



RESEARCH ARTICLE

OPEN ACCESS

ARTICLE INFO

Date Received:

July 26, 2022

Date Revised:

December 01, 2022

Date Published Online

December 25, 2022

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The Impact of Cognitive Behavioral Therapy on Depressive Symptoms in Patients with Type 2 Diabetes Mellitus

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ABSTRACT

Background: Diabetes and depression are major issues globally, with CBT identified as the most effective treatment for depression. Self-help CBT in Pakistan has shown positive results for depression treatment. A study has found that CBT leads to a higher remission rate for depression in Type 2 diabetes patients, highlighting the need for proper treatment of diabetes-related depression to improve health outcomes. **Methods:** In a randomized controlled trial a total of 32 patients with diabetes and depression were allocated to CBT therapy (n=16) and controls without CBT therapy (n=16). The study was conducted at the Department of Psychiatry, and diabetic's clinic of Department of General Medicine, Pakistan Institute of Medical Sciences, Islamabad, in a period of 2 months. Known cases of Type 2 Diabetes fulfilling the diagnostic criteria of Depression and anxiety using DSM –V research criteria, and who lived within the catchment area were approached. Formal approval from hospital ethical committee and written informed consent from participants were obtained. Those persons, who agreed to enter the study, were assessed 2 weeks after the first screening, to fill in the baseline measures when they attended their first appointment. These persons were asked to attend further appointments and were assessed every two weeks till end of the study final assessment were made. **Results:** The mean age of patients was 50.9 + 7.5 years in group A (CBT) and 45.4 + 10.1 years in group B (without CBT). Male and female cases were equally selected in both groups respectively. The mean HADS was found similar at baseline in both study groups while post intervention phases in group A, greater improvement was observed (8.8 + 2.6) compared to (10.3 + 2.9) in group B. The WHO quality of life scale was almost similar in both groups at baseline, however, greater improvement in quality of life was observed in group A (90.7 + 9.0) compared to group B (82.1 + 13.9) and the difference in mean WHOQOL was found statistically significant (p-value = 0.04). **Conclusions:** The CBT intervention has a clear role in the management of depression in diabetic patients. In this study it has shown significant improvement in the health and depression scales and also in the overall quality of life according to WHO scale.

Keywords: Cognitive behavior therapy, Type 2 Diabetes mellitus, depression, patient.

INTRODUCTION

Diabetes is a global issue with disastrous effects on people's lives, society, and the economy. According to the most recent data, there will be 592 million people living with diabetes by 2035. People with diabetes are most prevalent in the 40 to 59 age group. Eighty percent of diabetics reside in developing and middle-income nations [1]. Those with diabetes are two times more likely to die than those of a similar age who do not have the chronic condition [2]. Depression is a common mental condition that manifests as a gloomy mood, lack of interest in or pleasure in previously enjoyed activities, guilt or low self-worth sentiments,

interrupted sleep or food, low energy, and difficulty concentrating [3]. The loss of a significant person, thing, connection, or aspect of one's health are common causes, although it can also arise for no apparent reason. These issues may last for the rest of one's life and significantly affect one's capacity to handle daily obligations [4]. Although treating depression may assist improve these results, depression in diabetes patients is linked to decreased adherence and health outcomes [5].

Diabetes is a complex condition that necessitates total self-care, including adherence to prescribed medications, control of blood glucose, attention to nutrition and exercise recommendations, preventive foot care, attendance at medical appointments, and routine screening for complications. There may be a synergistic relationship between the therapies for diabetes and depression because behavioral management tactics for both conditions are similar in many ways. However, there isn't much solid evidence to support how these treatments can be combined in the best way. The behavioral therapy of both disorders may be an area of synergistic overlap, thus it is critical that researchers investigate how to integrate care efficiently to improve treatment outcomes [5]. Many different psychological interventions have been shown to be effective in the treatment of depression, but cognitive behavioral therapy (CBT) has been identified as the most effective psychosocial treatment for depression. CBT, a brief, skill-based intervention that aims to alter negative thinking and improve good behavior, such problem-solving and relaxation, has drawn the most attention as a psychosocial intervention since it has been successfully used to treat depression [5].

