetes mellitus is a metabolic disorder characterized by the body's impaired capacity to utilize and absorb glucose, leading to abnormal blood sugar levels. Diabetes mellitus comprises a group of disorders marked by elevated blood sugar levels (hyperglycemia) caused by insulin resistance, insufficient insulin production, or excessive glucagon release [1, 2]. Globally, diabetes is the seventh leading cause of mortality, affecting approximately 422 million people worldwide, as reported by the World Health Organization (WHO) in 2020. Projections indicate that this number will increase by 25% over the next decade, reaching 454 million, and by 51% over the next 25 years, reaching 548 million and the number will increase by 51% (700 million) in 2045 [3, 4]. In 2015, diabetes mellitus contributed to over 1.5 million deaths worldwide. Diabetes mellitus, reported to be one of most prevalent metabolic disorders, has been the sixth leading cause of mortality globally while most burden of the diabetes is harbored in developing countries which show poor compliance with management and treatment that leads to the progression of long-term complications in these patients. Hence, these patients from low and middle income countries are at higher risk of future adverse events and exert more pressure on healthcare systems of their respective

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countries [5]. Type 1 Diabetes (T1D) is an autoimmune disease that results in the destruction of pancreatic beta cells, which are responsible for producing insulin. In contrast, Type 2 Diabetes (T2D), the more common form, is marked by a gradual decline in blood sugar regulation due to a combination of insulin resistance and reduced beta cell function in the pancreas. Leading a sedentary lifestyle and engaging in inadequate physical activity substantially elevates the risk of developing type 2 diabetes. The World Health Organization highlights that regular exercise enhances insulin sensitivity, helping to lower the risk of diabetes [6]. Prediabetes is diagnosed based on specific blood test results. A diagnosis is typically made when Fasting Plasma Glucose (FPG) levels fall between 100-125 mg/dL. Additionally, results from a 2-hour oral glucose tolerance test ranging from 140-199 mg/dL or hemoglobin A1c (HbA1c) levels between 5.7% and 6.4% can also indicate prediabetes [7]. The growing prevalence of diabetes is primarily attributed to aging populations. However, improvements in medical care leading to lower mortality rates among individuals with diabetes, along with rising diabetes incidence in certain countries due to an increase in risk factors particularly obesity are also significant contributors to the higher prevalence [8]. Individuals may experience discouragement from struggling to maintain stable blood sugar levels, leading to a sense of failure or frustration. This emotional strain can result in avoiding essential diabetes care tasks, such as skipping glucose checks or insulin doses. Over time, the constant pressure of managing the condition can lead to emotional exhaustion and burnout [7, 8]. Symptoms of diabetic distress include feeling overwhelmed by the ongoing demands of managing diabetes, along with persistent worry about the condition's impact on daily life and long-term health [8]. Diabetes can impair the blood vessels that provide blood to the retina, leading to a condition called retinopathy. Elevated blood glucose levels can damage these smaller blood vessels, resulting in vision loss and, in severe cases, blindness [9]. High blood glucose levels can damage kidney blood vessels, reducing their ability to filter waste from the bloodstream. This leads to waste buildup in the body, causing fatigue, weakness, and swelling in the legs and ankles [10]. Almost 90 % of the diabetic patients have type 2 diabetes mellitus and its treatment demands a comprehensive, multidisciplinary and complicated strategies. These treatment strategies include; strict diet control, proper medication, adequate physical activity, regular blood glucose monitoring and treatment awareness [11]. Management of diabetes is associated with extra economic burden on suffering families so it leads to the anxiety, helplessness and depression so T2DM management entails to the emotional health of diabetic patients. An Insulin Adherence Protocol is a systematic plan designed to help individuals with diabetes consistently follow their insulin therapy. These protocols are essential for effective diabetes management and reducing the risk of complications [9, 10]. Living with diabetes has significant impact on the patients and when it involves self-care management practices, these sufferers may be stressed out, disturbed or depressed. Diabetes treatment primarily involves lifestyle counseling and education on diet, exercise, and weight management, alongside pharmacological therapy to regulate blood glucose levels and address or prevent related complications [11, 12].

Diabetes-related distress is a pervasive yet frequently underaddressed psychological burden among diabetic patients, characterized by emotional exhaustion, feelings of failure, and avoidance of essential self-care behaviors that collectively worsen glycemic control and long-term outcomes. With diabetes affecting over 422 million people globally and projections indicating a marked rise by 2045, the psychological dimensions of this chronic illness demand equal clinical attention alongside pharmacological management, particularly in low-and-middle-income countries like Pakistan where mental health integration into diabetes care remains limited. While Cognitive Behavioral Therapy (CBT) has demonstrated efficacy for depression and distress in high-income settings, evidence from tertiary care hospitals in Pakistan evaluating structured CBT interventions specifically for diabetes-related distress remains sparse and methodologically limited. This study therefore aimed to determine the effectiveness of cognitive behavioral techniques in reducing diabetes-related distress among adult patients presenting to a tertiary care hospital, comparing outcomes between an intervention and control group over a structured follow-up period.

