

**RELATIONSHIP BETWEEN TYPE 2 DIABETES
MELLITUS AND DEPRESSION: ROLE OF
PSYCHOLOGICAL MANAGEMENT**

Thesis submitted in partial fulfillment of the requirements for the
degree of M.Phil in Clinical Psychology Faculty of Biological
Sciences University of Dhaka-1000

Submitted by
Rumela Ali
M.Phil. (Part-II)
Registration No: 131
Session: 2003-2004



Department of Clinical Psychology

January 2009

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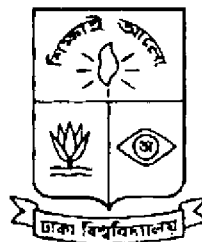
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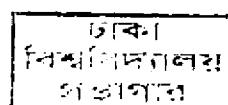
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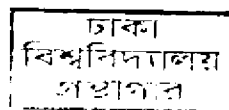
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January 2009



Dedicated To My Family

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Supervisor's Certificate

This is to certify that the thesis "Relationship between T2DM and Depression: Role of Psychological Management" submitted by Rumela Ali in partial fulfillment of the requirements for the degree of M.Phil in Clinical Psychology, Faculty of Biological Sciences, University of Dhaka is an original research work and that it was done under my Supervision.



7.1.09

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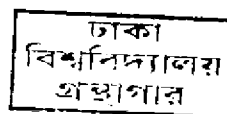
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ABSTRACT

The present study was carried out to explore the relationship between Type 2 Diabetes Mellitus (T2DM) and depression and to see the efficacy of psychological management, particularly, cognitive behavior therapy for depression in diabetic patients. It was hypothesized that there is a relationship between T2DM and depression and that psychological intervention is effective in reducing T2DM and depression. Both the qualitative and quantitative research methods were used in the study. Purposively the samples were taken from outpatient department (OPD) of Bangladesh Institute of Health Science (BIHS) Bashaboo, Dhaka and Bangladesh Institute of Research and Rehabilitation on Diabetes, Endocrine and Metabolic Disorder (BIRDEM), Shahbagh, Dhaka.

The sample of the study comprised 652 patients of whom 348 were males and 304 were females. Their age range was between 20-80 years and their average age was 51 ± 11 years. Their educational level was from illiteracy to doctorate degree. Duration of T2DM of the subjects were divided in three phases – less than 1 years (14.9% males and 17.2% females), 1-10 years (17.6% males and 17.2% females) and above 10 years (20.9% males and 12.3% females). 51.2% male subjects and 37.7% female subjects were married, 0.3% males, and 0.2% males & 0.5% females were separated. In respect of occupation 41.1% female Ss were housewives, 2.5% female Ss were service holder, 0.5% female Ss were business persons, 1.5% females were retired and other females 1.1%; whereas of male Ss 20.9% were jobholders, 14.3% were businessmen, 12.6% were retired persons and others were 5.7%.

The measures used in the study were: Depression Scale (Uddin & Rahman, 2005), accu-check, in-depth interview, 11-point rating scale, assessment of functioning level and observational reports. Cognitive behavior therapy was applied to six selected subjects of this study to see the effectiveness of psychological management in reducing the level of depression and T2DM in them. Blood glucose level and level of depression of these patients were measured before and after the application of cognitive behavior therapy. Intervention session for these selected Ss varied from 8-16 to produce the desired results. Follow up sessions for each of the six patients of the study took place after an interval of 30 days.

The findings of the study evinced that there was significant improvement on controlling T2DM and reducing depression level of all the six selected patients who were give psychological management namely; cognitive behavior therapy. Thus, the results of the study confirmed the hypothesis that there is a relationship between T2DM and depression and that psychological intervention is effective in reducing T2DM and depression.

Acknowledgements

I wish to put on record my deep sense of gratitude to Prof Dr. Anisur Rahman Founder Chairman Dept. of Clinical Psychology, University of Dhaka, Bangladesh with sincere regards, generous and completely heartened guidance, continuous support and constant supervision, which made me this research possible.

I am very much grateful to Muhammad Kamruzzman Mozumder, Assistant Professor Dept. of Clinical Psychology, University of Dhaka for his continuous support, valuable advice to complete the research work. .

I would like to thanks my teachers Chairperson Kamal Uddin Ahmed Chowdhury and Prof. Dr. Mhamudur Rahaman, Dept. of Clinical Psychology, University of Dhaka; for encouraging me to complete my study.

I am indebted to SM Abul Kalam Azad, Lecture, Dept. of Clinical Psychology, University Of Dhaka for his valuable suggestions, necessary corrections to finalize this manuscript.

I would also like to thanks to Hahiba, Sami, Mitu and Taniya for there kind support and assistance.

I express my thanks to Md. Moksed Ali pramanik, Nadira anti statistician Institute of Nutrition and Food Science, University of Dhaka; help me to analyzing the data.

I am indebted to all the respondents of the study for their kind co-operation.

I would also like to thank to my loving Keya, Anee, Mukul, Setu, Moithily, Mridul and Reme. Without their support, it was impossible to complete the research work.

I must put on record the most valuable person in my life my husband with his cooperation, encouragement and sacrifice it was not possible to me to finish the paper.

I express my heart-felt thanks and love to my father and mother for their patience, continuous support and constant inspiration to complete this study.

Finally, my appreciation goes to all of those who helped me directly or indirectly which has gone a long way with good suggestions, comments, and co-operation in accomplishing this research work.

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Chapter I

INTRODUCTION

1.1 Introduction

Depression is one of the co-morbid conditions to the people who are suffering from Type 2 Diabetes Mellitus (T2DM). Depressive patient having grossly uncontrolled diabetes gradually they become victims of slow and painful experience extending over years.

1.1.1 Diabetes and Depression

Patients with T2DM have a high prevalence of affective illness, with 11–15% meeting the criterion of major depression, study show that there is a strong association between T2DM & depression. In Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV), criteria for major depression are available (Anderson et al., 2001). Major Depression is found to be a chronic or recurrent illness in most patients with T2DM (Katon et al., 2004). Over a 5-year period, 80% patients with major depression and diabetes were found to have one or more relapses (Lastman, Griffith & Clouse, 1988). Comparing patients with diabetes alone, patients with depression and diabetes shown to have poorer self-management (i.e., following diet, exercise regimens, and checking blood glucose) and to have significantly more lapses in refilling oral hypoglycemic, lipid-lowering, and antihypertensive medications (Lin et al., 2004). Depressed patients with diabetes are also significantly more likely to have three or more cardiac risk factors (i.e., smoking, obesity, sedentary lifestyle, HbA1c 8.0%) compared to the patients with diabetes alone (Katon et al., 2004).

The association of depression in diabetes includes poor adherence to treatment, poor glycaemic control, greater frequency of macro-and micro vascular complication, sexual dysfunction and impaired quality of life (Marwick, 1999; Litwin et al., 1998; Siu et al., 2001; Fedele, 2000; Gavard, Lustman & Clouse, 1993; Brown, 2000).

1.2 Diabetes Mellitus

1.2.1 Definition

Diabetes Mellitus is a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both (WHO, 1999).

Different study groups and authors have used different criteria for diagnosing and defining diabetes mellitus. Most study groups felt the need for a general agreement or consensus in the uniform epidemiological study. In 1979, report from USA, National Diabetes Data Group (NDDG) was the first to propose definition, classification and diagnostic criteria for diabetes syndrome (NDDG, 1979). World Health Organization (WHO) Expert Committee on Diabetes recommended the NDDG reports after some minor modification in 1980 (WHO, 1980). WHO proposed another modified, classification and diagnostic criteria of diabetes and that was unanimously accepted in 1985 (WHO, 1985). In the 1985, Study Group omitted the terms Type 1 and Type 2 retaining the classes IDDM and NIDDM. A new class of Malnutrition – related Diabetes Mellitus was included in the report. In both 1980 and 1985 reports, classes of diabetes included Impaired Glucose Tolerance (IGT) as well as Gestational Diabetes Mellitus (GDM). It represented a compromise between clinical and etiological classification and allowed classification of individual subjects and patients in a clinically useful manner even though the specific cause or etiology was unknown.

1.2.2 Classification of Diabetes Mellitus

The current classification proposed in report of WHO consultation (1999) includes both clinical stages and etiological types of diabetes mellitus

A. Clinical Stages

- Normoglycaemia
- Impaired Fasting Glucose (IFG) – Blood glucose up to 6 mmol/L
- Impaired Glucose Tolerance (IGT) – Blood glucose 6.1-11 mmol/L
- Diabetes Mellitus (DM) – Blood glucose more than 11.1 mmol/L

B. Aetiological Types

- Diabetes Mellitus
 1. Type 1 Diabetes (Previously termed as IDDM) – Indicates the β -cell destruction, usually leading to absolute insulin deficiency
 - a) Immune mediated
 - b) Idiopathic
 2. Type 2 Diabetes (Previously termed as NIDDM) – Characterized by insulin resistance i.e. disorder of insulin secretion and insulin action.
 3. Protein deficient pancreatic diabetes- young mal nourished
 4. Fibro calculus pancreatic diabetes (FCPD)
 5. Others specific types
 - ◆ Genetic defects of β -cell function
 - ◆ Genetic defects in insulin action
 - ◆ Diseases of the exocrine pancreas
 - ◆ Endocrinopathies
 - ◆ Drugs or chemical induced diabetes
 - ◆ Diseases due to infection
 - ◆ Uncommon forms of immune mediated diabetes
 - ◆ Certain genetic syndrome

6. Gestational diabetes mellitus

Source: Expert Committee Report of WHO 1985 (WHO, 1985)

The two major forms of diabetes mellitus are Type 1 (insulin-dependent) diabetes, and Type 2 (non-insulin-dependent) diabetes.

- *Type 1: (Insulin-Dependent Diabetes)* usually occurs in children and young adults. It accounts for 5% to 10% of the total cases of diabetes. Type 1 diabetes requires insulin injections since the pancreas does not produce insulin. This type of diabetes may develop due to autoimmune, genetic and environmental factors (WHO 1985)
- *Type 2: (Non-Insulin-Dependent Diabetes)* most often occurs in adults over forty and may account for 90% to 95% of the total diabetes cases. In T2DM, either the body does not produce enough insulin or the cells ignore the insulin. Insulin is necessary for the body to be able to use glucose for energy.

When people eat food, the body breaks down all of the sugars and starches into glucose, which is the basic fuel for the cells in the body. Insulin takes the sugar from the blood into the cells. When glucose builds up in the blood instead of going into cells, it can cause two problems:

- Right away, body cells may be starving for energy.
- Over time, high blood glucose levels may hurt patients' eyes, kidneys, nerves or heart.

People with T2DM have problems using the insulin their body produces. Often, T2DM can be controlled by diet and exercise alone, though sometimes an oral agent or insulin is needed to maintain normal blood sugar levels (American Diabetes Association, 2007).

There is another form of diabetes called *Gestational Diabetes*: high blood glucose develops at any time during pregnancy in a woman who does not have diabetes.

Diabetes also occurs secondary to other conditions, such as pancreatitis, acromegaly and Cushing's syndrome, or it may occur because of treatment with corticosteroids. These cases are termed as secondary diabetes.

Warning signs of diabetes include:

- Any of the type 1 symptoms
- Frequent infections
- Blurred vision
- Cuts/bruises that are slow to heal
- Tingling/numbness in the hands/feet
- Hunger
- Thirst
- Frequent urination
- Recurring skin, gum, or bladder infections

Many people with diabetes have no early warning symptoms (American Diabetes Association, 2007).

Risk factors for diabetes include:

- A parent, brother, or sister with diabetes
- Obesity
- Age greater than 45 years
- Some ethnic groups (particularly African Americans, Native Americans, Asians, Pacific Islanders, and Hispanic Americans)
- Gestational diabetes or delivering a baby weighing more than 9 pounds
- High blood pressure

- High blood levels of triglycerides (a type of fat molecule)
- High blood cholesterol level
- Not doing enough exercise (American Diabetes Association, 2007; Larsen et al., 2003; Armstrong, 2006).

Being diagnosed as diabetes is the cause of a major life stress. It requires a large number of physical and mental accommodations. The individual must learn about a complex system of dietary and medical interventions. Lifestyle, work schedules may have altered. This can consume a lot of energy for both the individual and his or her family. Just as important, are the psychological adjustments. One must adjust to a new view of oneself. For those who liked to see themselves as invincible, this may be particularly difficult.

Many newly diagnosed diabetics go through the typical stages of mourning. These are denial, anger, depression and acceptance.

- Denial: This can be one of the more dangerous stages of the grief process. It may not occur only once. Many individuals cycle back to this phase several times.
- Anger: It really does seem unfair. In T2DM, patient trying to lose weight may envy heavier people who seem to enjoy good health. One might erupt at someone who innocently offers a desert. Unfortunately, anger can drastically affect glucose levels.
- Depression: Mild depressive feelings are a normal part of grieving and adaptation. As long as they are not pervasive or prolonged, they may not be harmful. However, when the depression lasts a long time, becomes severe or interferes with diabetic management.

- Acceptance: Individuals achieve different degrees of acceptance and inner peace. Some will need to experience the denial, anger and depression several times, as they move through different phases of life and different stages of diabetes. Some people move through a chronic disease to a state of much greater self-knowledge. They may actually say that the diabetes was, in part, a blessing. Through their close attention to diet and exercise, and their close monitoring of stress levels, they have arrived at a deeper understanding of themselves and their relations to others. They realize that for all human beings, life is vulnerable and precious (Lustman et al., 1997; Stabler, Surwit & Lane et al., 1987; Cohen et al., 1997; Koenigsberg, 1993; Goldston et al., 1997).

This is particularly difficult to manage diabetics when diabetic patient gets depressive symptoms. During this period, diabetic patient needs psychological support. Caregiver may help to manage patient's diabetes as well as depressive symptoms. If a diabetic patient gets clinical level of depression, in that case only caregiver's support is not enough. In this situation, the patient needs to get the management through multi disciplinary approach. Multi disciplinary approach includes the accumulative action of all types of health professionals such as General Physician, Clinical Psychologist, Nurse, and Social Worker to reduce clinical level of depression and manage diabetes. A clinical psychologist plays an important role to motivate diabetic patient to cope with diabetes treatment regimen and manage depressive symptoms.

1.3 Depression

1.3.1 Definition

When a person's feeling of sadness endures beyond a few weeks, he or she may have depression. According to the National Institute of Mental Health (United State of America), three to four million men are affected by depression; it affects twice as many women. Researchers do not know the exact mechanisms that trigger depression. Two neurotransmitters-natural substances that allow brain cells to communicate with one another are implicated in depression: serotonin and norepinephrine.

1.3.2 Symptoms of depression

Four or more of the symptoms have been present continually, or most of the time, for more than 2 weeks. The term clinical depression merely means the episode of depression is serious enough to require treatment. From Diagnostic and Statistical Manual of Mental Disorder 4th edition-TR (DSM-IV-TR), symptoms of depression are described bellow:

- A. Five (or more) of the following symptoms have been present during the same 2 week period and represent a change from previous functioning at least one of the symptoms
1. depressed mood most of the day, nearly every day, as indicated by either subjective report
 2. markedly diminished interest or pleasure in all, or almost all activities most of the day, nearly every day.
 3. significant weight loss when not dieting or weight gain, or decrease or increase in appetite nearly every day
 4. insomnia or hypersomnia nearly every day

5. psychomotor agitation or retardation nearly every day
6. fatigue or loss of energy nearly every day
7. feelings of worthlessness or excessive or inappropriate guilt
8. diminished ability to think or concentrate, or indecisiveness nearly every day
9. recurrent thought of death

B. The symptoms do not meet the criteria for a mixed episode

C. The symptom cause clinically significant distress or impairment in social, occupational, or other important areas of functioning

D. The symptom are not due to the direct physiological effects of a substance or a general medical condition

E. The symptom are not better account for by bereavement (American Psychological Association, 2000)

1.3.3 Causes of depression

Depressive disorders can affect the body, mood and thoughts. Anyone, regardless of age, gender, race, or socioeconomic status, can suffer from depression.

Depression is the leading cause of disability as measured by Years Lived with Disability and the fourth leading contributor to the global burden of disease (Disability Adjusted Life Years) in 2000. By the year 2020, depression is projected to reach 2nd place of the ranking of DALY's calculated for all ages, both sexes. Today, depression is already the second cause of DALY's in the age category 15-44 years for both sexes combined (WHO).

Depressive illness may begin slowly, and then deepen gradually over months or years. Symptoms of depression can also vary according to culture. In some cultures, depressed people may not experience sadness or guilt but may complain of physical problems. In

Mediterranean cultures, for example, depressed people may complain for headaches or anxiety. In Asian cultures, they may complain for weakness, fatigue or imbalance, headaches, poor appetite, pain in whole body.

People with depression often experience feelings of worthlessness, helplessness, guilt, and self-blame. At least 15 percent of seriously depressed people commit suicide, and many more attempt it (Angst et al., 1999; Apter et al., 2001; Gliatto & Rai, 1999; Haewitz & Ravizza, 2000; Oquendo et al., 1997; Osvath et al., 2004; Verona et al., 2004).

In some cases, people with depression may experience psychotic symptoms, such as delusions and hallucinations (Ohayon & Schatzberg, 2002; Johnson et al., 1991). Psychotic symptoms indicate an especially severe illness. Compared to other depressed people, those with psychotic symptoms have longer hospital stays. In addition, after leaving hospital, they are more likely to be moody, unhappy and more prone to committed suicide.

Depression may develop for some social cause: a marital conflict, financial difficulty, or some personal failure. Yet many people with these problems do not become intensely depressed. Most psychologists believe depression results from an interaction between stressful life events and a person's biological and psychological vulnerabilities.

Depression runs in families. By studying twins, researchers have found evidence of a strong genetic influence in depression (McGuffin & Katz, 1989; Tusang & Faraone, 1990; Plomin et al., 1997; Hill & Murry, 1986). Genetically identical twins raised in the same environment are three times more likely to have depression in common than fraternal twins, who have only about half of their genes in common. In addition,

identical twins are five times more likely to have bipolar disorder in common. These findings suggest that vulnerability to depression and bipolar disorder can be inherited (Cadoret et al., 1985).