Currently, Cognitive Behavior Therapy (CBT) is recommended for use in treating depression in both the UK and the USA. In Pakistan, CBT was applied and found to be successful in treating depression and anxiety. However, due to challenges with training and resources in Pakistan, the availability of this efficient therapy is constrained. Giving CBT in a self-help format is one method to get around these resource problems. In Pakistan, self-help CBT has recently been tried and proven to be beneficial [6]. An earlier study that included 51 individuals with type 2 diabetes and MDD, as defined by the Diagnostic Interview Schedule (DIS) and a Beck Depression Inventory (BDI) score, between the ages of 21 and 70. Every other week, a certified diabetes educator met with each participant individually for a one-hour diabetes education session. Remission was attained by 87% of patients in the CBT group (defined as a BDI score of 9 or lower), which was considerably higher than the remission rate for patients in the control condition. In addition, the authors discovered that 66.6% of patients in the CBT group, as opposed to 29.6% of patients in the control group, showed clinically meaningful improvement. 58.3% of patients who got CBT were still in remission at 6-month follow-up, which was considerably higher than for the education-only group [6].

There hasn't been much research done on the subject locally, and there isn't much information available about CBT for T2DM patients abroad. The current study concentrated on Depression, a co-morbid health issue in Type 2 diabetes patients. According to earlier research, diabetes-related sadness is linked to poor glycemic control, greater complications, and a higher mortality rate. Therefore, it is crucial to properly treat diabetes-related depression by keeping this in mind. For individuals with T2DM and depression, the current trial will focus on CBT psychotherapy [6]. We'll also look at indicators of outcome impacts like glycemic control, quality of life, and depressive and anxious symptomatology.

MATERIALS AND METHODS

A randomized control trail study was conducted at 32 patients of type 2 diabetes mellitus in Pakistan Institute of Medical Science Islamabad, Pakistan. The convenience sampling technique was used to collect data.

Data collection procedure:

A T2DM patient was collected from the outpatient unit of the diabetes clinic at the Pakistan Institute of Medical Sciences. It was intended to test close to 32 individuals. Patients were categorized after being randomly chosen. Eight male and eight female T2DM patients were placed in the experimental group, which received CBT in addition to antidepressants, and sixteen other T2DM patients—eight male and eight female—were placed in the control group, which only received antidepressant trials without CBT sessions. Patients ranged in age from 20 to 65 years old. The study's experimental design was pre-post. The primary screening tool used to identify people with depression was the Structured Clinical Interview for DSM-V Axis I Disorders. The Hospital Anxiety and Depression Scale was among the additional instruments (HAD – S) [7], as well as WHO Quality of Life (WHOQOL-BREF) 10. The assessment was conducted at the baseline and subsequently every two weeks until the therapy was completed (2 months, Mar 19-Apr19). Group in the control underwent an evaluation and received treatment, but no CBT sessions. This implied that they kept looking for assistance. In this group, a number was used that was the same as the

intervention groups. One of the requirements for inclusion was that the patient had type 2 diabetes mellitus and that the diagnosis had been made at least six months before the study trial [8]. We contacted everyone in the catchment area between the ages of 20 and 65 who met the diagnostic requirements for depression and anxiety using DSM-V research criteria. People who accepted to participate in the study were evaluated two weeks after the initial screening to collect baseline data before their first session. These individuals were requested to keep their appointments and had evaluations every two weeks until the study's conclusion. Written informed permission from participants as well as formal approval from the hospital ethical committee (reference number F. 1-1/2015/ERB/SZABMU/395) were acquired [9, 10]. Drug abuse, serious violent, homicidal, or suicidal ideation, a history of attempted suicide within the previous two years, significant cognitive impairment (such as dementia or learning disabilities), active psychosis, the absence of a Hb1Ac report to check or monitor glycemic control, and a limited capacity to understand Urdu were among the exclusion criteria.