METHODS

This Quasi Experimental Study was carried out in the General Medicine Department at Nishtar Medical University and Hospital, Multan, over a period of twelve months, following the approval of the research synopsis. The study included 64 patients experiencing diabetes-related distress, divided equally into two groups of 32 participants each. The sample size was calculated using specific parameters: P1 = 51%, P2 = 18% [13]. A non-probability consecutive sampling technique was used to sequentially include eligible participants.

$$n = \frac{\left\{ z_{1-\alpha}\sqrt{2\bar{P}(1-\bar{P})} + z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)} \right\}^2}{(P_1-P_2)^2}$$

On February 27, 2021, a meeting of the Institutional Ethical Review Board (IERB) was held, chaired by the patron of the IERB Committee at Nishtar Medical University, Multan.

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Following the meeting, the Institutional Ethical Review Board issued an approval letter with the reference number 4411/NMU and H on March 11, 2021. The inclusion criteria for the study require participants to be between 32 and 70 years of age and of either gender. Eligible patients should be experiencing diabetes-related distress as defined by the operational criteria. The exclusion criteria rule out patients with a known history of coronary artery disease, stroke, Chronic Renal Failure (CRF), or Chronic Liver Disease (CLD). Additionally, individuals with a previous history of psychological disorders, hypothyroidism confirmed through medical records, or a prior diagnosis of brain tumors supported by medical history are not eligible. Pregnant women and patients who do not provide consent to participate are also excluded from the study. A customized proforma was designed to collect data for this study. Following a rigorous pilot study, the questionnaire's reliability was established, yielding a Cronbach's alpha coefficient of 0.78 (78%). A total of 64 eligible diabetes patients were conveniently selected from the Outpatient Department (OPD) of Nishtar Hospital, Multan. The study received the required approval from the Institutional Ethical Committee. Prior to participation, informed consent was obtained from each patient, ensuring they understood the study's objectives, were assured of confidentiality, and were notified that participation posed no risks. These patients was randomly assigned two groups using lottery method i.e. group A (undergoing cognitive therapy) and group B (does not undergo cognitive therapy) patients was followed fortnightly for eight weeks to observe the outcome of therapy and all the information was noted on the proforma specifically designed for the study along with other data such as age, gender, residential status, control of diabetes, obesity, family history, hypertension and monthly family income will also be recorded on proforma by the researcher. Data analysis was performed using SPSS version 23.0, which calculated the mean and standard deviation for variables including age, BMI, and duration of diabetes. Frequencies and percentages were computed for categorical variables, including the outcomes of cognitive therapy, age groups, diabetes management, gender, residential status, history of hypertension, and family history of diabetes. Therapy outcomes were evaluated using the chi-square test, with statistical significance set at $p < 0.05$. Effect modifiers, including age, gender, hypertension, diabetes control, family history of diabetes, residential status, and obesity, were adjusted for through stratification. A post-stratification chi-square test was conducted to assess their impact on the outcomes, with a p-value of 0.05 or less considered statistically significant. Diabetes Distress Score more than 80/102 on DDS – 17 scale (is a 17-item self-report tool used to measure the emotional and psychological distress related to managing diabetes. It evaluates aspects like emotional, regimen, physician, and interpersonal distress) was deemed as positive which is attached as Annexure. The World Health Organization (WHO) defines obesity as "an abnormal or excessive accumulation of fat that poses a health risk" [14]. It is typically assessed using the Body Mass Index (BMI), which is calculated by dividing weight in kilograms by height in meters squared (kg/m^2). The WHO categorizes BMI as follows: Normal weight: BMI 18.5–24.9, Overweight: BMI 25–29.9, and Obesity: BMI ≥ 30.

RESULTS

The study enrolled 64 patients with diabetes-related distress, comprising 28 males (43.8%) and 36 females (56.2%). Mean age of these patients with diabetes related distress was 51.45 ± 8.34 years (range; 37-65 years). The mean age of male and female patients with diabetes-related distress was comparable, with males averaging 51.86 ± 7.58 years and females averaging 51.14 ± 8.98 years ($p = 0.735$). Additionally, 35 (54.7%) of these patients were over the age of 50Among the 64 participants, 29 (45.3%) resided in rural areas, while 35 (54.7%) lived in urban areas. A significant proportion of participants 40 (62.5%) had a poor socioeconomic status, compared to 24 (37.5%) who belonged to middle-class families. Family History of Diabetes was present in 25 (39.1 %). The average Body Mass Index (BMI) of the participants in this study were 26.23 ± 2.53 kg/m^2, with obesity observed in 13 (20.3%) of the patients experiencing diabetes-related distress.