Genes may influence depression by causing abnormal activity in the brain. Studies have shown that certain brain chemicals called neurotransmitters play an important role in regulating moods and emotions. Neurotransmitters involved in depression include norepinephrine, dopamine, and serotonin.

People who were abused and neglected during childhood have a higher risk of major depression when they become young adults (Sinha, Cnaan & Gelles, 2006).

1.4 Psychological theories of depression

Major psychological views of depressions include the psychoanalytic theory, behavioral theory, and cognitive-behavioral theory.

1.4.1 The Psychodynamic view

The psychodynamic view of depression anchors on the principle of loss (authored by Freud). Researchers privy to this view of depression believe the root of all depression lies in the loss of something loved, whether it can be a person or an object. The loss can be real or it can be imaginary (Gelder, 1996).

1.4.2 The Behavioral view

Skinner proposed that depression could be understood as an extinction of normal behavior due to the lack of its positive reinforcement from the social environment (Skinner, 1953). Moreover, unpleasant events include interaction with the environment

that is aversive in that, they are distressing; these include negative sexual and marital experience and the experience of incompetence in any field. Depression is been due to low rate of positive rewards and a high rate of negative rewards (Hill & Murray, 1986).

1.4.3 The Cognitive Behavioral view

One etiological theory of depression is the Aaron Beck cognitive theory of depression. His theory states that depressed people think the way they do because of their thinking is been towards negative interpretations. According to Beck's theory of depression, depressed people acquire a negative schema of the world in childhood and adolescence (Children and adolescents who suffer from depression acquire this negative schema earlier). Depressed people acquire such schemas through a loss of a parent, rejection of peers, criticism from teachers or parents, the depressive attitude of a parent and other negative events. When the person with such schemas encounters a situation that resembles in some way, even remotely, the conditions in which the original schema was learned, the negative schemas of the person are activated (Gerald & Neale, 2001).

Another theory established by Seligman called "Learned helplessness". In his theory he told that learned hopelessness is a psychological condition in which a human being or an animal has learned to act or behave helpless in a particular situation, even when it has the power to change its unpleasant or even harmful circumstance. Learned helplessness theory is the view that clinical depression and related mental illnesses result from a perceived absence of control over the outcome of a situation (Kaplan, Sadock & Grebb, 1994). Seligman concluded that there are six symptoms of learned helplessness; each of them has parallels in depression:

Six symptoms are-

- Reduced intension of voluntary response
- Negative cognitive set (difficulty in learning that responses will produce outcomes)
- Persistence overtime (increased by multiple exposure to uncontrolled punishment)
- Reduced aggressive and competitive responses with lowered dominance status
- Loss of appetite, weight and libido
- Physiological changes (Kaplan, Sadock & Grebb, 1994 & Seligman, 1975)

1.5 Bio-psycho-social determinants of major depression

There are no single causes of depressive disorder. In fact, depressive disorder is a result of a combination of three major factors, which play a significant role in its causation and maintenance:

- Biological
- Psychological
- Social

Biological factors either alone or with the psychological factors make the individual vulnerable to depressive disorders and the social factors trigger the illness. Thus, depressive disorder is a combination of three (Rahim, 2001) (Figure: 1)

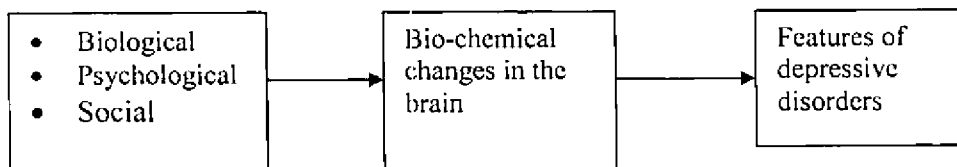


Figure1: Etiological factors of depression

There are several forms of depressive disorders. The most common are major depressive disorder and dysthymic disorder (Kessler et al., 2005; WHO, 2004).

1. Major depressive disorder
2. Dysthymic disorder

Dysthymic disorder, also called dysthymia, is characterized by long-term (two years or longer) but less severe symptoms that may not disable a person. But can prevent one from functioning normally or feeling well. People with dysthymia may also experience one or more episodes of major depression during their lifetimes (Kessler et al., 2003).

Some forms of depressive disorder exhibit slightly different characteristics than those described above, or may develop under unique circumstances. However, not all scientists agree on how to characterize and define these forms of depression. They include:

Psychotic depression, which occurs when a severe depressive illness is accompanied by some form of psychosis, such as a break with reality, hallucinations, and delusions.

Postpartum depression, which is diagnosed if a new mother develops a major depressive episode within one month after delivery. It is estimated that 10 to 15 percent of women experience postpartum depression after giving birth (Altshuler, Hendrich & Cohen, 1998).

Seasonal affective disorder (SAD), which is characterized by the onset of a depressive illness during the winter months, when there is less natural sunlight. The depression generally lifts during spring and summer. SAD may be effectively treated with light therapy. (Rosenthal, Sack & Gillin, 1984; Rohan et al., 2004).

Bipolar disorder, also called manic-depressive illness, is not as common as major depression or dysthymia (Gentile, 2007; Jarema, 2007; Mathews & Muzana, 2007; McClellan, 2007). Bipolar disorder is characterized by cycling mood changes-from extreme highs (e.g., mania) to extreme lows (e.g., depression).

Depression typically cannot be shaken or willed away. An episode must therefore run its course until it weakens either on its own or with treatment. Depression can be effectively treated with antidepressant drugs, psychotherapy or a combination of both.

Despite the availability of effective treatment, most depressive disorders go untreated and undiagnosed. Studies indicate that general physicians fail to recognize depression in their patients at least half of the time. In addition, many doctors and patients view depression in elderly people as a normal part of aging, even though treatment for depression in older people is usually very effective (Rohan et al., 2004).

1.6 Relationship between T2DM and depression

Empirical studies strongly suggest that depression is more prevalent among adults with diabetes than among the general population (Gavard, 1993). Living with diabetes can mean loss of health, independence, freedom and these factors can affect the psychological state. Many people have trouble in adjusting to living with diabetes and often require support from family, friends and health professionals.

Fisher explained two general theories about relationship between T2DM and depression. "One theory says that depression hits people with diabetes more often than the general population because they get burned out managing their disease. They get upset, gloomy and hopeless and many feel that, they cannot control what is going on.

"The second theory looks at the links between glucose metabolism and the physiological response to stress, distress and depression. All of these factors are linked through the neuro-endocrine system in ways that are not well documented. It is thought by some that high, chronic levels of depression influence glucose metabolism over time through these interlocking physiological systems." (Lustman & Ryan, 2002; Lustman, Penckofer & Ray, 2007).

Recent estimates indicate that from 10.9% to 32.9 % of diabetes patients have been affected by depression (Anderson et al., 2001). These numbers vary in accordance to methods of psychopathological classification and assessment of depressive symptom. Studies also shows compared to general population, individuals living with type 2 diabetes experience greater frequency and duration of depressive episodes (Lustman et al 1997).

Depression could double the risk of developing type 2 diabetes mellitus, and can be considered a risk factor for its development (Eaton et al., 1996; Freedland, 2004). The Hoorn found psychological stress was positively associated with diabetes mellitus (Mooy et al 2000). The number of stressful life events during the preceding five years was assessed in 2,262 adults aged 50-74 year without known diabetes, five per cent had previously undiagnosed diabetes. Among single stressful events unrelated to work, death of a partner or moving from a house was related to greater percentage of undetected diabetes (10.6 and 6.9%). Similarly more the number of stressful events reported, the greater the prevalence of undetected diabetes. This study suggested that stressful life events could lead to the onset of diabetes mellitus. There is a saying that heredity loads the gun (T2DM) and stress pooled the trigger. The causal roles are unclear, although impaired central nervous system glucose metabolism, sedentary lifestyle, diet and smoking may all contribute to expand depression in diabetes. (Haupt & Newcomer, 2004).

A recent study has shown that leptin in the limbic system and could have a potential role in emotional processes. Increasing the leptin signals in brain may be a new approach to treat depressive disorders (Lu et al., 2006).

1.7 Prevalence of T2DM and Depression

Depression is a highly prevalent disease associated with substantial morbidity, mortality and recognized as an important co-morbidity for a number of chronic medical conditions. Among many chronic medical conditions, diabetes is the one, which is overburdened by depression. Numerous reports have indicated that patients with diabetes are 1.5–2 times more likely to have depression compared with people without diabetes (Little et al., 1998).

Over the past years, research has evidenced a high prevalence of depression in patients with diabetes and its deleterious relationship to the metabolic control (Lebowitz et al., 1997). Most researchers agree that an interaction of both physiological (neurochemical and neurovascular changes) and psychosocial factors (decreased quality of life, chronic stress associated with daily diabetes management) interact to increase psychological vulnerability to depression (Reynolds et al., 2006).

Studies showed 25% of diabetic do have depression in their lifetime. Since the prevalence is rising in Bangladesh 10% of the adult population with diabetes and among them, at least 2-3% does have depression of varying degrees of severity (Chowdhury et al., 1981).

A meta-analysis of studies on the prevalence of co-morbid depression in adults with diabetes was published recently. Medline and PsycInfo search engines were used to identify studies that measured point prevalence or lifetime prevalence or both, of

depression in adults with diabetes, thirty-nine studies were included, with a total combined of 20,218 subjects. The principal conclusion was that diabetes doubled the odds of depression (Anderson et al., 2001). Depression might be related to complexities in management of diabetes (Sridhar & Madhu, 2002). In clinical practice, identification of depression in diabetes often ignored for a variety of reasons: societal disapproval of depression, complicity between physicians and patients not to discuss depressive symptoms, and wrongly considering depression as a 'normal consequence of difficult medical illnesses (Lustmana & Clouse, 2004). The potential benefits of treatment are thereby missed. It may be suspected by history of depression, mental health treatment, family history of depression, symptoms out of proportion to medical explanation, and persistent focus on bodily complaints, innocuous medical symptoms not responding to reassurance, sexual dysfunction or chronic pain as a dominant complaint (Kohen, 2004).

Sometimes only medication cannot help patient to elevate their uncontrolled diabetes as well depression. Combination of diabetes medication and psychotherapy may help to control their diabetes and depressive symptom.

1.8 Psychological management

1.8.1 Psychotherapy

Psychotherapy is a process of discovery whose goal is to eliminate or control troubling and painful symptoms so that the patient can return to normal functioning. It also can be used to help a person overcome a specific problem or to stimulate overall emotional growth and healing. Psychotherapist helps people boost insight into their feelings, change behaviors, resolve problems or learn how to deal with feelings like stress, grief, loss, fear and sadness. Sometimes, Psychotherapy or talk therapy is combined with homework assignments between sessions. Therapy can be held one-on-one, with couples, families or even in groups.

The National Institute of Mental Health (NIMH) is part of the National Institutes of Health (NIH), a component of the U.S. Department of Health and Human Services suggests psychotherapy for people when:

- They feel an overwhelming and prolonged sense of sadness, helplessness, helplessness and lack of hope about lives.
- Their emotional difficulties make it hard for them to function from day to day. For example, they are unable to concentrate on assignments and their job performance suffers as a result.
- Their actions are harmful to themselves or to others. For instance, they drink too much alcohol, taking drugs and become overly aggressive.
- They are troubled by emotional difficulties facing family members or close friends.
- They are having problems with interpersonal relationships.

Talk therapy brings concrete results for many people. Research shows emotional and physical healths are closely linked and that therapy can improve a person's overall health.

Therapy can effectively decrease depression, anxiety and related symptoms such as pain, fatigue and nausea. According to the National Institute of Mental Health (USA), more than 80 percent of people with depressive disorders improve when they receive appropriate treatment. Psychotherapy has also been found to increase survival time for heart surgery, cancer, diabetic patients and it can have a positive effect on the body's immune system.

The followings are the common types of therapy:

- Cognitive behavior therapy
- Interpersonal therapy
- Gestalt therapy
- Music therapy
- Drama therapy
- Photo therapy
- Supportive therapy
- Family therapy
- Sex therapy
- Light therapy

Study showed that, cognitive behavior therapy is more effective to decrease blood glucose level and depression (Lustman, 1998). Additional psychotherapy also used based on patients need.

1.8.2 What is Cognitive Behavior Therapy?

Cognitive and/or behavioral psychotherapies (CBP) are psychological approaches based on scientific principles and research has shown to be effective for a wide range of problems. Clients and therapists work together, once a therapeutic alliance has been formed, to identify and understand problems in terms of the relationship between thoughts, feelings and behaviors. The approach usually focuses on difficulties in the here and now, and relies on the therapist and client developing a shared view of the individual's problem.

Cognitive and/or Behavioral Psychotherapists are usually health professionals such as clinical psychologist, specialist mental health nurses, psychologists, psychiatrists, general practitioners, social workers, counselors or occupational therapists who have received additional cognitive and/or behavioral therapy training and supervision .

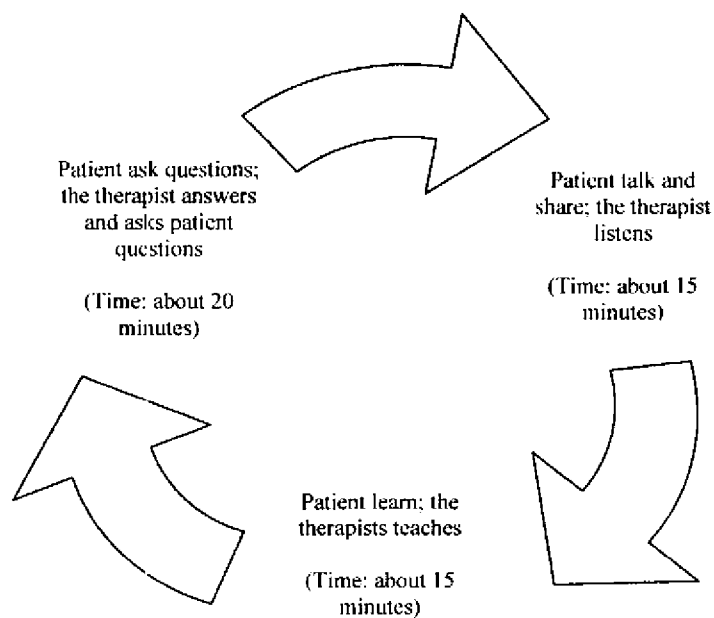


Figure 2: A Typical CBT Session

1.8.3 Key factors influencing the effective delivery of cognitive behavior therapy

- Therapeutic relationship – a trusting, safe, therapeutic alliance is essential for successful CBT sessions.
- Collaboration–
 - Is a way of being with clients based on equal collaborations, both of them bringing something to the therapeutic relationship. The therapist brings skills and knowledge of psychological processes, theories of emotion and techniques that have helped others and could help the client. The client is an expert in their own experience, and brings their own resources.
 - The therapist should not have pre-conceived ideas about where the therapy is going.
- Formulation – a unique map or hypothesis of presenting problems or situations that integrate information from assessments within a coherent CBT framework drawing upon theory and evidence based practice.
- Socratic dialogue/ guided discovery – is a style of questioning to both gently probe for people's meanings and to stimulate alternative ideas. It involves exploring and reflecting on styles of reasoning and thinking and possibilities to think differently. CBT is not about trying to prove a client wrong and the therapist right, or getting into unhelpful debates – rather by skillfully collaborating, clients come to see for themselves (discover) that there are alternatives

- Homework – the client tries things out in between therapy sessions, putting what has been learned into practice. This is referred to as homework and sometimes includes behavioral experiments.
- An ability to engage clients and to form a collaborative working relationship with them.
- Ability to conduct a comprehensive assessment-involving interview, observation, data collection and the use of relevant clinical measures.
- An ability to formulate a model of therapeutic change using theory, principles and research derived from the cognitive, cognitive-behavioral and/or behavioral approaches to therapeutic change.
- Use educational strategies and relationship skills to inform the client/patient and encourage their active participation in clinical decision-making and the development of a personalized therapeutic program based on cognitive and/or behavioral theoretical principles and research.
- To implement a therapeutic program with the active participation of the client/patient, skillfully using a range of cognitive and/or behavioral methods to teach /coach them in the acquisition of improved skills in their use of more adaptive cognitive, behavioral and physiologically responsive strategies for the alleviation of distress and development of personal effectiveness.
- To monitor the effects of treatment, reinforcing and shaping the client/patients participation; modifying the treatment procedures as dictated by progress, data feedback and collaborative problem solving.
- Skillfully utilize the clinical environment, community resources and the clients own home setting (as relevant), with the involvement of client/patient partner,

family and significant others (where relevant and with the client/patients informed consent) to facilitate and generalize effective change and feedback.

- A therapist must be skillful to evaluate client/patient progress through the collaborative clinical relationship, preparing them for increased independence from therapeutic help and discharging them from active treatment into a planned follow-up process that audits clinical effectiveness through client/patient outcome measures.

1.9 Justification of the study

Diabetes, a condition that places responsibility for management firmly on the individual, has a serious impact on daily life, and can have psychosocial and emotional consequences. Psychological problems such as depressive symptomatology are much more common in those with diabetes than in those without this disease. The exact cause of depression in-patient with diabetes is unknown, but it is likely complex, involving interactions among psychological, physical and genetic factors.

Diabetes is a challenging illness, coping with the disease and its complications such as neuropathy, nephropathy, retinopathy, cardiovascular disease and loss of sexual capacity are difficult. In addition, it may append to depression. While the clinical response that depression is merely secondary to diabetes is evident in some cases, this hypothesis insufficiently account for most cases of depression. Most of the researcher agreed that an interaction of both physiological and psychosocial factors of depression in diabetes decreased self-esteem, self-health care, day-to-day living activities, and overall quality of life. There is also a grater risk of depression in-patient with diabetes who has a family history of depression; this may be inductive of a genetic vulnerability (Lustman et al., 1987).