Statistical analysis:

Data was analyzed through SPSS version 19. Between case and control group data was analyzed with odd ratio.

RESULTS

In this study, 32 patients with diabetes mellitus and depression were divided into two groups: those receiving CBT-based self-help plus antidepressants, and those receiving simply pharmaceuticals without CBT sessions. The average patient age was 45.4 + 10.1 years for group B and 50.9 + 7.5 years for group A (CBT) (without CBT). While more than (80%) of the patients in group A were over the age of 41, more than (70%) of the cases in group B fell within that age range. Due to the equal selection of male and female cases, each group contained 8 (50.0%) males and 8 (50.0%) females (Table 1). In the two groups, the socio-demographic traits of the patients were contrasted. Both groups' patients were nearly all married (90.0%). Similar to group A, most people in group B (68.8%) and group A (81.3%) lived in urban regions. A third of the patients in each group were illiterate, a fourth had just received their primary or middle education, and 40.0% of the patients in each group had completed their upper secondary or graduate degrees. Two thirds (68.8%) of group B's members and more than half (56.3%) of group A's members had monthly incomes of more than RS. 20000 (Table 2).

According to the two study groups, the clinical presentation and medical background of the patients were also examined. 9 (56.3%) of the 16 patients in group A and 10 (62.5%) of the 16 patients in group B had a positive family history of diabetes. The HBA1c levels were virtually equally poorly controlled in both groups, with 3 (18.8%) and 4 (25%) patients in group B, respectively. Equal numbers of patients in groups A and B—10 (62.5%)—were free of any co-morbid conditions. Two (12.5%) instances in group A had heart problems, compared to 4 (25.0%) in group A and 6 (37.5%) in group B who both had hypertension. Compared to none in group B, 5 (31.3%) patients in group A had neuropathy. Similar to this, 2 (12.5%) patients in group A versus 1 (6.3%) case in group B experienced a combined neuropathy/nephropathy problem (Table 3).

Table 1. Baseline characteristics of patients in the two study groups

	Group A (CBT) (n=16)	Group B (Without CBT) (n=16)
Age (years)		
Mean \pm SD	50.9 \pm 7.5	45.4 \pm 10.1
Age categories		
Up to 40	2 (12.5%)	5 (31.3%)
41 to 50	7 (43.7%)	6 (36.4%)
51 or above	7 (43.7%)	5 (31.3%)
Sex		
Male	8 (50.0%)	8 (50.0%)
Female	8 (50.0%)	8 (50.0%)

The Hospital Anxiety and Depression Scale (HADS) and WHO quality of life scale (WHOQOL-BREF) mean values and standard deviations were compared between the two study groups in accordance with the study's purpose. While post intervention phase in group a showed larger improvement (8.8 + 2.6) compared to group B (10.3 + 2.9), the difference between means was not statistically significant. The mean HADS was similar at baseline in both research groups. The WHO quality of life scale was almost similar in both groups at the beginning, but patients receiving CBT intervention, group A (90.7 + 9.0), showed greater improvement in quality of life than group B (82.1 + 13.9), and the difference in mean WHOQOL was found to be statistically significant (P value = 0.04). (Table 4).

Table 2. Socio-demographic characteristics of the patients in the two study groups

	Group A (CBT) (n=16)	Group B (Without CBT) (n=16)
Marital status		
Married	15 (93.8%)	14 (87.5%)
Unmarried	0 (0.0%)	2 (12.5%)
Widowed	1 (6.3%)	0 (0.0%)
Residence		
Rural	3 (18.8%)	5 (31.3%)
Urban	13 (81.3%)	11 (68.8%)
Education		
Illiterate	6 (37.5%)	5 (31.3%)
Primary/middle	4 (25.0%)	4 (25.0%)
Higher secondary	5 (31.3%)	6 (37.5%)
Graduate	1 (6.3%)	1 (6.3%)
Occupation		
Government service	2 (12.5%)	2 (12.5%)
Private service	0 (0.0%)	5 (31.3%)
Business	0 (0.0%)	1 (6.3%)
Labourer	2 (12.5%)	4 (25.0%)
House wife	8 (50.0%)	3 (18.8%)
Others	4 (25.0%)	1 (6.3%)
Monthly income (Rs.)		
Up to 20000	7 (43.8%)	5 (31.3%)
More than 20000	9 (56.3%)	11 (68.8%)