Table 1: Demographic Distribution

Trait	Categories	Frequency (%)
Gender	Male	28 (43.8%)
	Female	36 (56.2%)
Age Groups	≤ 50 Years	29 (45.3%)
	≥ 50 Years	35 (54.7%)
Socioeconomic Status	Poor	40 (62.5%)
	Middle Income	24 (37.5%)
Family History	Yes	25 (39.1%)
	No	39 (60.9%)
Residential Status	Rural	29 (45.3%)
	Urban	35 (54.7%)
Obesity	Yes	13 (20.3%)
	No	51 (79.7%)

Table 2 highlighted the role of cognitive behavioral therapy in reducing diabetes related distress as compared with control group i.e. P=0.004 which is statistically significant.

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Table 2: Distribution of Efficacy among Study Cases with Diabetes Related Distress in both Groups (n = 64)

Groups Efficacy	Group A Frequency (%)	Group B Frequency (%)
Yes	17 (53.1%)	06 (18.8%)
No	15 (46.9%)	26 (81.2%)
p-Value	0.004	

The efficacy of the study was analyzed and stratified based on various factors, including gender, age, residential status, socioeconomic status, family history of diabetes, presence of hypertension, obesity, and control of diabetes. This table summarizes the relationship between efficacy (Yes/No) and various factors in the study, along with their p-values. Efficacy results showed no statistically significant difference between male and female participants (p = 0.793), or between age groups of ≤50 and ≥50 years (p = 0.201). Similarly, socioeconomic status showed no significant impact, with no differences between poor and middle-income groups (p = 0.282). Residential status revealed a borderline difference in efficacy between rural and urban residents (p = 0.073). Additionally, neither obesity (p = 0.755) nor family history (p = 0.993) had a significant influence on efficacy (Table 3).

Table 3: Stratification of Efficacy among Study Cases with Diabetes Related Distress (n=64)

Variables	Categories	Efficacy		p-Value
		Yes	No	
Gender	Male (n=28)	11	17	0.793*
	Female (n=36)	12	24	
Age	≤50 Years (n=29)	13	16	0.201*
	≥50 Years (n=35)	10	25	
Socioeconomic status	Poor (n=40)	12	28	0.282*
	Middle Income (n=24)	11	13	
Residential Status	Rural (n=29)	14	15	0.073*
	Urban (n=35)	9	26	
Obesity	Yes (n=13)	4	9	0.755*
	No (n=51)	19	32	
Family History	Yes (n=25)	09	16	0.993*
	No (n=39)	14	25	

*Statistically Insignificant

DISCUSSION

Cognitive-Behavioral Therapy (CBT) is a widely used approach in addressing diabetes-related distress. CBT is a type of psychotherapy which is focused on identifying and changes in negative thoughts patterns and behaviors that may contribute to psychological distress. A total of 64 patients experiencing diabetes-related distress met the study's inclusion criteria, comprising 28 males (43.8%) and 36 females (56.2%). Fayed A *et al.*, from Saudi Arabia has reported 65 % female gender preponderance in diabetes related distress, which aligns with these findings [15]. Wardian J *et al.*, from the United States also found a 56% predominance of diabetes-related distress in females, consistent with these results [16]. Grulovic N *et al.*, from France reported a 52% predominance of males, which is somewhat higher than the proportions observed in this study [17]. Chew BH *et al.*, from Malaysia also identified a higher prevalence of females among patients with diabetes-related distress, aligning with these findings [18]. Nguyen *et al.*, from Vietnam reported that 52.7% of patients experiencing diabetes-related distress were female, which is comparable to these findings [19]. In contrast to these findings, Kamrul-Hasan *et al.*, from Bangladesh observed a predominantly male population, accounting for 54.8% [20]. The study's participants had a mean age of 51.45 years (SD = 8.34), spanning a range of 37 to 65 years. The mean age for male patients was 51.86 ± 7.58 years, and for female patients, it was 51.14 ± 8.98 years, with no statistically significant difference (p = 0.735). Additionally, 35 (54.7%) of these patients were over the age of 50 [15]. Wardian J *et al.*, from United States of America has also reported 55.2 ± 8.82 years mean age among patients with diabetes related distress, similar to these results [16]. Grulovic N *et al.*, from France reported a mean age of 48.11 ± 15.53 years in patients with diabetes-related distress, which aligns with these findings [17]. These findings are consistent with those of Chew BH *et al.*, from Malaysia, who reported a mean age of 56.9 years in patients experiencing diabetes-related distress [18]. Nguyen VB *et al.*, from Vietnam reported a mean age of 53.8 ± 11.9 years in patients with diabetes-related distress, which aligns with these results [19]. Kamrul-Hasan AB *et al.*, from Bangladesh reported 50.36 ± 12.7 years mean age in diabetes related distress, similar to the study results [20]. This study comprised 64 participants, of whom 29 (45.3%) were rural residents and 35 (54.7%) were urban residents. Poor socioeconomic status was noted in 40 (62.5%) while 24 (37.5%) had middle class family background. Fayed A *et al.*, from Saudi Arabia has reported findings that are consistent to the results of this study [15]. Nguyen VB *et al.*, from Vietnam has also reported 85.7 % patients with diabetes related distress from urban localities, similar to this results [19]. Kamrul-Hasan AB *et al.*, from Bangladesh reported 55.9 % patients with diabetes related distress were from urban areas, similar to this study results [20]. Chew BH *et al.*, from Malaysia has also reported a high prevalence of hypertension (80%) in patients with diabetes related distress, which is consistent with these findings [18]. Nguyen VB *et al.*, from Vietnam has also reported 28.6 % hypertension among patients with diabetes related distress, similar to this results [19]. Kamrul-Hasan AB *et al.*, from Bangladesh reported a similar finding, with a 66.8% prevalence of positive family history of diabetes among individuals experiencing diabetes-related distress,