The causes of depressive disorders in diabetes patient is multi-factorial but specially in Bangladesh the potential precipitating factors in predisposing persons may be due to:

- Bio-psycho-social problems
- Economical and political instability
- Imbalance between earning and expenditure

Diabetics may also feel lonely or set apart from friends and family because of several extra work. Some diabetic may feel hopeless because they cannot follow the daily

routine of diabetes management, occasionally they cannot practice the physician's instruction and there blood glucose level remains high.

Professional mental health worker like Clinical psychologist can help these patients to overcome these morbid conditions. Combination of psychological and physiological intervention strategies help to reduce high blood glucose level as well as depression. There are various forms of psychological interventions such as family therapy, cognitive behavior therapy, supportive therapy, play therapy, marital therapy. Cognitive behavior therapy is one of the established psychological intervention methods for treating depression in diabetic patient.

The present research is designed to add more knowledge to diabetes and depression based on objectives that can define the relationship between diabetes mellitus and depression. The intervention will help to reduce high blood glucose level and depression. This study will also help to evolve psychotherapeutic interventions to deal with depression in the diabetics and thereby enhance their coping strategies for hazard free, better quality of life. Therefore, it is justified to study diabetes and the relationship between depression and the role of psychological management in combating such conditions.

1.10 Objective of the study

To find out the relationship between Type 2 Diabetes Mellitus & depression and to see the effect of psychological management of patients with T2DM and depression.

1.11 Hypotheses

1. There is a relationship between T2DM and depression.
2. Cognitive behavior therapy is an effective psychological management for treating T2DM patients with depression.

The next chapter deals with literature review. The third chapters present the investigation. The results of the investigation are given in chapter four. The fifth and final chapter deals with discussion.

CHAPTER II LITERATURE REVIEW

Chapter II

LITERATURE REVIEW

2.1 Relationship between T2DM and depression

Major depression occurs in one out of four patients with type 1 and type 2 diabetes mellitus (Anderson et al., 2001) and is associated with poor glycemic control, negative clinical outcomes, reduced quality of life, lower level of function, and diabetic-related morbidity (Katon et al., 2004; Zhang et al., 2005). Several studies demonstrated that individuals with diabetes experienced up to threefold incidence of depression compared to those without diabetes (Herrmanns et al., 2005; Nichols & Brown, 2003).

Sherita et al, (2004) conducted a research to determine whether depressive symptoms predict type 2 diabetes. They found that the baseline depressive symptoms were positively associated with BMI, fasting insulin, systolic blood pressure, caloric intake, physical inactivity, and current smoking (all $P < 0.05$). In prospective analyses, after adjusting for age, race, sex, and education, individuals in the highest quartile of depressive symptoms had a 63% increased risk of developing diabetes compared to those in the lowest quartile (relative hazard [RH] 1.63, 95% CI 1.31–2.02). This relation persisted after adjustment for stress-associated lifestyle factors (smoking, physical activity, caloric intake, and adiposity) (1.28, 1.02–1.60) and metabolic covariates (fasting insulin and glucose, lipids, blood pressure, and adiposity) (1.38, 1.10–1.73).

Freedland, (2004) analyzed data, from four large prospective population studies from the United States and Japan, determined the risk of diabetes development attributable to depression. These studies included nearly 100,000 participants in all. Each of the

studies controlled traditional diabetes risk factors in determining risk. While acknowledging the possibility of publication bias and other confounding influences, Freedland concluded that the studies provide convergent evidence that depression significantly increases the risk of developing type 2 diabetes.

In a research, Ali et al, (2007) found that the symptoms of depression are more common in diabetes than non-diabetics in a rural community of Bangladesh. They established that, 29% of male and 30.5% of female participants with diabetes and 6.0% of male and 14.5% of female subjects without diabetes had depressive symptoms rating ≥ 20 on the Montgomery and Aasberg Depression Rating Scale (MADRAS). After controlling for potential confounding factors including age, gender, fasting plasma glucose > 7.0 mmol/L and waist-hip ratio, the association of depression with diabetes remained significant. The findings indicate that depression is particularly common in those with diabetes.

Denise et al, (2006) studied the elderly people with diabetes using both psychiatric and psychotropic medication and found that Major depressive disorder (MDD) affects about 10% of older adults and 18% of those with type 2 diabetes. Adults with diabetes have twice the rate of major depression compared to those without diabetes.

Elizabeth et al, (2004) established that the predominantly type 2 diabetic population had a mean HbA_{1c} level of $7.8 \pm 1.6\%$. Three-quarters of the patients received hypoglycemic agents (oral or insulin) and reported at least weekly self-monitoring of glucose and foot checks. The mean number of HbA_{1c} tests was 2.2 ± 1.3 per year and was only slightly higher among patients with poorly controlled diabetes. Almost one-half (48.9%) had a BMI > 30 kg/m², and 47.8% of patients exercised once a week or

less. Pharmacy refill data showed a 19.5% non-adherence rate to oral hypoglycemic medicines (mean 67.4 ± 74.1 days) in the prior year. Major depression was associated with less physical activity, unhealthy diet, and lower adherence to oral hypoglycemic, antihypertensive, and lipid-lowering medications. In contrast, preventive care of diabetes, including home-glucose tests, foot checks, screening for microalbuminuria, and retinopathy was similar among depressed and non-depressed patients.

Groot et al, (2001) originate a significant association between depression and complications of diabetes ($p < .00001$, $z = 5.94$). A moderate and significant weighted effect size ($r = 0.25$; 95% CI: 0.22–0.28) was calculated for all studies reporting sufficient data ($k = 22$). Depression was significantly associated with a variety of diabetes complications (diabetic retinopathy, nephropathy, neuropathy, macro-vascular complications, and sexual dysfunction). These findings demonstrate a significant and consistent association of diabetes complications and depressive symptoms.

According to Pineda et al, (2007), diabetes is steadily becoming an epidemic among Latinos, and depression complicated diabetes management. This study examined depressive symptoms and metabolic control in Latinas with diabetes in a community with diabetes in a community clinical setting. The association of depressive symptoms and metabolic control was supported in this study. Social support was found to be associated with depressive symptoms. These findings explained in a culture-specific framework. The authors speculate that the role of the women in Latino families makes it difficult for a Latina to attend to her own care needs until she ages.

Gary et al, (2000) conducted a research to determine the prevalence of depressive symptoms and the relationship between depressive symptoms and metabolic control. In

their result they found that the prevalence of depressive symptoms (CES-D ≥ 22) was 30%. After adjustment for age, sex, income, social support, and duration of diabetes in linear regression models, there were significant graded relationships between greater depressive symptoms and higher serum levels of cholesterol and triglycerides ($P < 0.050$). Similar, albeit less statistically significant, relationships were found with higher levels of HbA1c ($P = 0.104$), diastolic blood pressure ($P = 0.073$), and LDL cholesterol ($P = 0.176$). Unexpectedly, individuals who reported more depressive symptoms also had higher serum levels of HDL cholesterol ($P = 0.047$). In conclusion, they established that depressive symptoms are marginally associated with suboptimal levels of HbA1c, diastolic blood pressure, and LDL cholesterol, and significantly associated with suboptimal levels of total cholesterol and triglyceride levels.

2.2 Role of psychological management

Ismail and Hesketh (2004), explored whether adherence difficulties and psychological problems are associated with poor glycaemic control in diabetes a meta-analysis review.

They searched MEDLINE, PsychINFO, EMBASE, and the Cochrane Central Register of Controlled Trials up to January 2003. Eligible studies were randomized controlled trials that involved people with type 2 diabetes and evaluated a psychological therapy (counseling, cognitive behavior therapy, or psychodynamic therapy) to improve diabetes control. They extracted the number of participants, their age, duration of diabetes, glycaemic control, type of psychological therapy, its mode of delivery, and type of intervention in the control group. Twenty-five trials were eligible for the review. In 12 trials, the mean percentage glycated hemoglobin was lower in people assigned a psychological intervention than in the control group (usual care, education,

waiting list, or attention control); the pooled mean difference was -0.32 (95% CI -0.57 to -0.07) equivalent to an absolute difference of -0.76%. There were non-significant differences in blood glucose concentration (eight trials; -0.11 [-0.65 to 0.42]) and weight gain (nine trials; 0.37 [-0.18 to 0.93]). Psychological distress was significantly lower in the intervention groups (five trials; -0.58 [-0.95 to -0.20]). Interpretation of the study, in type 2 diabetes, there are improvements in long-term glycemic control and psychological distress but not in weight control or blood glucose concentration in people who receive psychological therapies.

Wayne et al, (2005) administered a research on the association of co morbid depression with mortality in Patients with Type 2 Diabetes. In their study, they found that there were 275 (8.3%) deaths in 3,303 patients without depression compared with 48 (13.6%) deaths in 354 patients with minor depression and 59 (11.9%) deaths among 497 patients with major depression. A proportional hazards model with adjustment for age, sex, race/ethnicity, and educational attainment found that compared with the non-depressed group, minor depression was associated with a 1.67-fold increase in mortality ($P = 0.003$), and major depression was associated with a 2.30-fold increase ($P = 0.0001$). In a second model that controlled for multiple potential mediators, both minor and major depression remained significant predictors of mortality. In fine, they found that among patients with diabetes, both minor and major depressions are strongly associated with increased mortality.

A study carried by Lustman and Freedland (1998) found that cognitive behavioral therapy (CBT) improves depression in diabetes. Depression remitted in 85% of those receiving CBT as compared to 27% of those not receiving CBT in one study ($P < 0.001$). They found that enhanced care management for depression also showed improved mood, functioning, and exercise.

Wang et al (2008) conducted a systematic review of three randomized controlled clinical trials evaluating the efficacy of non-pharmacological treatment of depression on glycaemic control in individuals with type 2 diabetes. Cochrane library, Pubmed, MEDLINE, EBM review, ProQuest Medical Bundle and SCOPUS databases were searched using the following medical subject headings or key words - depression, mood disorder, depressive symptoms, diabetes mellitus, glycemic control, glycated hemoglobin, glucose, psychological therapy, psychotherapy, non-pharmacological therapy and cognitive behavior therapy. The publication date was limited from 1996-2007. Studies were selected if they used a randomized controlled trial design using non-pharmacological treatments for depression, included individuals with type 2 diabetes mellitus as participants, depressive symptoms and glycaemic control (determined by hemoglobin A(1)C) as outcomes. In conclusion, they established from the available evidence that non-pharmacological treatment of depression had limited effect on glycaemic control in individuals with type 2 diabetes.

Piette (2005) developed an intervention that used a cognitive-behavioral therapy (CBT) model to promote walking among individuals with co-morbid diabetes and depression. The intervention—the Michigan VA Positive Steps Program—was tested in a pilot program at the Department of Veterans Affairs (VA) Health Services Research and Development Center for Excellence in Ann Arbor in 2003. Their primary care provider identified individuals with both diabetes and depression and interested individuals were subsequently screened for eligibility. During sessions, the nurse reviewed CBT concepts with the patient and encouraged the patient to gradually increase his or her daily step counts.

The intervention materials were modified from existing CBT manuals. Specific information about diabetes and the walking program was added. Eleven individuals began the pilot program, but three dropped out before starting the physical activity component. Of the eight who completed the study, five recorded pedometer data for both the 6th and 12th week. Initially, participants walked an average of 6,562 steps per day. Six weeks later, the average step count was 8,829 steps per day ($t=3.05$, $df=4$, $p=.039$). The average difference of 2,266 steps represents an increase of 20 minutes of walking each day at three miles per hour.

T. A. Armour et al (2004) conduct a systematic review of published literature to assess which family interventions are effective in improving diabetes-related outcomes in people with diabetes and family members (blood or non-blood relatives) residing in their homes. They searched computerized bibliographic databases (MEDLINE, EMBASE, PsycINFO, CINAHL, WOS, ERIC, Cochrane, CDP, and SocAbs) for randomized clinical trials published in any language that evaluated the effectiveness of family-based interventions with no age restriction. They found that family-based interventions had positive effect on knowledge for five studies ($N= 217$). A beneficial effect of interventions on GHb for eight studies ($N = 505$) was also observed using Meta analysis [-0.6 (95% CI $-1.2, -0.1$)].

The literature suggested that self and family education in diabetes and psychotherapy might be effective in improving diabetes and depression or both.

CHAPTER III THE INVESTIGATION

Chapter III

THE INVESTIGATION

3.1 The Sample

Six hundred and fifty two diabetes patients constituted the purposive sample of this study. They were attending at the outpatient department (OPD) of Bangladesh Institute of Health Science (BIHS) Bashaboo, Dhaka-1214 and Bangladesh Institute of Research and rehabilitation on Diabetes, Endocrine and Metabolic Disorder (BIRDEM), Shahbagh, Dhaka. These organs of the Diabetic Association of Bangladesh (DAB). The ages of the respondents were between 20 and 80 years with an average age of 51 ± 11 . The responders were divided into three groups, as described below:

Group A:

In this group, two hundred nine patients were included. They were newly diagnosed as diabetic (duration of diabetes was between 0 to 12 months).

Group B:

Two hundred twenty seven patients suffered from diabetes for 1 to 10 years were in this group.

Group C:

The third group constituted by two hundred sixty patients having diabetes for more than 10 years.

All the groups were tested by depression scale (Uddin & Rahman, 2005) to find out the rate of depression. From 652 patients of three groups, six patients were selected to provide psychological intervention. The patients were selected according to their severity of depression. Detailed descriptions of the subjects are presented in (Table 1 and 2).

Table 1: Subjects' Characteristics

Demographic Variables	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
<u>Age</u>						
30-40 years	3	0.5	22	3.4	25	3.8
31-40 years	49	7.5	54	8.3	103	15.8
41-50 years	94	14.4	119	18.5	213	32.7
51-60 years	110	16.9	75	11.5	185	28.4
60+	92	14.1	34	5.2	126	19.3
Total	348	53.4	304	46.6	652	100.0
<u>Education</u>						
Illiterate	25	3.8	52	8.0	77	11.8
Primary	53	8.1	109	16.7	162	24.8
Secondary	100	15.3	106	16.3	206	31.6
Degree	85	13.0	26	4.0	111	17.0
Hons.	43	6.6	4	0.6	47	7.2
M.A & others	42	6.4	7	1.1	49	7.5
Total	348	53.4	304	46.6	652	100.0
<u>Occupation</u>						
House wife	0	0	268	41.1	268	41.1
Service	136	20.9	16	2.5	152	23.3
Business	93	14.3	3	0.5	96	14.7
Retired	82	12.6	10	1.5	92	14.1
Others	37	5.7	7	1.1	44	6.7
Total	348	53.4	304	46.6	652	100.0
<u>Duration of T2DM</u>						
<1 year	97	14.9	112	17.2	209	32.1
1-10 years	115	17.6	112	17.2	227	34.8
10+ years	136	20.9	80	12.3	216	33.1
Total	348	53.4	304	46.6	652	100.0
<u>Marital Status</u>						
Unmarried	2	0.3	1	0.2	3	0.5
Married	334	51.2	246	37.7	580	89.0
Divorced	2	0.3	0	0	2	0.3
Separated	1	0.2	3	0.5	4	0.6
Total	348	53.4	304	46.6	652	100.0

Table 2: Demographic information of the Subjects receiving Psychotherapeutic Interventions (n=6)

Serial Number	Cases ID Number	Sex	Age	Education	Marital Status	Socio-economic Status	Occupation	Number of Sessions	Follow Up
1	C1	Female	49	S.S.C	Divorce	Upper Middle	Housewife	15	2
2	C2	Female	43	Diploma Engineer	Married	Middle	Housewife	8	DNA
3	C3	Male	43	B.A.	Married	Middle	Business	16	1
4	C4	Female	52	S.S.C	Married	Middle	Housewife	8	1
5	C5	Female	50	S.S.C	Separated	Lower Middle	Nurse	10	1
6	C6	Female	42	S.S C	Widow	Lower Middle	Business	13	1

DNA= Did not attained

3.2 Research Design

In the present study, both qualitative and quantitative research methods were used (Strauss & Corbin, 1990). Survey method was used to find out the relationship between T2DM and depression. Quantitative data collection method was employed to find out the relationship between T2DM and depression. The qualitative case study method was also applied to identify different types of issues in T2DM and depression such as causal factor of depression, present situation of blood glucose level, predisposing, precipitating and maintaining factors of depression. Pre-post test was used to see the effectiveness of psychological intervention.

3.3 Means and Instruments of collecting data

1. Socio-demographic questionnaire includes age, sex, education, marital status, socio-economic status, etc to compare relationship between socio-demographic variables, T2DM and depression.
2. Accu-check active-blood glucose measuring instrument, manufactured by Sanofi Aventis used for estimation of blood glucose level.
3. Depression Scale (Uddin & Rahman, 2005) was used to detect the current level of depression. A depression scale was developed and tested by the researchers in Bangladesh for the first time. This is a 5-point rating scale. Ideas of these items were taken from some foreign scales such as Beck Depression Inventory (BDI), Hospital Anxiety Depression Scale (HADS). This research was conducted in 3 phases. The reliability of this scale was done by measuring internal consistency (through conducting split-half reliability) and test-retest reliability. Rating scales were discrete as follows: 'not at all applicable=1'; 'not applicable=2'; 'uncertain=3'; 'a bit applicable=4'; and 'fully applicable=5'.
4. Qualitative data collection method was used by using topic guide to explore patients' negative automatic thoughts, contemporary thoughts about diabetes and depression. Illness related behavior, feelings and thoughts assessed by using 5 factor model. All of these were investigated using semi structured clinical interview. Topic guide were arranged by the researcher with the help of mental health professionals.
5. 11-point rating scale was used with patients self-rating with respect to their current problem severity. Here '0' means no problem, and '10' means most severe problem. The rating was recorded after verbal confession by the patients. The intervention rating scale was used before and after the psychological intervention.
6. Observational report was overseen to establish the observable features and to monitor changes after applying psychological managements. Facial expression, body language as for example: gesture and posture, tone of

voice, eye contact, speech, mood (anxious, depressed), motor and social behavior were the observation report indicators. This report was collected during the beginning, middle and last part of the sessions.