Table 3. Presentation and medical history of patients in the two groups

	Group A (CBT) (n=16)	Group B (Without CBT) (n=16)
Family H/O diabetes		
Positive	9 (56.3%)	10 (62.5%)
Negative	7 (43.8%)	6 (37.5%)
HB1AC levels		
In control	6 (37.5%)	7 (43.8%)
Not in control	10 (62.5%)	9 (56.3%)
Co-morbid condition		
None	10 (62.5%)	10 (62.5%)
Hypertension	4 (25.0%)	6 (37.5%)
Heart trouble (angina)	2 (12.5%)	0 (0.0%)
Any complications		
Neuropathy	5 (31.3%)	0 (0.0%)
Neuropathy/nephropathy	2 (12.5%)	1 (6.3%)

Table 4. Comparison of Health scales and WHO quality of life scale between intervention and control arms

	Pre-intervention		p-value	Post intervention		p-value
	Group A (CBT) (n=16)	Group B (without CBT) (n=16)		Group A (CBT) (n=16)	Group B (without CBT) (n=16)	
HADS (Mean \pm SD)	17.0 \pm 5.1	16.3 \pm 3.4	0.62	8.8 \pm 2.6	10.3 \pm 2.9	0.14
WHOQOL (Mean \pm SD)	64.7 \pm 9.5	63.4 \pm 11.7	0.71	90.7 \pm 9.0	82.1 \pm 13.9	0.04

DISCUSSION

In individuals with diabetes mellitus, depression is a common co-morbidity that has a negative impact on self-care, medication compliance, the development of micro vascular and macro vascular problems, and abnormal metabolic parameters. Finding effective diabetes patients' depression treatments is crucial. The majority of diabetics prefer therapy over medication for depression, despite the fact that both approaches are successful [10]. According to the study, cognitive behavioral treatment (CBT) and antidepressants together significantly and clinically outperform antidepressants alone in terms of improving health-related quality of life (WHOQOL).

32 individuals were randomly randomized in this cross-sectional study to receive antidepressants together with CBT (group A) or antidepressants alone (group B). Brief research details were sent to patients who had been identified for the investigation [11, 12]. After receiving consent, those who met the requirements were requested to participate in the study, and after randomization, they were assigned to one arm of the trial. The age range of the patients was from 29 to 64 years, with the mean age of the patients being 48.1 years and more than (75%) instances being over the age of 41. The mean age of all participants was 53.61 \pm 10.7 years in a study that looked at the prevalence of depression and its determinants among type 2 diabetes mellitus patients in multiple tertiary care facilities in Mangalore, South India. T2DM was reported to have a median lifespan of 12.1 \pm 7.35

years. In a different study, albeit the difference was not all that significant, depression prevalence rose with age and the length of diabetes. 73 participants submitted data, which was collected. The study population's average age was 50.8 + 9.2 years [13]. Male and female cases were equally chosen for the current investigation, therefore there were 8 (50.0%) males and 8 (50.0%) females in each group. There is minimal focus on mood disorders and depression, despite the fact that age and gender of patients play a definite influence in the development of diabetes mellitus and depression. Furthermore, it is unclear how the pathophysiological links between these two disorders work. The psychological makeup of DM patients has a substantial impact on their self-management behaviors. Without the patients' adherence to the efficient treatments, there would be persistently insufficient management of the diseases, additional problems associated with diabetes, a reduction in quality of life, and a load on the healthcare systems [14]. There is proof that depression and poor metabolic control are related among people with type 2 diabetes who also have other health issues (such as hypertension and obesity) [7, 14].