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comparable to the study's results [20]. This study revealed a mean Body Mass Index (BMI) of 26.23 ± 2.53 kg/m^2 among participants, with 13 (20.3%) cases categorized as obese. Wardian J *et al.*, from United States of America has reported 30.32 ± 6.40 kg/m^2 mean body mass index in patients with diabetes related distress, indicating higher BMI levels in American population as compared with the local population [16]. Nguyen VB *et al.*, from Vietnam has reported 67 % overweight or obese patients with diabetes related distress, quite higher from these results [19]. Kamrul-Hasan AB *et al.*, from Bangladesh reported 23.9 ± 3.7 kg/m^2 mean body mass index in diabetes related distress consistent with the results of this study [20]. Out of the 64 study participants, only 20 (31.3%) patients had their diabetes under control, whereas 41 (64.1%) had uncontrolled diabetes. Fayed A *et al.*, from Saudi Arabia has reported 19 % controlled diabetes in diabetes related distress, in line with these study findings [15]. Nguyen VB *et al.*, from Vietnam has also reported 47.3 % patients with diabetes related distress had their HbA1c higher than 7 %, comparable to the results of this study [19]. Kamrul-Hasan AB *et al.*, from Bangladesh reported 25.7 % controlled blood glucose levels in diabetes related distress, as observed in these study results [20]. Efficacy was observed in 23 (35.9%) of these study cases. In group A, efficacy was observed in 17(53.1%) participants, compared to 6(18.8%) in group B (P=0.004). Newby J *et al.*, also reported remission of depression in 51 % with these therapies compared with 18 % in control groups, similar to these findings [21].

This study was constrained by a small sample size of only 64 participants, a single-center design limited to outpatient settings, and a quasi-experimental rather than fully randomized controlled trial methodology, all of which restrict the generalizability and causal strength of the findings. The relatively short follow-up period and absence of long-term glycemic outcome tracking further limit conclusions about the sustained impact of cognitive behavioral techniques on both psychological distress and diabetes control. Future studies should employ multicenter randomized controlled trial designs with larger, more diverse patient populations including inpatients and rural communities to enhance representativeness. Additionally, integrating objective biomarkers such as HbA1c alongside validated distress scales, and evaluating the cost-effectiveness of CBT delivery models within Pakistan's public health infrastructure, would provide more comprehensive evidence to support policy-level integration of psychological care into national diabetes management guidelines.

CONCLUSIONS

The findings of these study endorse the application of cognitive behavioral methods in managing diabetes-related distress, as these techniques were found to be both effective and reliable. Effectiveness of therapy was significantly higher among experimental group as compared with control group. Clinicians treating such patients with diabetes related distress can effectively employ cognitive behavioral techniques for its effective management and to achieve desired clinical outcomes. The current study has some limitations. First, patients were taken only from outpatient departments. Secondly, limited generalizability of the results due to small sample size and study access within single institute.

Authors' Contribution

Conceptualization: SM
Methodology: MA
Formal analysis: IF, MA
Writing and Drafting: IF, SAK
Review and Editing: IF, SAK

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

The authors declare no conflict of interest.

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