7. The baseline assessment was done by in-depth interview to monitor changes. The assessment of functional level was also done in six different ways such as social, occupational, cognitive, somatic, behavioral, and motivational.
8. Subjective reports were taken from the subjects to find out the efficacy of the psychological interventions.
9. Pre-test and post-test method were applied to see the gradual improvement of the subjects. Here pre-test means assessment phase and post-test means intervention phases.

3.4 Procedure

The study was conducted in two phases:

Phase 1:

Sixteen hundred and fifty two cases were selected purposively from Bangladesh Institute of Health Science, Bashaboo, Dhaka-1214 and Bangladesh Institute of Research and rehabilitation on Diabetes, Endocrine and Metabolic Disorder (BIRDEM), Shahbagh, Dhaka. Depression scale (Uddin & Rahman, 2005) was administering the subjects to assess the level of severity of depression. Depressive symptoms were rechecked with the help of Diagnostic and Statistical Manual of Mental Disorder (DSM-IV-TR). To find out the connection between blood glucose level and depression, means, standard deviations correlational analysis were conducted.

Phase 2:

In the second phase, six cases were purposively selected according to inclusion criteria such as age, sex, education, marital status, duration of diabetes etc. All subjects were selected from phase one respondents. At first, brief description of the research was given to the subjects. The researcher took informed consent from them. Then the researcher individually administered a socio-demographic questionnaire. The researcher explained the psychological intervention procedure and its benefit to

ameliorate T2DM as well as depression to the patient. The researcher, in clinical setting, arranged one session every week. Two sessions per week were arranged according to the patient's necessitate. Then blood glucose level was measured using accu-check machine in every alternative session. In depth interview was taken for assessment purpose. It included presenting problems, chief complaint, history of physical illness, childhood, educational, occupational, marital, family history, families' medical and psychiatric history, onset of T2DM, predisposing, precipitating and maintaining factors of depression and T2DM. Depression scale was used to assess the current level of depression (Uddin & Rahman, 2005) in every alternative session. Some preliminary therapeutic technique was used to build up rapport. All personal information was collected using topic guide and structured clinical interview method. After gathering, all information a formulation was shared by using Beck's cognitive model of depression. Patients' dysfunctional assumptions, negative automatic thoughts were analyzed using coding and matrix. At the same time, maintaining factors were also found out with the help of the subjects. After sharing the formulation, cognitive behavior therapy was applied to reduce depression in subjects.

3.5 Intervention Principle

Goals of Intervention (Cognitive Behavior Therapy):

The goals of cognitive behavioral therapy are to alleviate depressive symptoms, T2DM and prevent their recurrence by helping the patients:

1. Identify, test and reshape negative cognitions about themselves, the world, and the future
2. Develop new and more flexible cognitive patterns
3. Getting a better understanding of patients personal goals
4. Developing skills for improving therapeutic relationships
5. Managing T2DM, depression and other situations
6. Finding solutions to the issues or concerns that first brought patient in to therapy
7. Learn coping skills

Although side-effects of therapy are not common, there is the potential risk that talking with a therapist may make patient feel worse about his/her situation. Patients may feel emotions such as anger, guilt, sadness, frustration, loneliness, or helplessness. These feelings may be brief. They may be a sign that patients are working hard in therapy. When these feelings come up, it is helpful to talk with the therapist about them so that patient can better understand and cope with them.

3.6 Intervention (CBT) session

To build up rapport the researcher listened to the patient very carefully. For this researcher started conversation with the patient where he/ she told his/ her story. Both the patient and the researcher worked together to come up with new ways to manage depressive symptoms so that the patient could better cope with life. Each of this session lasted approximately 50-60 minutes. A session of therapy was done once a week generally. Most of the courses of CBT lasted for several weeks. Depending on the nature and the severity of the condition, a course of CBT could be longer or shorter. It generally takes 10-15 sessions.

A brief description of Cognitive Behavior Therapy sessions for the T2DM patients with depression are described below. (The first three were patients' baseline assessment session).

- a. Socialization to therapy, increasing hope, establishing rapport and assessment are the things on which initial sessions were focused. The cognitive model was shared through the consideration of the relationship between thoughts and feelings. To identify the current level of depression, Depression scale (Uddin & Rhman, 2005) was administered in every alternative sessions. By working on the prioritized and agreed targeted problems the early sessions continued. Behavioral technique was used to reduce targeted problems e.g. inactivity, withdrawal and loss of pleasure. To find out patients' mastery and pleasure routine an activity schedule was given to monitor their daily activities. Five

factor models were given to identify how the patients' thoughts, ideas, feelings, attitudes and behaviors affect their daily life.

- b. Psycho- education was given for T2DM and depression in the middle sessions when the rapport was build up. To elevated patients daily activity levels different behavioral techniques e.g. problem solving, graded task assignment were administered. Later on pros and cones were identified for decision-making.
- c. To identify targeted problems, in particular, the identification and challenge of negative automatic thoughts, cognitive techniques were used. The researcher helped the patient to learn how to identify negative thoughts and challenge them in between sessions.
- d. Lesson learned and how to use them in the real life situation was mainly focused on the final sessions of the therapy. The researcher also worked for relapse prevention in this stage. Finally, the patients are encouraged to summarize the skills they have gained in between the therapy sessions and during the follow up sessions.

The researcher used the following cognitive behavior therapy techniques to ease patients' blood glucose level and depressive symptoms.

1. Psycho-education for diabetes and depression
2. Self-monitoring and self-evaluation of mood and activity
3. Activity scheduled increases in levels of general, social, pleasurable activity and behavioral productivity
4. Pros and cones for decision making
5. Development of self-reinforcement patterns
6. Problem-solving and decision-making skills, and time management
7. Relaxation training to encourage active stress management by development of positive coping and mastery images

8. Assertiveness training, improvement of communication skills
9. Role play to enhance social skills
10. Graded activity for reducing inactivity
11. Distraction for low mood
12. Stimulus control for sleep disturbance
13. Positive qualities seeking for increase low self esteem
14. Anger management
15. Thought challenge

CHAPTER IV THE RESULTS

Chapter IV

THE RESULTS

Data processing and analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), Version 11.0. Correlational analysis was done to explore correlations between the variables. Quantitative data from self-rating of patient's problems, assessment of functional level rating and psychometric tools (Depression Scale) were used for analyzing the test result.

The results were presented in two parts:

- Quantitative outcome
- Qualitative outcome, divided into three parts:

Part A: Case reports

Part B: Difference in functional levels among pre-test, post-test and follow up sessions.

Part C: Overall subjective improvement in the reported problem areas

Quantitative outcome of the study is presented below:

Table 3: Subjects' depression score

Depression score	Frequency	Percent
Minimal (30-100)	489	75.0
Mild depression (101-114)	96	14.7
Moderate depression (115-123)	38	5.8
Severe depression (124-150)	29	4.4
Total	652	100.0

Table 3 shows that 75% patients had minimal level of depression, 14.7% had mild level of depression, 5.8% had moderate level of depression and 4.4% suffered from severe depression.

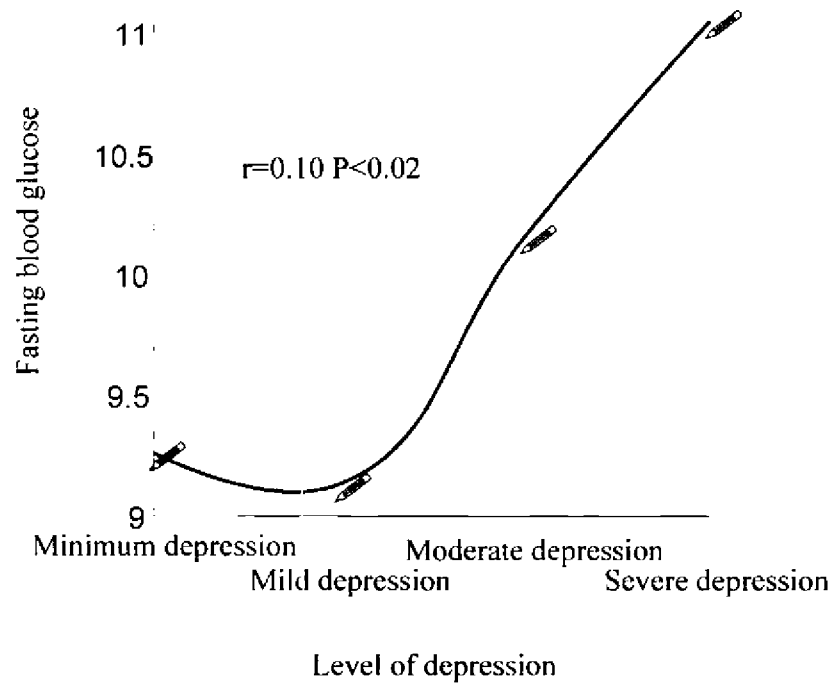


Figure 3: Linear curve of fasting blood glucose & level of depression

Figure 3 shows the linear relationship between level of depression and fasting blood glucose level. A significant correlation ($r = 0.10$ $P < 0.02$) was found between depression level and fasting blood glucose level. Positive relationship implies that level of depression tends to increase with fasting blood glucose level.

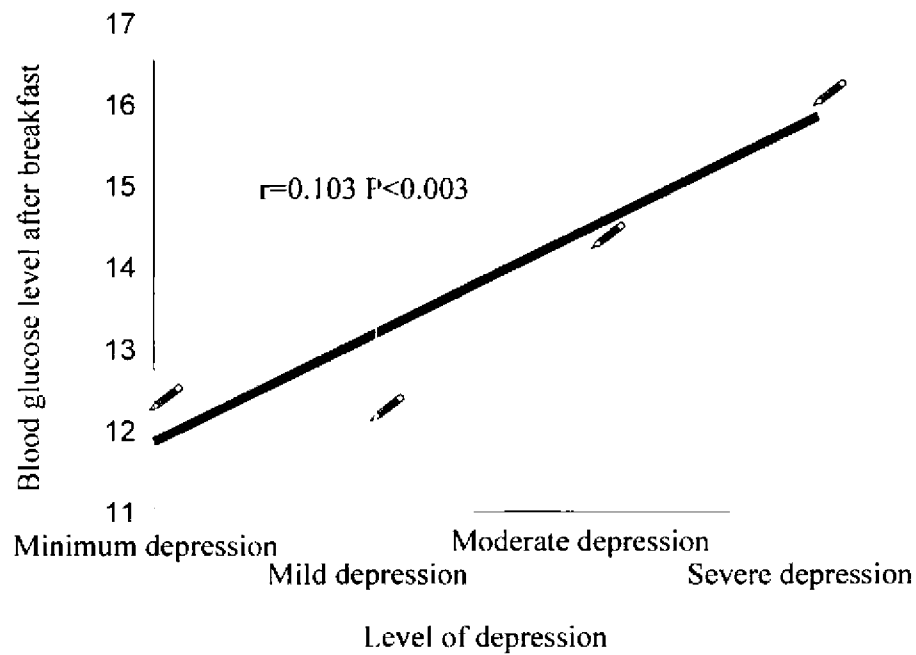


Figure 4: Linear relationship between blood glucose level after breakfast & level of depression

Figure 4 shows the linear relationship between level of depression and fasting blood glucose level after breakfast. Again, a significant correlation ($r = 0.103$ $P < 0.003$) was found between depression level and fasting blood glucose level after breakfast. Positive relationship implies that level of depression tends to increase with fasting blood glucose level after breakfast.

Qualitative analyses were done for three parts:

Part A: Case reports

Part B: Difference in functional levels among pre-test, post-test and follow up sessions.

Part C: Overall subjective improvement in the reported problem areas.

Part A: Case reports of six patients

Case study-1

A 50-year old divorced woman was diagnosed as a case of type 2 diabetes since 2003. While attending to healthcare center Bashaboo, Dhaka. She was referred to the researcher for psychological intervention.

Relevant background information

Case1 is a case of Type 2 Diabetes Mellitus (T2DM) since 2003. Prior to therapy session, she could not control her blood sugar and was unable to follow the physician's instructions. She was worried most of the time about her uncontrolled blood sugar level and diabetes related complications. She developed some depressive symptoms such as negative thoughts, irritable mood, loss of memory, loss of social interaction, sadness, irritation, lack of interest in daily activities, assertiveness problems etc at that time.

In initial assessment session (using semi-structured interview) Case1 told the researcher that her birth history and developmental milestone were normal and she belongs to a middle class family. She did not have any significant past medical or psychiatric history. She is the second child of her parents and was introvert in nature. She has eight brothers and no sister. She passed SSC examination in 1979 and got married in 1982. She had history of familial disharmony. Her husband beat her very badly. She decided to divorce her husband in 1985. In between these two years, she gave birth to a boy. After divorce, she came back to her family and started a job. In 2003, she got some physical problems such as weakness and feeling thirsty. Physicians suggested her to check if she had diabetes. Test result showed that she was suffering from T2DM.

Assessment measures

A Depression Scale (Uddin & Rahman, 2005) was administered to identify her current level of depression. Depressive symptoms were also crosschecked by Diagnostic and Statistical manual of Mental Disorder 4th edition (DSM-VI-TR).

Semi structured interview method was used to identify her current symptoms of depression. History was taken by open-ended question. All history was gathered with the help of active listening and note taking.

After the assessment session, the underlying cause was shared with the patient so that she could take some initiative to solve the problems.

Formulation

Early experience

Aggressive behavioral pattern of her father
 The client was introvert
 She was married without her consent in 1982
 Age gap was 10 years with her husband
 She used to be beaten badly by her husband
 She was divorced in 1985



Core beliefs

Self: I am not a good person, everybody was sympathetic to me.
 World: If all people compromise with each other then the world will be a good place.
 Future: My future is dark.



Dysfunctional Assumption

If I do not utilize my time, people will not respect me.



Critical Incidence

She divorced her husband in 1985.



Negative Automatic Thoughts

What will happen to me?
 What is my son's future?
 I am hopeless



Symptoms

Cognitive	Loss of interest, concentration problems.
Behavior	Social withdrawal, passivity.
Affective	Sadness, irritation, anxiety.
Somatic	Chest pain, palpitation.
Motivational	Loss of interest, loss of memory.

Maintaining factors:

1. Persistent sadness
2. Uncontrolled T2DM
3. Lack of education about diabetes mellitus
4. Avoidance of social interaction

Intervention Plan

Intervention plan was set according to the maintaining factors of the client. Cognitive behavioral therapy (CBT) was appropriate for her problems. Here the researcher follows some general guidelines such as:

1. Agenda setting
2. Mood check (subjective score)
3. Administer depression scale (every alternative session)
4. Monitor blood glucose level (every alternative session)
5. Home work check
6. Discuss today's major topic
7. Today's feedback

The researcher administered psychological intervention as depicted below:

1. Initial phase: C1 was not co-operative to the researcher prior to giving CBT. Then a brief discussion was done with the client regarding the therapy and was assured that confidentiality will be maintained strictly. She then developed confidence to the researcher and narrated her problems without restrictions.
2. She was introduced to five-factor model so that she could recognize her source of problems.
3. Activity scheduling: She was depressed, less active and was passive in nature at the beginning. Activity schedule was helpful for the client to enhance her activities and motivated her to do something. It also assisted to elevate her pleasurable activities.
4. Psycho-education: She was too much depressed and worried about her lower activity level and uncontrolled diabetes. She was educated about diabetes and diabetes related complications. The researcher also educated her about depression and the connections between depression & T2DM. Finally, the researcher helped the patient to identify the impacts of depression on diabetes.
5. Relaxation: Breathing relaxation technique was administered for coping with mental tension as well as depressive symptoms.

6. Homework assignment: She was asked to do some homework. Each assignment was prepared with the collaboration of the researcher and patient. With the help of homework assignment, the patient discovered some new issues that currently she was facing.
7. By nature, the patient was passive and could not engage in social interaction. Assertion training was given to reduce her passivity.
8. In order to reduce her indecisiveness she was taught about the pros and cons about a given issue.
9. To face the day-to-day life problems patient was trained on problem solving technique.

Outcome

Thirteen sessions were given to the patient and among these two were follow up sessions in thirty days interval. First three sessions were baseline once.

Subjective and objective outcome of the session are as follows:

Subjective report

Table 4 : Subjective report of Case1's overall problem rating

Number of sessions	Scores
1	10
5	5
10	2
Follow up session	0

This table shows that at the beginning her problem score was 10 out of 10. After therapy sessions rating score was zero (Here 10 = Sever problems and 0 = No problem).