In this study, patients receiving CBT had better control of their glycemic levels according to HBA1c (43.8%) compared to the non-CBT group (18.8%). In a study, changes in blood sugar (localized hemoglobin) following CBT therapy were significant in both study groups. However, there is a statistically significant difference between the two groups' mean blood sugar differences before and after the intervention. The patients' knowledge of their blood sugar findings prior to the interventions, according to researchers, may have been one of the intervening factors that had an impact on the blood sugar results [15]. This is why the Hb1c reports were emphasized in the inclusion criteria of our investigation. Due to ethical concerns, the blood sugar findings were disclosed to the patients before intervention; as a result, they may have managed their diabetes-related diet and, as a result, their blood sugar, had been controlled. The patients' attendance in diabetes education sessions is another aspect that could have an impact. Another noteworthy aspect of this study is its small sample size; statistical evidence suggests that a more accurate conclusion might be drawn by expanding the sample size. Among the most successful forms of treatment for depression are cognitive behavioral therapies. They haven't proven very effective, though, in treating depression brought on by medical ailments. The findings of this study, which are consistent with several similar studies, show that cognitive-behavioral therapy can be a safe therapeutic option for diabetes patients who are depressed [15].

The HADS score in the current study dropped from 17.0 at baseline to 8.8 following antidepressant and cognitive behavioral therapy treatments. With CBT psychotherapy, the WHOQOL scale's overall health quality increased from 64.7 to 90.7. Results from a study that looked at the importance of quality of life in chronic diseases and the contribution of education to its development showed that cognitive-behavioral trainings had a large and determinant impact on the improvement of patients' quality of life [16]. In a study, cognitive behavioral treatment for adherence and depression in type 2 diabetes (CBT-AD) was evaluated. It was predicted that CBT-AD will improve hemoglobin A1C, depression, and adherence (A1C). A provider letter documented psychiatric diagnoses. Eighty-seven persons with unipolar depression and uncontrolled type 2 diabetes got enhanced therapy as usual (ETAU), which included medication adherence, SMBG self-monitoring, and lifestyle counselling. In addition, those randomly assigned to the intervention arm got 9–11 CBT–AD sessions. According to the findings, CBT-AD is a useful treatment for depression, glycemic control, and adherence, and it has long-lasting and clinically significant advantages for diabetes self-management and glycemic control in individuals with type 2 diabetes and depression¹⁶. Diabetes patients' depression has been proven to be lessened by CBT¹⁸. Cognitive behavioral therapy (CBT) reduces the number of the depressed diabetic patients and consequently offer them a better quality of life [17].

The socio-demographic features of the research groups in terms of residency, education, and monthly income were not significantly different, and the same was true of their medical histories and outward manifestations. The non-CBT group's patients were shown in a more negative light due to a small difference in neuropathy and nephropathies, which was slightly bigger in that group.

The number of cases randomly assigned to each research group is one of the study's few remaining weaknesses. Since there was no long-term monitoring of these cases, data on them may have painted a clearer picture of how interventions for diabetes and depression would have fared both in the short and long terms. We advise conducting large-scale randomized controlled trials with robust research methodologies before generalizing the findings of the current investigation, especially when considering CBT as a substantial life modulator and causal factor in depression linked with type 2 diabetes mellitus. Additionally, it may be advised for individuals who also have other co-morbid illnesses in addition to depression. Patients with varied degrees of depression should also use cognitive behavior therapy as a form of advocacy and education. Effective screening, diagnosis, and treatment of people with diabetes and depression co-morbidities require more work [18].

The study has only a few benefits. The current study was unique in its field and a positive development both locally and nationally.

A comparable control group was also enrolled, providing evidence of the intervention—CBT therapy—and its effect.

Conclusions

The CBT intervention has a clear role in the management of depression in diabetic patients. It has shown significant improvement in the health and depression scales and also in the overall quality of life according to WHO scale in these patients.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTION

All authors equally contributed in this research study.

Acknowledgement:

We acknowledge the endless support and continues motivation in field of research by honorable Dr. Muhammad Bashir who remained a reservoir of knowledge of advance research methodology during this journey.

FINDING SOURCE

No funding was received by this work

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