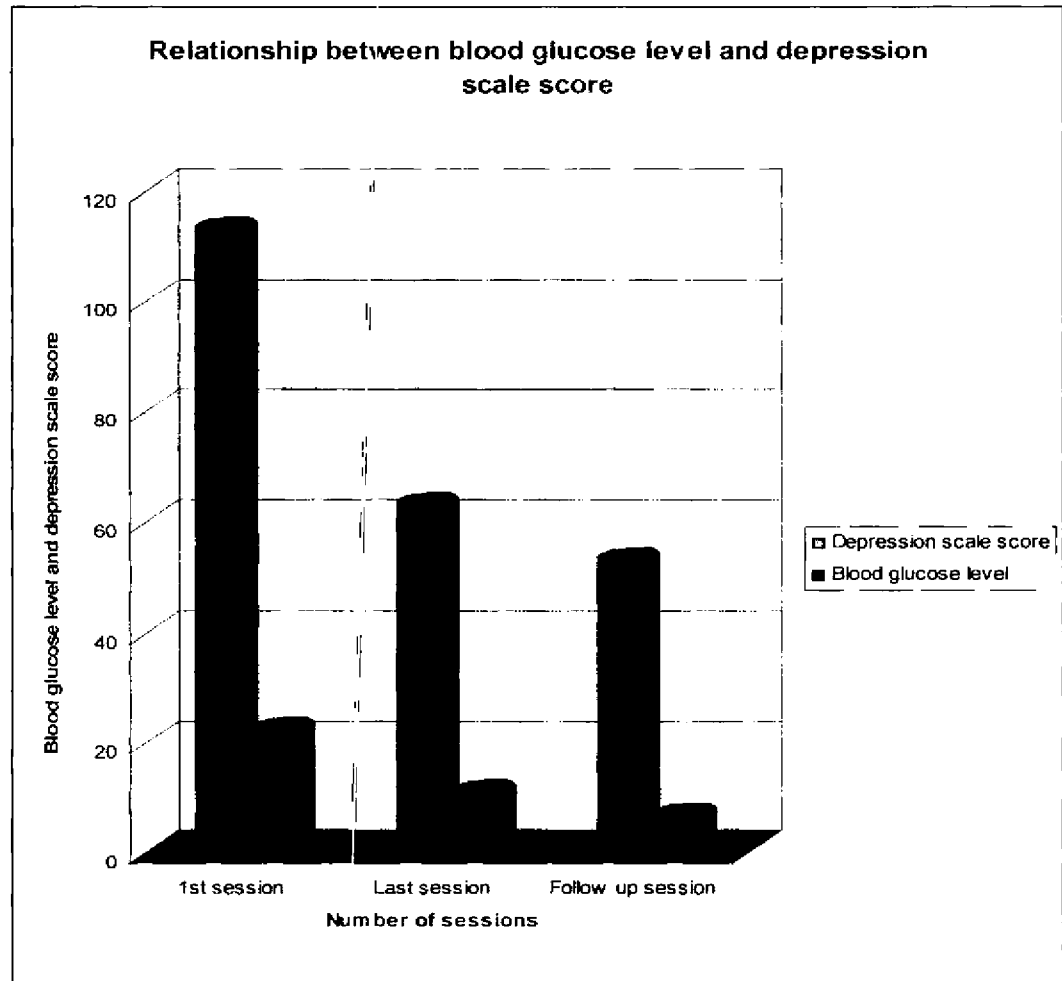
Objective report:

Figure 5 shows that depression level of the subject decreases with the decreased in blood glucose level.

Table 5 : Techniques used for intervention and its outcomes

Domains	Pre-test (assessment)	Techniques	Post-test (intervention)
Cognitive	Poor concentration, loss of memory.	Graded task	Now she believes that she concentrates on her swing and other activities.
Behavioral	Lowered activity level, avoid social interactions, passivity.	Activity schedule, graded activities, assertion training	Increased daily and social activities by regular walking and meeting with new people.
Affective	Anxiety, irritability, sadness, depression.	Distraction, ventilation, assertiveness training	Feel so happy and able to say no in right time.
Somatic	Chest pain, palpitation, neck pain.	Relaxation, psycho-education	Reduced symptoms
Motivational	Loss of interest, loss of enjoyment.	Graded task assignment, scheduling for mastery and pleasure.	Enjoy watching television and traveling.
Negative automatic thoughts (NATs)	What will happen to me when my mother was dead? I'm totally hopeless My brothers will not taking care of me when I am physically incapable.	Identifying automatic thought, thought challenge, modifying automatic thought	Death was a natural process; I am not hopeless if I try I will succeed in my life. My brother loves me so much Inshallah they will take care of me.

Researcher observation:

In the first session, Case I was very much depressed and worried about her uncontrolled diabetes and loss of enjoyment in day-to-day activities. Nevertheless, she was well dressed, neat and clean. In follow up session she reported that she was feeling much better than before and able to manage her uncontrolled diabetes and overcome depressive symptoms.

In conclusion it can be said that in order to control depressive symptoms and uncontrolled diabetes, psychological intervention is an effective strategy.

Case study-2

A 43-year old married woman was diagnosed as a case of type 2 diabetes in 2006. While attending a healthcare center Bashaboo, Dhaka she was referred to a trainee clinical psychologist for psychological intervention due to depressive symptoms and prolonged period of uncontrolled diabetes.

Relevant background information

According to the C2's statement, her birth history was uneventful and developmental milestones were normal. Due to her introvert nature, relationship with her mother and sisters were not well enough. She has three sisters and two brothers. She married against her will in 1988. The age gap with her husband was around fifteen. She found that her husband often shifted from one job to another often. He always tried to pull down her wife. She finished her diploma in engineering after marriage in unfavorable circumstance and her husband was not praise the degree. After starting the diploma course, she delivered a baby girl normally. She imposes all anger related to her husband's behavior upon her girl, very strictly controlled her daughter's life, and because of this situation, behavior with her daughter was not good from the very beginning. This made her psychologically more vulnerable. Along with her psychological problem, she developed some physical illness like extreme generalized weakness, irritation and lower abdominal pain. Physician advised her to check blood glucose level along with some other investigations. She then labeled as an impaired glucose tolerance case and latter on developed diabetes. In the mean time, her husband was jobless and this situation was going on for the last three years. Therefore, she was psychologically upset and found her more depressive than before. When she was attending to the healthcare center, stuffs suggested her to consult with trainee clinical psychologist for depressive symptoms.

Assessment measures

A Depression Scale (Uddin & Ranman, 2005) was administered to identify her current level of depression. Her depressive symptoms were also crosschecked by Diagnostic and Statistical manual of Mental Disorder 4th edition (DSM-IV-TR).

Semi structured interview method was used to identify her current symptoms of depression. History was taken by open-ended question. All history was gathered with the help of active listening and note taking.

After assessment sessions formulation, the underlying cause was shared with the patient so that she could take some initiative to solve the problems.

Formulation

Early Experience

The client was introvert

From childhood, there were communication problems with her mother

The wedding was done forcefully

Age gap with husband-15 years

Communication gap with husband

Always dominated by husband

Her husband suspected her behavior



Core Beliefs

World: World is a bad place for me

Self: I am worthless, I am incapable

Others: Everybody shows sympathy to me



Dysfunctional Assumption

If I do not do things well they will not respect me.



Critical Incidence

Her husband without a job for 3 years



Negative automatic thoughts

I will die very soon

My future is dark

I am not psychologically fit

My mother dose not love me

I am so stupid.

Nobody cares for me.

I am hopeless because of my husband.



Symptoms

Behavioral: Lowered activity level, social withdrawal.

Motivational: Loss of interest, low self-esteem.

Cognitive: Poor concentration, indecisiveness.

Affective: Sadness, guilt, anger, crying.

Somatic: Sweating, loss of appetite, weakness.

Maintaining factors:

1. Aggressive behavior
2. Awful relationship with husband, children and mother
3. Fear of death
4. Negative thought's about self

Intervention Plan

Intervention plan was set according to the maintaining factors of the Case2. Cognitive behavioral therapy (CBT) was appropriate for her problems. The researcher followed some general guidelines such as:

- 1 Agenda setting
- 1 Mood check (subjective score)
- 2 Administer depression scale (every alternative session)
- 3 Monitor blood glucose level (every alternative session)
- 4 Home work check
- 5 Discuss today's major topic
- 6 Today's feedback

In between sessions, the researcher and Case2 set goals in collaboration with each other. Long-term goal of Case2 was to increase self-esteem. The short-term goal was to find out a job and control diabetes.

The researcher administered psychological intervention, as briefly depicted below:

- Initial phase: The patient was non co-operative with the researcher prior to giving CBT. After a brief introduction and assurance of confidentiality from the researcher, Case2 developed confidence to the researcher and narrated her problems flawlessly.

- She was introduced to five-factor model so that the patient could recognize her source of problems.
- Psycho-education: Patient Case2 was too much depressed and worried about her lower activity level and uncontrolled diabetes. The patient was educated about diabetes and diabetes related complications. The researcher also educated her about depression and the connection between depression & T2DM. Finally, the researcher helped the patient to identify the impacts of depression on diabetes.
- The patient was depressed, less active and was passive in nature at the beginning. Activity schedule was helpful for the patient to enhance her activities and motivated her to do something. She was also assisted to elevate her pleasurable activities.
- Problem solving techniques were taught to deal with real life problems. By using problem-solving technique, she learned computer program.
- Case2 was passive and could not engage in social interaction. Assertion training was given to eliminate her passivity.

Outcome

Eight sessions were given to the patient. First three sessions were considered as a baseline sessions. Subjective and objective outcome sessions, were as follows:

Subjective report:

Table 6: Subjective report of Case2's overall problem rating

Number of sessions	Scores
1	10
3	7
5	6
Follow up session (by phone)	0

This table shows that at the beginning her problem score was 10 out of 10. After therapy sessions the rating score was zero (Here 10 = Sever problems and 0 = No problems).

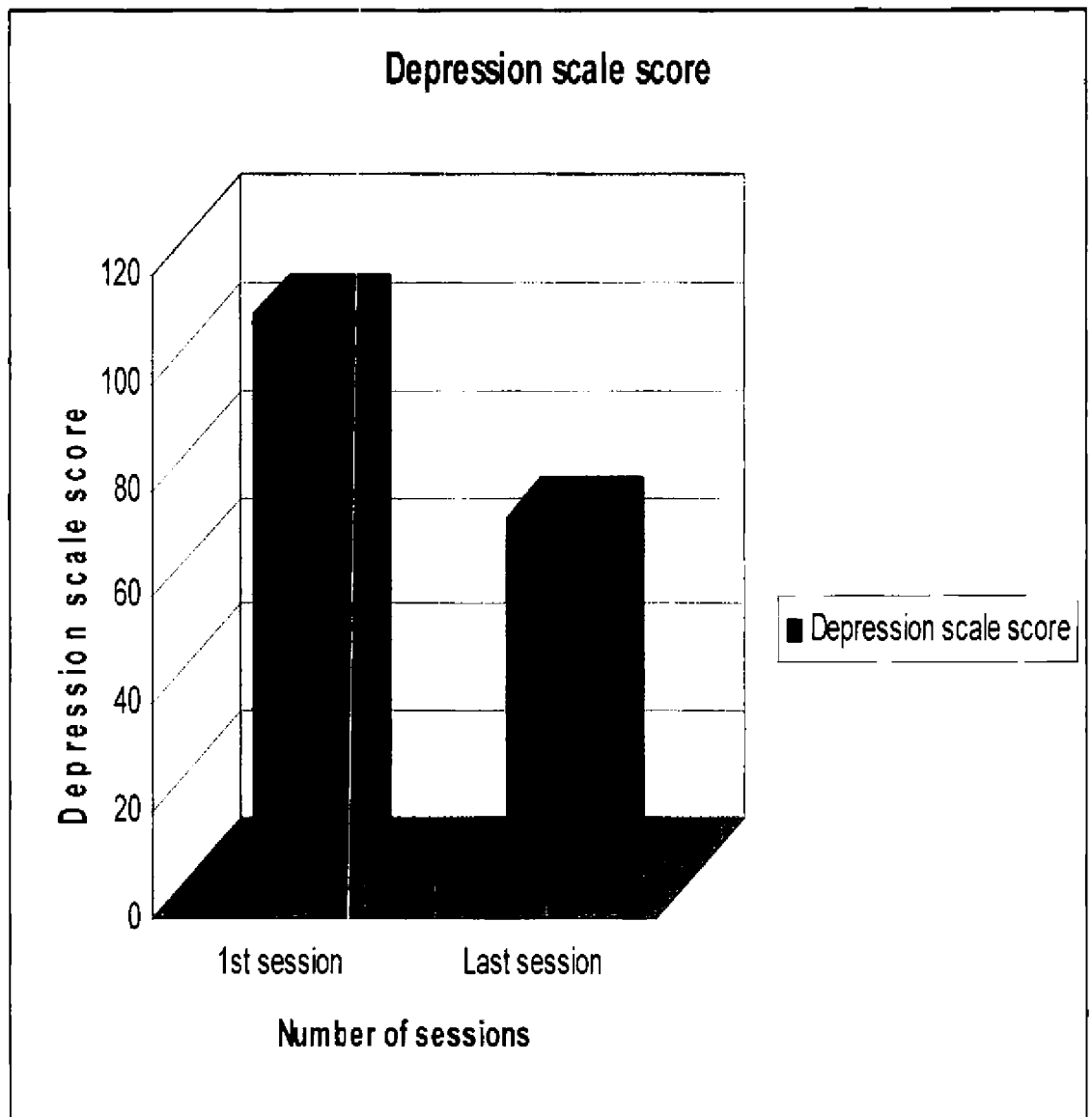
Objective reports:

Figure 6 : Depression scale scores of the subject.

Table 7: Techniques used for intervention and its outcomes

Domains	Pre-test (assessment)	Techniques	Post-test (intervention)
Cognitive	Poor concentration, indecisiveness	Graded task, pros and cons.	Concentrate on her daily activities; still she is trying to make her own decision.
Behavioral	Lowered activity level, social withdrawal, crying.	Activity schedule, graded activities.	She was admitted in a computer course.
Affective	Sadness, guilt, depression, anger.	Distraction, ventilation, relaxation.	She can distract herself in sad situation, use relaxation in right time.
Somatic	Sweating, loss of appetite, weakness.	Psycho-education about diabetes and depression, five-factor model.	Now she can understand why problems occur and she maintains her diet chart.
Motivational	Loss of interest, low self-esteem.	Graded task assignment, scheduling activities.	Enjoy watching television and traveling.
Negative automatic thoughts (NATs)	Nobody care for me I will die very soon My future is dark I am not psychologically fit person My mother don't love me I am hopeless because of my husband.	Direct questioning, role play, counting negative thoughts, diary keeping, pros and cons, collect information such as thought experiment, pooling, behavior experiment and thought challenge.	Everybody loves me; if I try hard, my future will be bright; I have to face my problems without avoiding; I am capable of doing something so I will try to help my husband.

Researcher observation:

In the first session, Case2 was very much depressed and upset about her financial problems. She was not well dressed. In the last session she reported that, she was feeling better than before and was able to manage her uncontrolled diabetes. She also told that she was taking some initiative to increase her activity level. Though she could not attend the follow up session, by phone she told the researcher that she was doing much better than before.

In conclusion, it can be said that in order to control depressive symptoms and uncontrolled diabetes, psychological intervention is an effective strategy.

Case study-3

A 43-year old man diagnosed as diabetes since 1997. While attending to a healthcare center Bashaboo, Dhaka he was referred to a trainee clinical psychologist for psychological intervention due to depressive symptoms.

Relevant background information

According to the patients statement his birth history and developmental milestone were normal. He had no significant past medical and psychiatric history. He has three brothers and two sisters. Relationship with his family member was good and he was social. Patient is a graduated businessperson. In 1997, he went abroad (Dubai) for business purpose. However, he felt so weak that he was unable to concentrate on his business. He then consulted with a physician and found himself diabetic after doing some relevant investigations. In 1998, he got married. At the beginning, his married life was happy. Few months after his marriage, he left Bangladesh for business purpose. However, this time he lost his business. This catastrophe made him psychologically disturbed. He then came back to Bangladesh in 2004 and invested money in business again. Unfortunately, he lost his money again. In the mean time, he became a father of a baby boy. Case3's wife was upset in overall circumstances and could not cope with this economic crisis. She blamed her husband for this current situation. His wife also accused him that Case3 spent all the money for his relatives. Gradually the situation became worse. They begin to quarrel and even beat each other. All these events made Case3 depressed and felt to talk to trainee clinical psychologist.

Assessment measures

A Depression Scale (Uddin & Rahman, 2005) was administered to identify her current level of depression. Her depressive symptoms were also crosschecked by Diagnostic and Statistical manual of Mental Disorder 4th edition (DSM-IV-TR).

Semi structured interview method was used to identify her current symptoms of depression. History was taken by open-ended question. All history was gathered with the help of active listening and note taking.

After assessment session formulation, the underlying cause was shared with the patient so that he could take some initiative to solve the problems.

Formulation

Early Experience
 Detection of diabetes (1997)
 Got married in 1998
 Adjustment problem with wife since 2004
 Loss of money (2004)
 Financial problems



Core Beliefs

World: World is a good place but not for me
 Self: I am worthless, hopeless
 Others: My future is very dark



Dysfunctional Assumption

If I do not do well all the time, she will not respect and love me.



Critical incidence

In July 2008, serious conflict occurs with his wife



Negative automatic thoughts

I am an unlucky person
 My future is dark
 I am failure
 Some times, I feel like committing suicide
 She makes my life miserable



Symptoms

Behavioral: Fatigue, avoidance, weakness,

Motivational: Loss of enjoyment.

Cognitive: Poor concentration, indecisiveness, suicidal thoughts.

Affective: Anger, depressed, crying, frustration, sadness

Somatic: Loss of sleep and appetite, headache, palpitation, dry mouth, agitation

Maintaining factors:

- 1 Communication gap with wife
- 2 Conflict with wife
- 3 Sexual problems
- 4 Uncontrolled diabetes due to tension

Intervention Plan

Intervention plan was set according to the maintaining factors of the patient. Cognitive behavioral therapy (CBT) was appropriate for his problems. The researcher follows some general guidelines such as:

- 1 Agenda setting
- 2 Mood check (subjective score)
- 3 Administer depression scale (every alternative session)
- 4 Monitor blood glucose level (every alternative session)
- 5 Home work check
- 6 Discuss today's major topic
- 7 Today's feedback

The researcher administered psychological intervention briefly depict below:

- Initial phase: Prior to giving CBT patient was not co-operative with the researcher. After a brief introduction and assurance of confidentiality from the researcher, Case3 developed confidence to the researcher and narrated her problems flawlessly.
- He was introduced to five-factor model so that the patient could recognize her source of problems.
- Pros and cons were given to the patient to eliminate his indecisiveness.

- Role-play was a useful technique for goal setting and problem solving. In sessions, this was also practiced through role reversal. If it were successful in therapy session patient would feel motivated to practice in real life situation.
- Stimulus control techniques are used to alleviate sleep problems. Here Case3 was discouraged to stop drinking coffee or tea in evening and encouraged using bed only sleep and sex.
- Patient was depressed for her married life distraction technique was used to reduce depressed mood.
- He had relationship problems with his wife. They decided to break up. The researcher applied couple therapy to eliminate their problems by using goal setting. The researcher had to take an active part to control sessions.
- By using mastery and pleasurable activities patient was enjoying his daily activities.

Outcome

Sixteen sessions were given to the patient. Only two of them were follow-up session in thirty days interval. First three sessions were baseline once. Subjective and objective outcome sessions were as follows:

Subjective report:

Table 8: Subjective report of Case3's overall problem rating

Number of sessions	Scores
1	10
5	8
10	7
15	2
Follow up session	0

This table shows that at the beginning his problem score was 10 out of 10. After therapy sessions rating score was zero (Here 10 = Sever problems and 0 = No problems).

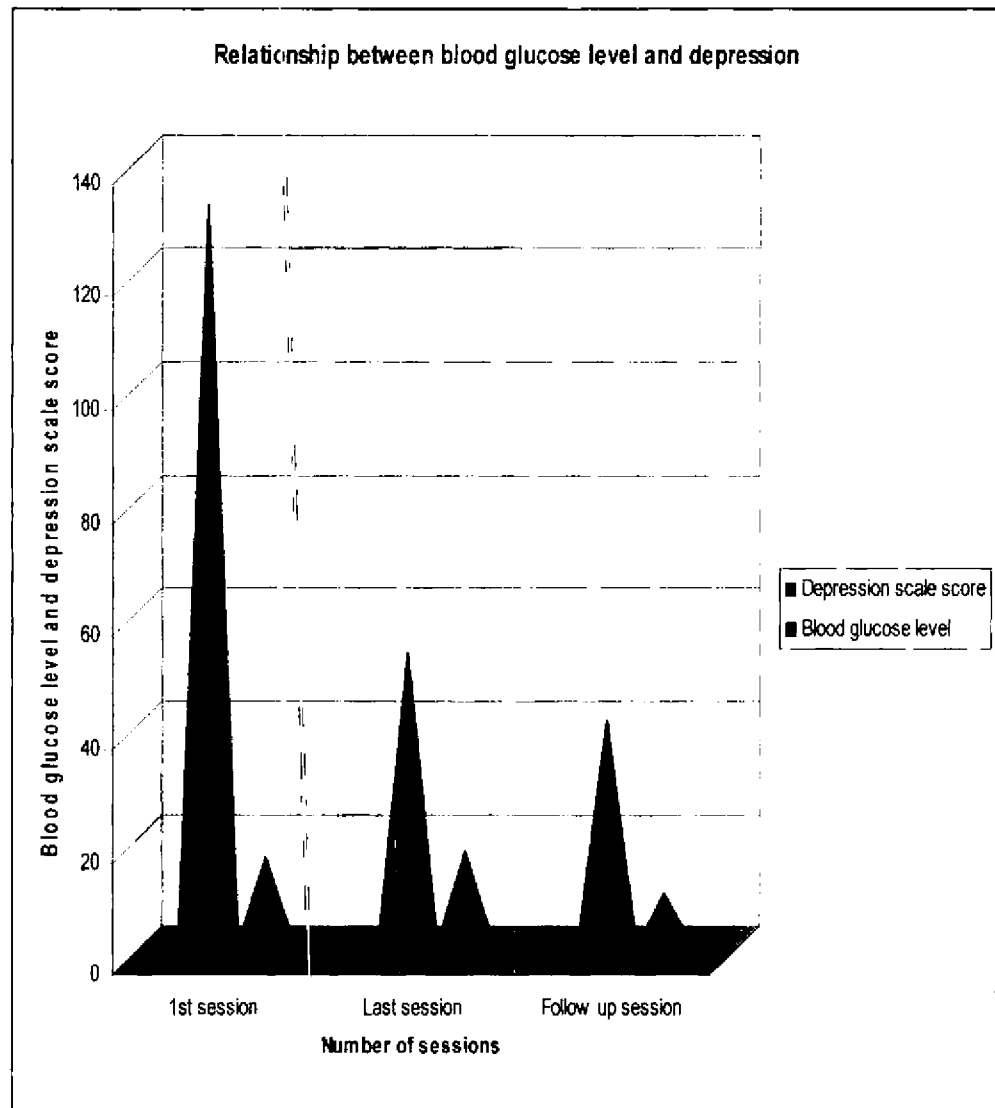
Objective report:

Figure 7 depicts that depression level of the subject decreased with the decrease in blood glucose level

Table 9: Techniques used for intervention and its outcomes

Domains	Pre-test (assessment)	Techniques	Post-test (intervention)
Cognitive	Poor contrition, indecisiveness, suicidal thoughts.	Graded task, pros and cons, distraction.	Concentration problems is partially reduced, make own decisions, suicidal ideation was diminished.
Behavioral	Fatigue, avoidance, weakness	Graded task, consult with doctors for any physical problems.	Controlling diabetes and walking feel better.
Affective	Anger, depressed, crying, frustration, sadness	Distraction, ventilation, role-play, relaxation training.	Control his emotion properly.
Somatic	Loss of sleep, loss of appetite, palpitation, premature ejaculation.	Psycho-education for diabetes & depression, sleep hygiene, couple therapy.	By managing emotional problems he can manage his somatic symptoms.
Motivational	Loss of enjoyment	Scheduling for mastery and pleasure.	Now he was enjoying his work and passing time with wife.
Negative automatic thoughts (NATs)	I am an unlucky person Sometimes I feel like committing suicide She makes my life miserable She never understands my feelings. Probably I did something wrong that is why it was happening to me (diabetes). I cannot make her happy.	Counting negative thoughts, distraction, pros and cons, Identifying negative thoughts, thought challenge, modify thoughts.	I will try to make my life happy, suicide was not a right option and diabetes was not a result of sin, her way of expression was wrong but she loves me.

Researcher observation

In the first session, Case3 was very much depressed and concerned about his relationship. For that reason he could not control his diabetes and blood glucose remain high. He was not in well dress, neat and clean. During the sessions he became more vulnerable but before termination he was well dressed and his facial expression was normal. In follow up session, he reported that he was feeling much better than before and able to manage her uncontrolled diabetes, overcome depressive symptoms and maintained his family life nicely.

In conclusion, it can be said that in order to control depressive symptoms psychological intervention is an effective strategy.

Case study-4

A 52-year old married woman diagnosed as type 2 diabetes since 2004. While attending to a healthcare center Bashaboo, Dhaka she was referred to a trainee clinical psychologist for psychological intervention.

Relevant background information

In preliminary assessment session, she reported that she was depressed and frustrated with her current lifestyle. She also told about her sleep disturbance, lack of concentration, irritation etc.

Case4's birth history and developmental milestones were normal. She was aggressive in nature. Relationship with her mother was not good and she could not tolerate her mother. She passed SSC examination in 1972. In 1973, she got married. Her husband was also an arrogant person. He always misbehaves with case 4. Her mother-in-laws behavior towards Case4 was also awful. She then attempted to commit suicide but her husband rescued her. She had one daughter and one son. They have the same nature like their father. Relationship with her daughter was not well. Even her daughter beat her. This made the situation more vulnerable. She was depressed most of the time and developed headache, generalized body ache, weakness etc. She then consulted with a physician. The physician advised her to do some investigations along with blood glucose level. She was diagnosed as a case of diabetes. In the year 2004, her husband lost his capacity to walk by an accident. Case4 tried her best to overcome the situation. She was upset most of the time and unable to take care of herself and gradually her blood glucose level was uncontrollable. She could not cope with the above circumstances and was referred to a trainee clinical psychologist.

Assessment measures:

A Depression Scale (Uddin & Fahman, 2005) was administered to identify her current level of depression. Her depressive symptoms were also crosschecked by Diagnostic and statistical manual of Mental Disorder 4th edition (DSM-VI-TR).

Semi structured interview method was used to identify her current symptoms of depression. History was taken by open-ended question. All history was gathered with the help of active listening and note taking.

After assessment, session's formulation, the underlying cause was shared with the patient so that she could take some initiative to solve the problems.

Formulation

Early Experience

From child hood, she got anger problems
 She gets married in 1973
 Husband was introvert and very rude to her
 She was bitten by her husband
 Chaotic relationship with daughter since 1990
 She was also bitten by her daughter



Core Beliefs

World: Life is too much hard
 Self: Nobody loves me, care me; I am worthless
 Others: My future is very dark



Dysfunctional Assumption

I can do everything beyor d my wish if my family members love me.



Critical incidence

In 2004, her husband was seriously injured by a road accident.



Negative automatic thoughts

I am a bad mother
 I am not a good wife
 My daughter never understand my feelings
 I wish I could die
 I feel discomfort about my atmosphere



Symptoms

Behavioral: Destructive behavior, social withdrawal

Motivational: Loss of interest.

Cognitive: Poor concentration, indecisiveness, suicidal thoughts, loss of memory.

Affective: Anger, depression, crying, sadness.

Somatic: Pain in whole body, heaviness in chest pain, loss of sleep, increase appetite.

Maintaining factors:

1. Communication problems with husband and daughter
2. Destructive behavior
3. Depressed feelings

Intervention Plan

Intervention plan was set according to the maintaining factors of the patient. Rational was given to the patient in order to begin the intervention plan. Cognitive behavioral therapy (CBT) was appropriate for her problems. Here the researcher follows some general guidelines such as:

- 1 Agenda setting
- 2 Mood check (subjective score)
- 3 Administer depression scale (every alternative session)
- 4 Monitor blood glucose level (every alternative session)
- 5 Home work check
- 6 Discuss today's major topic
- 7 Today's feedback

With the above guidelines researcher administer psychological intervention. The techniques are as follows:

- Brief introduction was given to the patient regarding the therapy and assured that confidentiality will be maintained strictly. She then developed confidence to the researcher and described her problems perfectly.
- She was introduced to five-factor model so that she could recognize her source of problems.
- Patient was too much depressed and worried about her uncontrolled anger. She was educated about diabetes and diabetes related complications. The researcher also introduced her about depression, and the relation between depression & T2DM. Finally, the researcher helped the patient to identify the impacts of depression on diabetes.
- Assertion training was given for her anger management and increased social interactions.
- Anger management technique was also used to control her anger.
- Stimulus control techniques were used to alleviate her sleep disturbance.

- Breathing relaxation technique was administered for coping with stress as well as depressive symptoms.
- Behavior experiments were applied to challenge her negative thoughts.
- Patient was depressed for her current life atmospheres and distraction technique was used to reduce depressed mood.
- Pros and cons were given to the patient for her indecisiveness.

Outcome

Eight sessions were given to the patient and among them one was follow up sessions in thirty days interval. First three sessions were baseline ones. Subjective and objective outcome of the sessions are as follows:

Subjective report:

Table 10: Subjective report of Case4's overall problem rating

Number of sessions	Scores
1	10
4	5
Follow up session	0

This table shows that at the beginning her problem score was 10 out of 10. After therapy sessions rating score was zero (Here 10 = Sever problems and 0 = No problem).

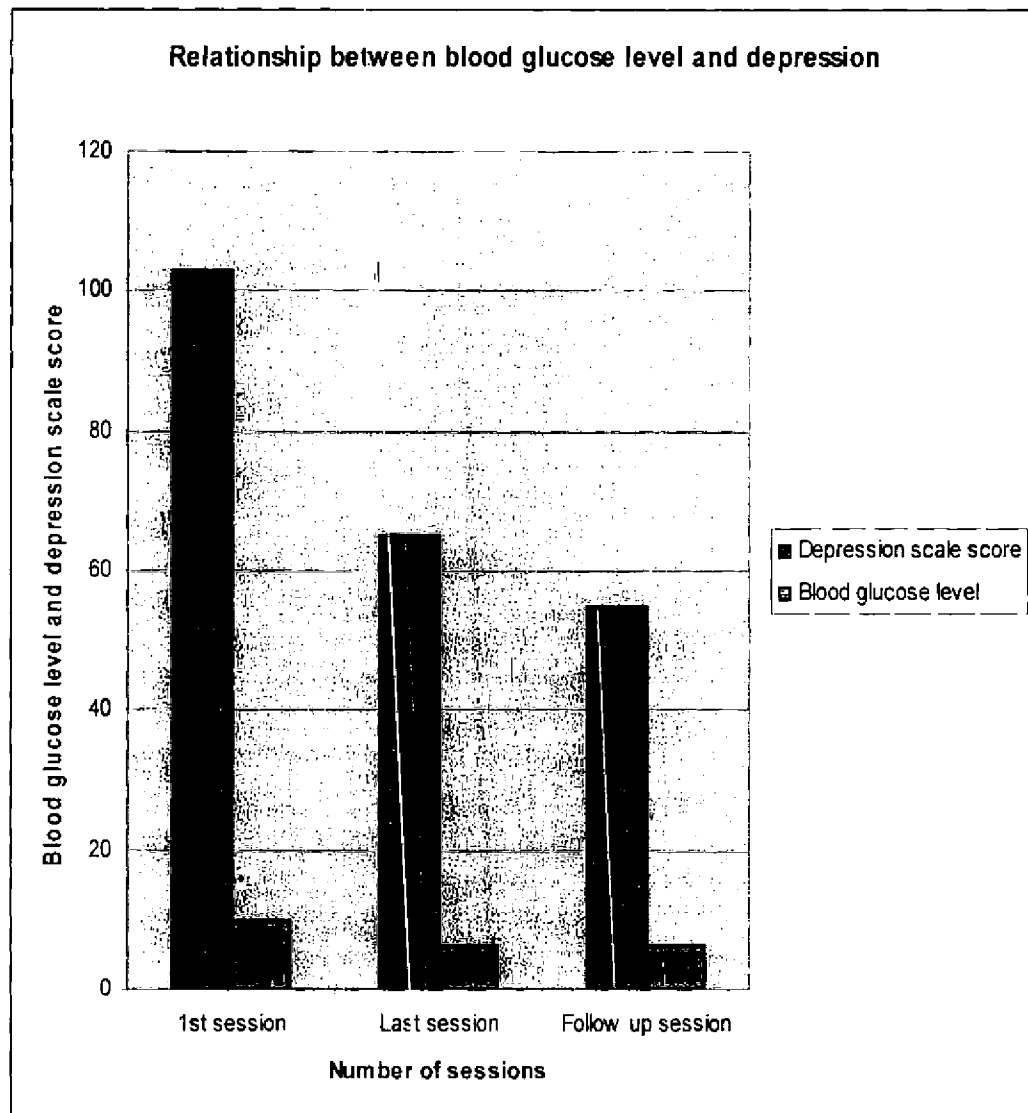
Objective report:

Figure 8: shows that depression level of the subjects decreased with the decreases in blood glucose level.

Table 11: Techniques used for intervention and its outcome

Domains	Per-test (assessment)	Techniques	Post-test (intervention)
Cognitive	Poor contrition, indecisiveness	Graded task, pros and cones	She can make her own decisions
Behavioral	Destructive behavior	Behavior experiment, distancing, positive qualities seeking.	Reduced symptoms
Affective	Anxious, irritability, sadness.	Distraction, ventilation, pros and cones.	Feel better than before.
Somatic	Chest pain, palpitation, neck pain, sleeps problems.	Relaxation, psycho-education, stimulus control.	Consult with doctors and sleep problems was diminished.
Motivational	Loss of interest.	Graded task assignment, scheduling for mastery and pleasure.	Motivated to do something again.
Negative automatic thoughts (NATs)	I am hopeless, worthless I am a bad mother I am not a good wife My daughter never understand my feelings I wish I could die I feel so uninterested about my atmosphere	Direct questioning, identifying negative automatic thoughts, thought challenge.	I am thinking all or nothing that is bad for me, not everything was in my control so, I do not have to be worried, death was not the only solution, I have to face my problems and control my diabetes.

Researcher observation

In the first session, Case4 was very much aggressive and frustrated about her existing atmosphere. She was well dressed, neat and clean. In the follow up session she informed that, she was feeling much better and able to manage her anger and also reported that psychological intervention was helpful method to decreased depressive symptoms.

In conclusion, it can be said that psychological intervention was an effective strategy in order to manage depressive symptoms

Case study-5

50-year old, separated woman was diagnosed as diabetes since 2005. While attending to a healthcare center Bashaboo, Dhaka she was referred to a trainee clinical psychologist for psychological intervention.

Relevant background information

According to the Case5's statement, she was worried about her lifestyle. Her birth history and developmental milestones were normal. She was a member of a lower middle class family. She had a younger brother and a younger sister. The relationship with her father was not good. She was forced to get married against her will in 1982. She found out that her husband had a severe disease called Tuberculosis immediately after the marriage. However, her mother in law blamed her for this disease. After getting treatment, husband was cured from disease and started his job with a regular manner. However, he did not give money to her for the daily expense. In the mean time, she gave birth to a girl. Though there was a newborn baby in the family, the husband did not contribute to the family. She decided to take a job to overcome this economical situation. She left her baby to her sister and went to the nursing training. In the mean time, the husband made an extra marital affair with Case5's sister. As a result, the couple life was chaotic and they had been separated. Case5 got a job in a hospital and she took the responsibility to grow her (the baby) up. In this period, Case5 had a little contact with her husband. Fourteen years later, in 1996, the Case5's daughter was forced by Case5's husband to get married with a gambler. This incident made a severe stress on Case5. When she came to know that her daughter was also tortured in the same way she experienced in her early life, she became psychologically upset. This time, some symptoms had been developed on her such as self-criticism, crying, sadness etc. With the above complications, she seeks help to eliminate the symptoms and referred to a trainee clinical psychologist.

Assessment measures

A Depression Scale (Uddin & Rahman, 2005) was administered to identify her current level of depression. Her depressive symptoms were also crosschecked by Diagnostic and Statistical manual of Mental Disorder 4th edition (DSM-VI-TR).

Semi structured interview method was used to identify her current symptoms of depression. History was taken by open-ended question. All history was gathered with the help of active listening and note taking.

After assessment, session's formulation, the underlying cause was shared with the patient so that she could take some initiative to solve the problems.

Formulation

Predisposing factors:

1. She was born in lower middle class family; during the liberation war in 1971 they lost everything.
2. She got married with a Tuberculosis patient by familial pressure in 1982.
3. Her mother-in-law blamed her for her son's illness
4. Her husband was passing most of his time idle
5. Relationship with husband was chaotic
6. In 1996 patients daughter got married but her husband was a gambler and he was also passing his time with disruptive works.

Precipitating factor:

In 2005, her daughter left Bangladesh with her husband.

Maintaining factors:

1. The first cause for maintaining patient's problems was her married life; she could not tolerate it any longer.
2. She could not find anybody to share her problems
3. Her daughter was facing the adjustment problems in the same way that she experienced in early life this made Case5 psychologically vulnerable.
4. Most of the time she was crying, could not find any hope to live.

Intervention Plan

Intervention plan was set according to the maintaining factors of the patient. Rational was given to the patient in order to begin the intervention plan. Cognitive behavioral therapy (CBT) was appropriate for her problems. The researcher follows some general guidelines such as:

- 1 Agenda setting
- 2 Mood check (subjective score)
- 3 Administer depression scale (every alternative session)
- 4 Monitor blood glucose level (every alternative session)
- 5 Home work check
- 6 Discuss today's major topic
- 7 Today's feedback

With the above guidelines researcher administer psychological intervention. The techniques are as follows:

- Brief introduction was given to the patient regarding the therapy and was assured that confidentiality will be maintained strictly. She then developed confidence to the researcher and narrated her problems impeccably.
- She was introduced to five-factor model so that she could recognize the source of her problems.
- Patient was too much depressed and worried about her lower activity level and uncontrolled diabetes. Here patient was educated about diabetes and diabetes related complications. The researcher also introduced her about depression and the relation between depression & T2DM. Finally, the researcher helped the patient to identify the impacts of depression on diabetes.
- Breathing relaxation technique was administered for coping with stress as well as depressive symptoms.
- Pros and cons were given to the patient to eliminate her indecisiveness.
- Role-play was a useful technique for goal setting and problem solving. In sessions this was also practiced through role reversal.
- Stimulus control techniques were used to ease sleep disturbance.

- Distraction technique was used to reduce her low mood.
- Mastery and pleasurable techniques were applied and as a result the patient enjoyed her daily activities.
- Problem solving techniques were implemented to recognize the nature of problems and then systematic method was used to overcome the recognized problems.

Outcome

Eight sessions were given to the patient and among them one was follow up session in thirty days interval. First three sessions were baseline once. Subjective and objective outcome of the sessions are as follows:

Subjective reports:

Table 12 : Subjective report of Case5's overall problem rating

Number of sessions	Scores
1	10
5	7
10	2
Follow up session	1

This table shows that at the beginning her problem score was 10 out of 10. After therapy sessions rating score was one (Here 10 = Sever problems and 0 = No problem).

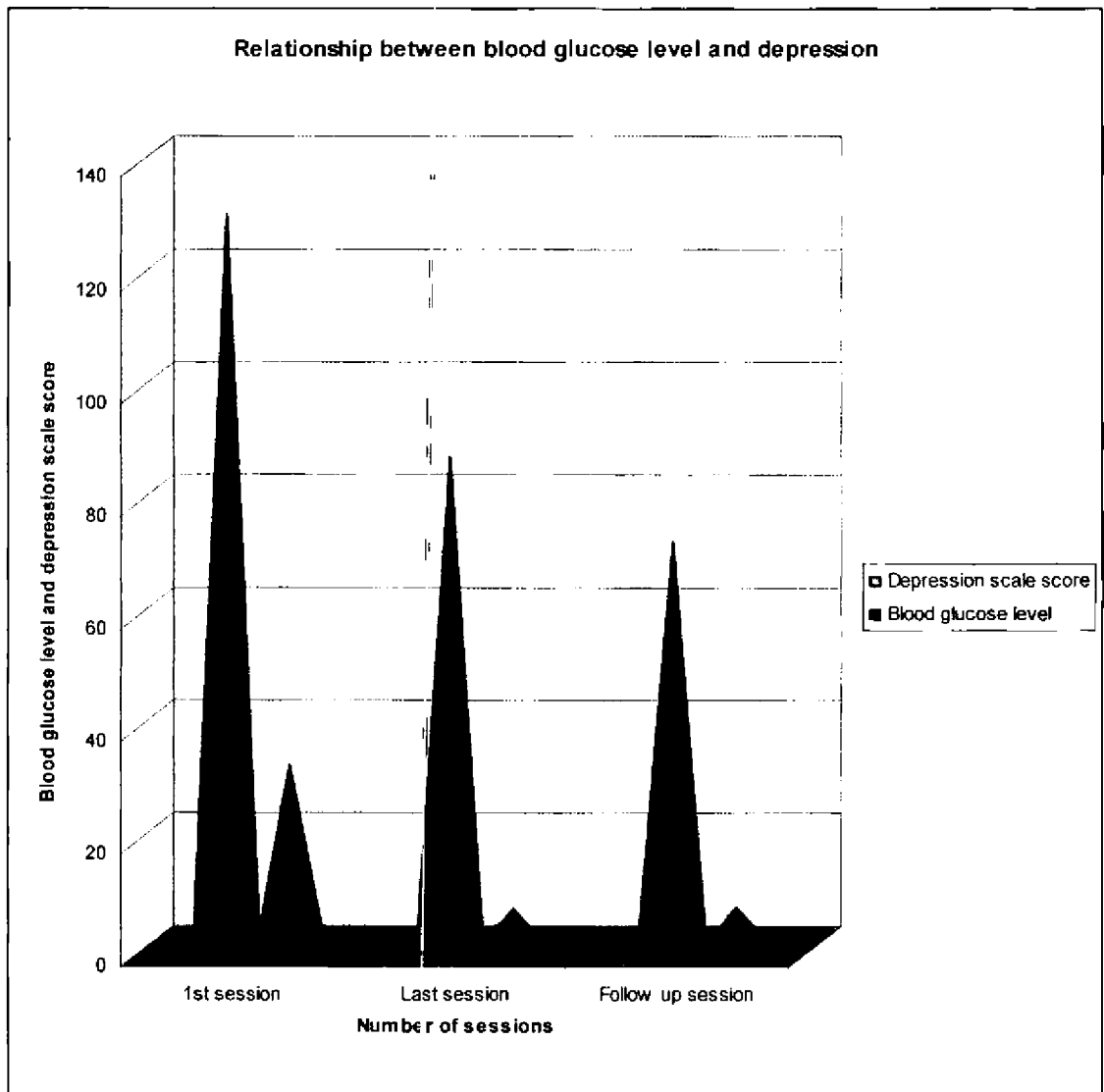
Objective report:

Figure 9 shows that depression level of the subject decreases with the decrease in blood glucose level.

Table 13: Techniques used for intervention and its outcomes

Domains	Pre-test (assessment)	Techniques	Post-test (intervention)
Cognitive	Rumination, self-criticism, indecisiveness	Graded task, pros and cons, positive quality seeking, psycho-education	I can pass my life with my positive qualities.
Behavioral	Avoid social interactions	Activity schedule, graded activities, assertion training	Increased daily and social activities.
Affective	Irritability, sadness, depression, crying	Distraction, ventilation, finds pleasurable activities, role-play.	Learning computer reduced her sadness.
Somatic	Heaviness in chest, chest pain, sleep disturbance.	Relaxation, consult with doctor for further examination, sleep hygiene.	Reduced sleep problems, she can understand that her somatic problems were psychological.
Motivational	Loss of motivation, loss of enjoyment.	Scheduling for mastery and pleasure.	She was motivated to do some extra work to pass her time.
Negative automatic thoughts (NATs)	I am mentally sick person Nobody loves me I am unfortunate person My life is not worth living Everything was my fault I have no self esteem	Counting negative thoughts, identify negative thought, thought challenge.	Without my husband and daughter, I can pass my life by doing something that was very important for my cheerfulness.

Researcher observation

In the first session, Case5 was very much depressed about her existing life conditions. She was well dressed, neat and clean. In last session she informed that, she was feeling better than before and able to overcome depressive symptoms. In the follow up session, she reported that psychological intervention was helpful method to decrease depressive symptoms.

In conclusion, it can be said that psychological intervention was an effective interventions strategy in order to manage depressive symptoms and diabetes.

Case study-6

42-year old widowed woman was diagnosed as a case of type 2 diabetes since 1997. While attending to a healthcare center Bashaboo, Dhaka she was referred to a trainee clinical psychologist for psychological intervention due to depressive symptoms and prolonged period of uncontrolled diabetes.

Relevant background information

According to Case6's statement, her birth and developmental history were normal. She belongs to a middle class family. She had no remarkable childhood history. From childhood, she had a dependable personality. After passing SSC examination, she got married. Her husband was caring and loving person. Relationship with her husband was very good but her in-laws could not tolerate her. Case6's husband always maintained a good relationship to all family members. In 1997, when Case6 got diabetes her husband took care of her appropriately. He always helps Case6 in house hold works. Case6 delivered a baby girl. She was passing her time very nicely. Case6's husband died due to hart attack in 2005. This made her psychologically vulnerable. She could not overcome this grief. At that time, Case6 could not maintain her diabetes routine. Her daughter requested to get rid of the grieving process but could not do it precisely. Financial crisis started in the mean time. Case6 started a small business to maintain family. However, she could not continue because of his weakness, depressed mood. Therefore, she was referred to a trainee clinical psychologist.

Assessment measures:

A Depression Scale (Uddin & Rahman, 2005) was administered to identify her current level of depression. Her depressive symptoms were also crosschecked by Diagnostic and Statistical manual of Mental Disorder 4th edition (DSM-VI-TR).

Semi structured interview method was used to identify her current symptoms of depression. History was taken by open-ended question. All history was gathered with the help of active listening and note taking.

After assessment, session's formulation, the underlying cause was shared with the patient so that she could take some initiative to solve the problems.

Formulation

Early Experience

Dependent personality

Relationship with in-laws family was chaotic.

After marriage, most of the time she feels depressed.



Core Beliefs

World: World is a good place but not for me

Self: I am worthless, hopeless

Others: My future is very dark



Critical incidence

In 2005, her husband was dead.



Dysfunctional Assumption

If my daughter keeps me happy then I will be happy forever



Negative automatic thoughts

I never overcome this situation

I am failure

Life was meaning less

Why Allah gave me such pain?

What will happen to my daughter?



Symptoms

Behavioral: Fatigue, weakness, always in fear, passivity

Motivational: Loss of enjoyment, loss of motivation.

Cognitive: Poor concentration

Affective: Frustration, sadness, depression

Somatic: Loss of sleep and appetite

Maintaining factors:

1. Uncontrolled diabetes due to tension
2. Persistent fear about her daughter
3. Cannot overcome bereavement process
4. Depressed feelings

Intervention Plan

Intervention plan was set according to the maintaining factors of the patient. Rational was given to the patient in order to begin the intervention plan. Cognitive behavioral therapy (CBT) was appropriate for problems. Here the researcher follows some general guidelines such as:

1. Agenda setting
2. Mood check (subjective score)
3. Administer depression scale (every alternative session)
4. Monitor blood glucose level (every alternative session)
5. Home work check
6. Discuss today's major topic
7. Today's feedback

With the above guidelines the researcher administer psychological intervention. The techniques are as follows:

- Brief introduction was given to the patient regarding the therapy and assured that confidentiality will be maintained strictly. She then developed confidence to the researcher and described her problems perfectly.
- Introduction to five-factor model was given to the patient to recognize her source of problems.
- Patient was too much depressed and worried. Here patient was educated about diabetes and diabetes related complications. The researcher also introduced her about depression and the relation between depression & T2DM. Finally, the researcher helped the patient to identify the impacts of depression on diabetes.
- Assertion training was also implemented for her passivity and increased social interactions.
- Graded task was used to eliminate her concentration problems. It was also helpful for increase pleasurable activities.
- Relaxation was given to the patient to eliminate her tension.
- She was asked to do some homework. Each assignment was prepared with the collaboration of researcher and the patient. With the help of homework assignment, the patient discovered some new issues that currently she was facing.

Outcome

Thirteen sessions were given to the patient and among them one was follow up session in thirty days interval. First three sessions were baseline ones. Subjective and objective outcome of the sessions are as follows:

Subjective report:

Table 14: Subjective report of Case6's overall problem rating

Number of sessions	Scores
1	10
5	5
11	3
Follow up session	2

This table shows that at the beginning her problem score was 10 out of 10. After therapy sessions rating score was two (Here 10 = Sever problems and 0 = No problem).

Objective report:

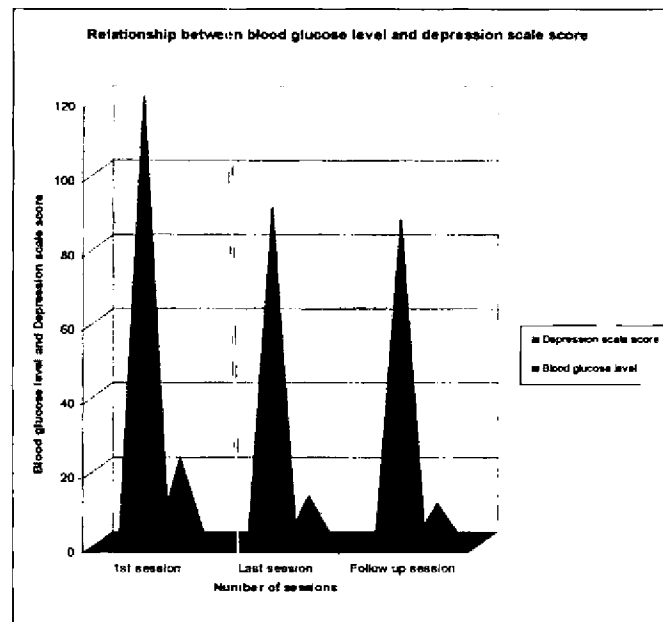


Figure 10 shows that depression level of the subjects decreased with the decrease in blood glucose level.

Table 15: Techniques used for intervention and its outcome

Domains	Pre-test (assessment)	Techniques	Post-test (intervention)
Behavioral	Lowered activity level, avoid social interactions, passivity.	Activity schedule, graded activities, assertion training	Feel better to say no in right time, increased activities.
Affective	Depression, irritability, sadness, crying	Ventilation, Distraction, five-factor model.	Slightly reduced her depression and sadness.
Somatic	Loss of sleep, appetite and weakness.	Relaxation, psycho-education, sleep hygiene, consult with doctors.	Appetite was okay, feeling better than before.
Motivational	Loss of interest, loss of enjoyment.	Graded task assignment, scheduling for mastery and pleasure.	State her small business.
Cognitive	Poor concentration, loss of memory, concentration problems	Graded task	She can concentrate on her studies.
Negative automatic thoughts (NATs)	I never overcome this situation My future is dark I am failure Life was meaning less Why Allah gave me such pain What will happen to my daughter? I am hopeless	Collect negative thoughts by in depth interview, challenge and modify them.	I have to decrease dependency, my husband teaches me how to survive and manage everything, my daughter was not my weakness she was my power.

Researcher observation

In the first session, Case6 was very much depressed, worried and frustrated about her current life status. She was well dressed, neat and clean. In last session, she informed that she was feeling changes but it was not remarkable. She reported that in follow up session, she was feeling much better and took her decisions properly.

In conclusion, it can be said that, psychological intervention was a valuable strategy in order to manage depressive symptoms

Part B: Difference in functional levels among Per-test, post-test and follow up sessions

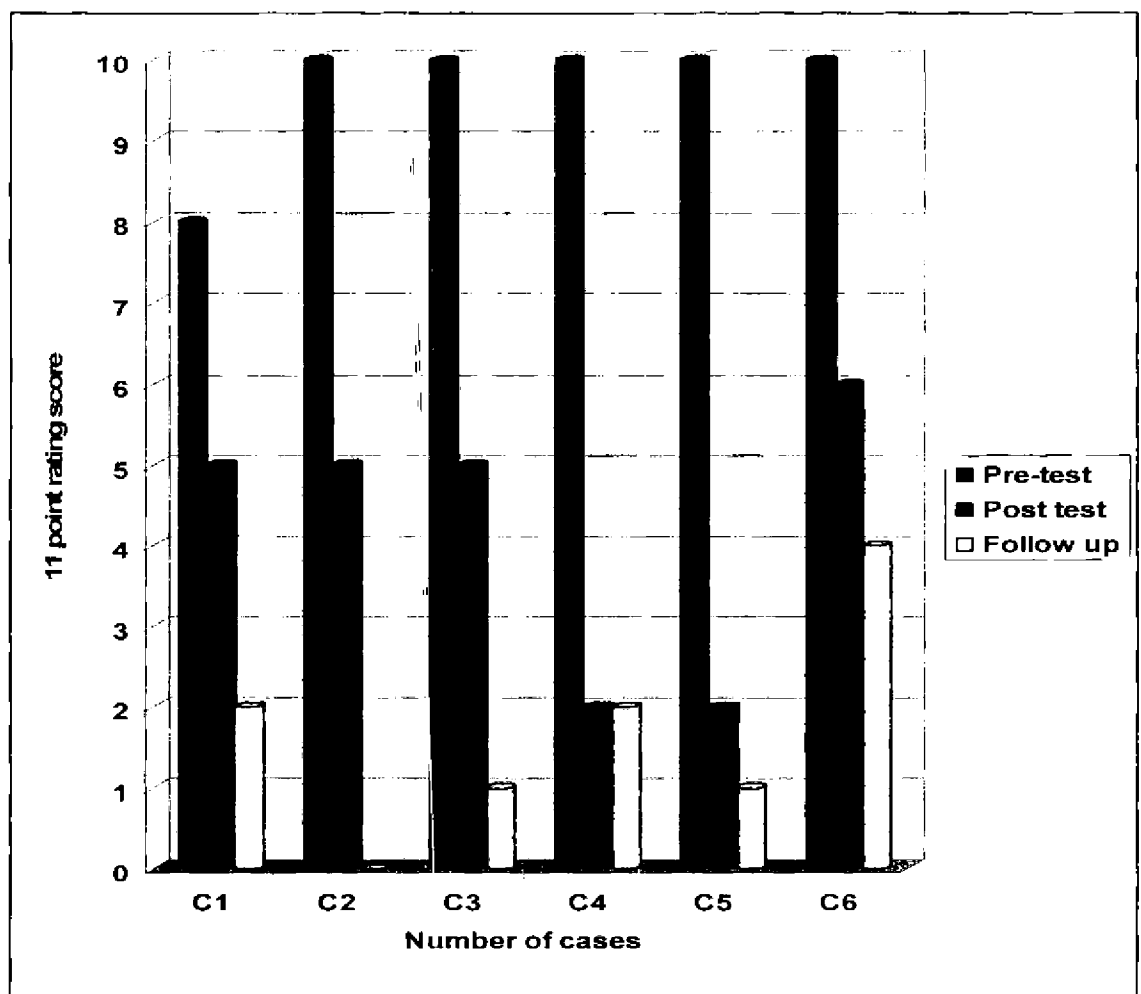
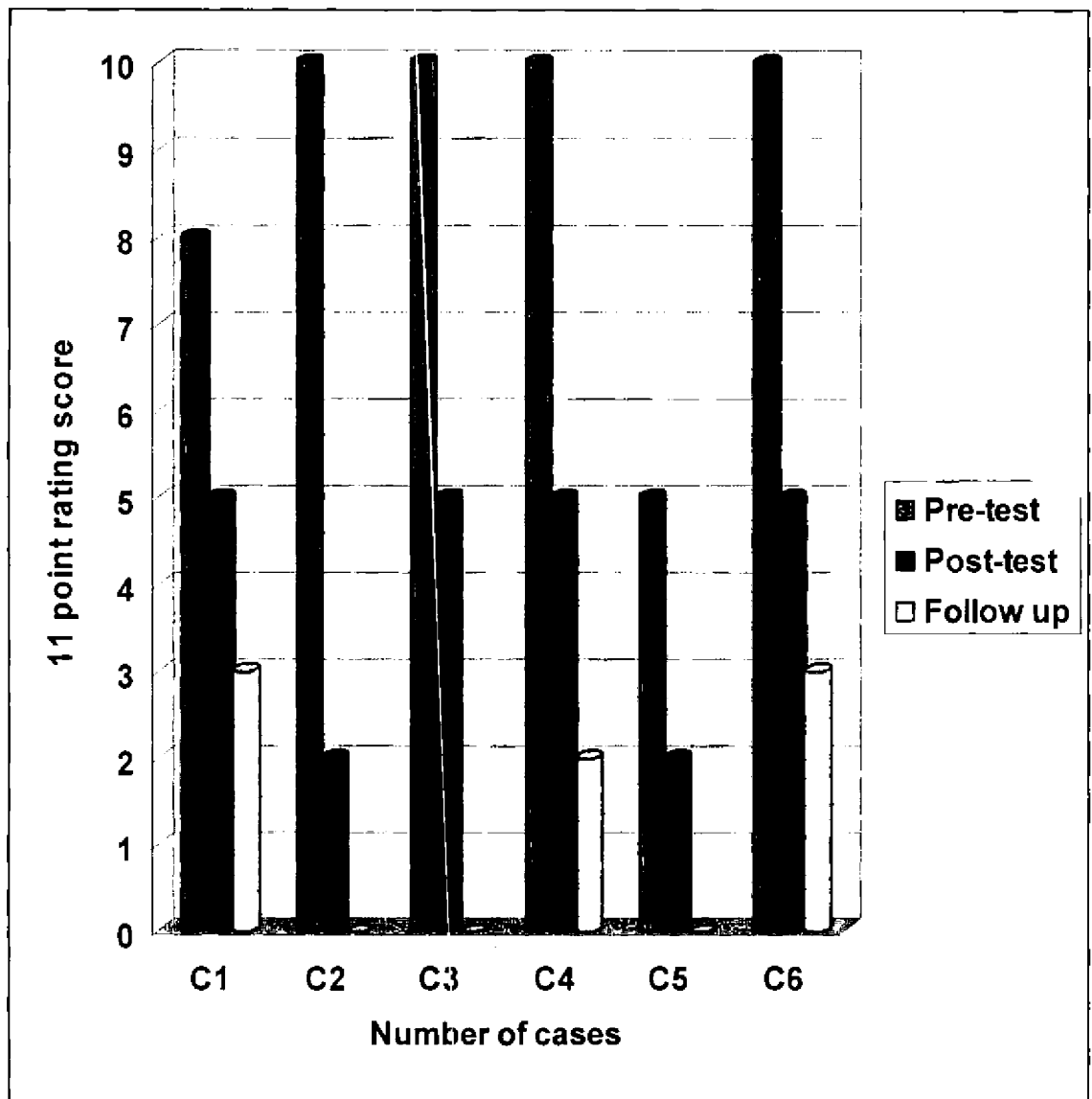


Figure 11 : Presents graphical representation of improvement of six cases in social functioning level

Figure 11 shows the pre-test and post-test level of social functioning. After intervention, five out of six cases reported that their social functioning level increased. Subsequent follow up sessions indicated that social interaction increased further (Here 0 = No problem, 10= Severe problem).



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Figure 12: Presents graphical representation of improvement of six cases in occupational functioning level

Figure 12 shows the pre-test and post-test level of occupational functioning. After intervention, five out of six cases reported that their occupational functioning level increased. In follow up sessions it was found that occupational functioning level increased (Here 0 = No problem, 10= Severe problem).

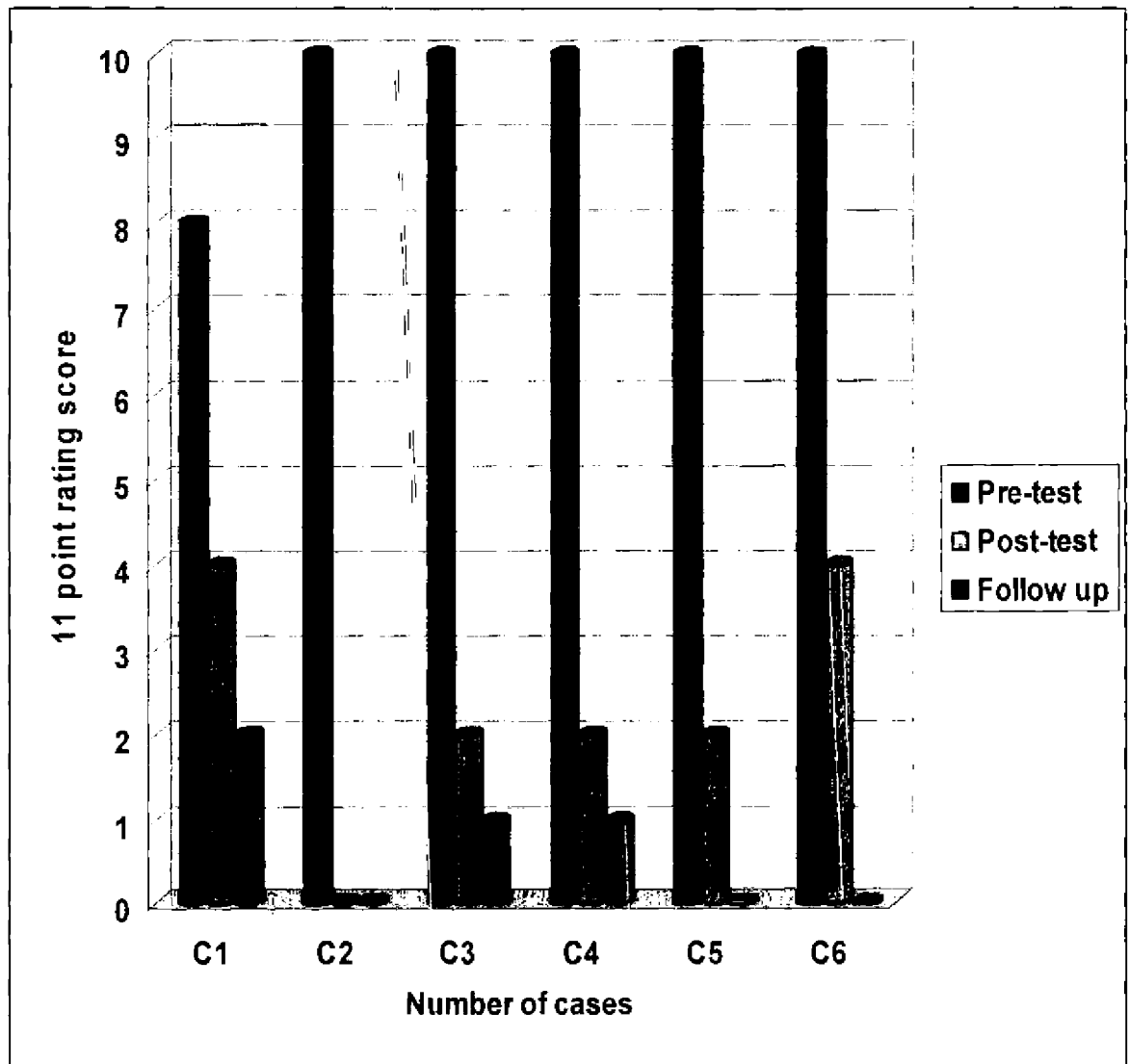


Figure 13: Presents graphical representation of improvement of six cases in behavioral functioning level

Figure 13 shows the pre-test and post-test level of behavioral functioning. In post-test phase, five out of six cases reported that their behavioral problems were reduced. In follow up sessions, behavioral problems reduced (Here 0 = No problem, 10= Severe problem).

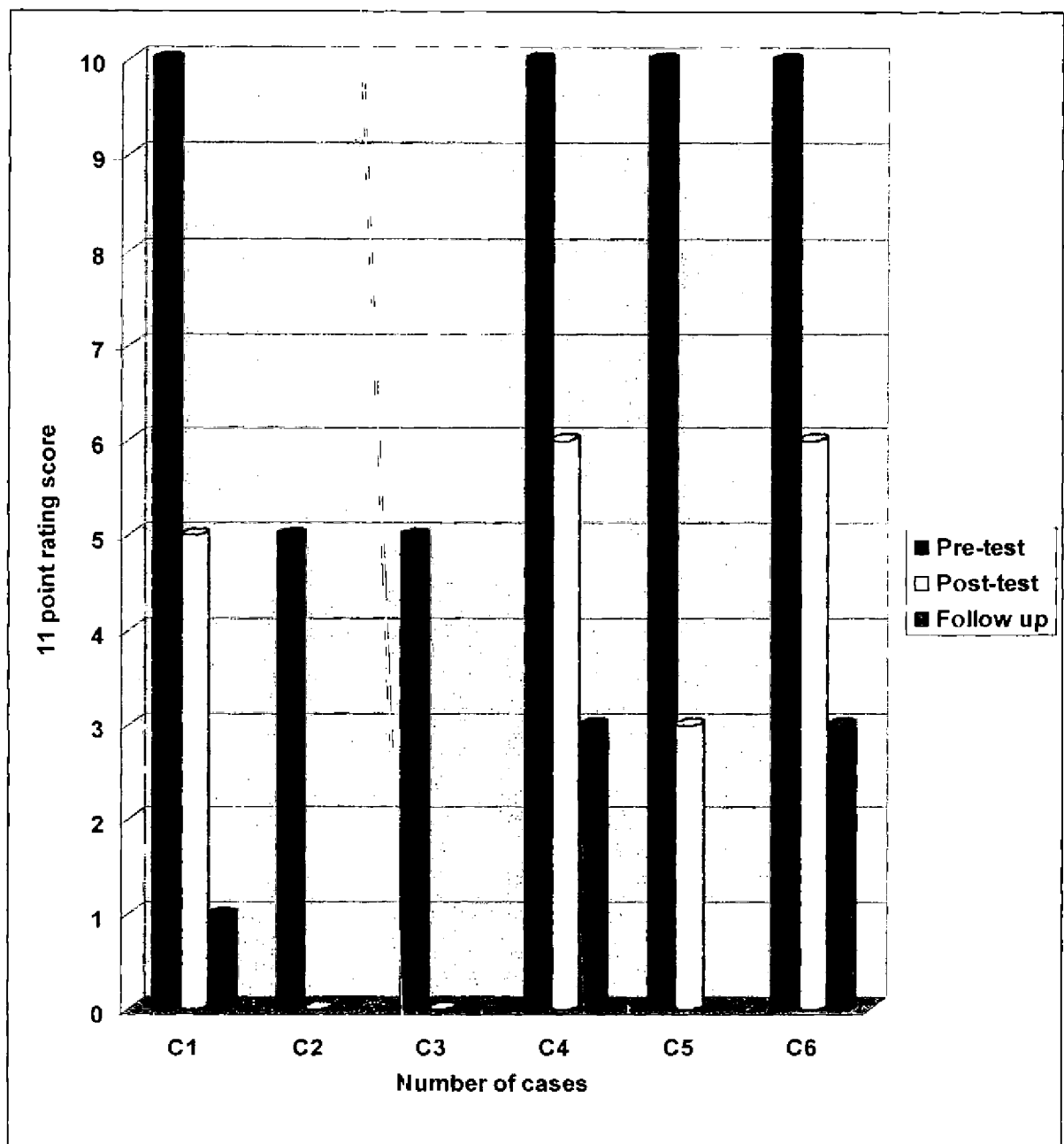


Figure 14: Presents graphical representation of improvement of six cases in somatic functioning level

Figure 14 shows the pre-test and post-test level of somatic functioning. After intervention (post-test) six out of six cases reported that, their somatic functioning level increased. In follow up sessions, they reported that somatic functioning level increased (Here 0 = No problem, 10= Severe problem).

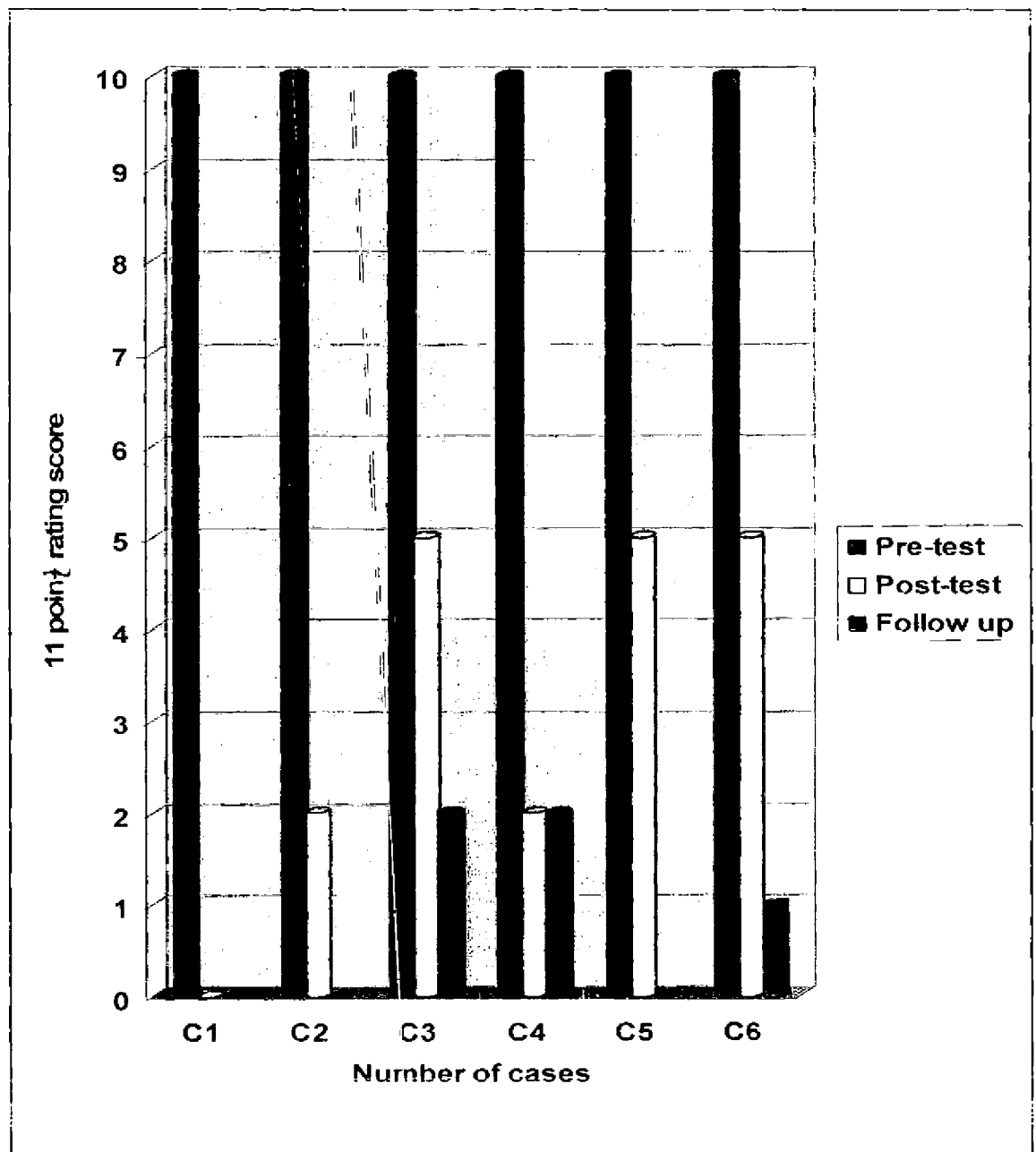


Figure 15: Presents graphical representation of improvement of six cases in cognitive functioning level

Figure 15 shows the pre-test and post-test level of cognitive functioning. In post-test phase, six out of six cases reported that their cognitive problems were reduced. In follow up sessions, cognitive functioning level was found to have improved further (Here 0 = No problem, 10= Severe problem).

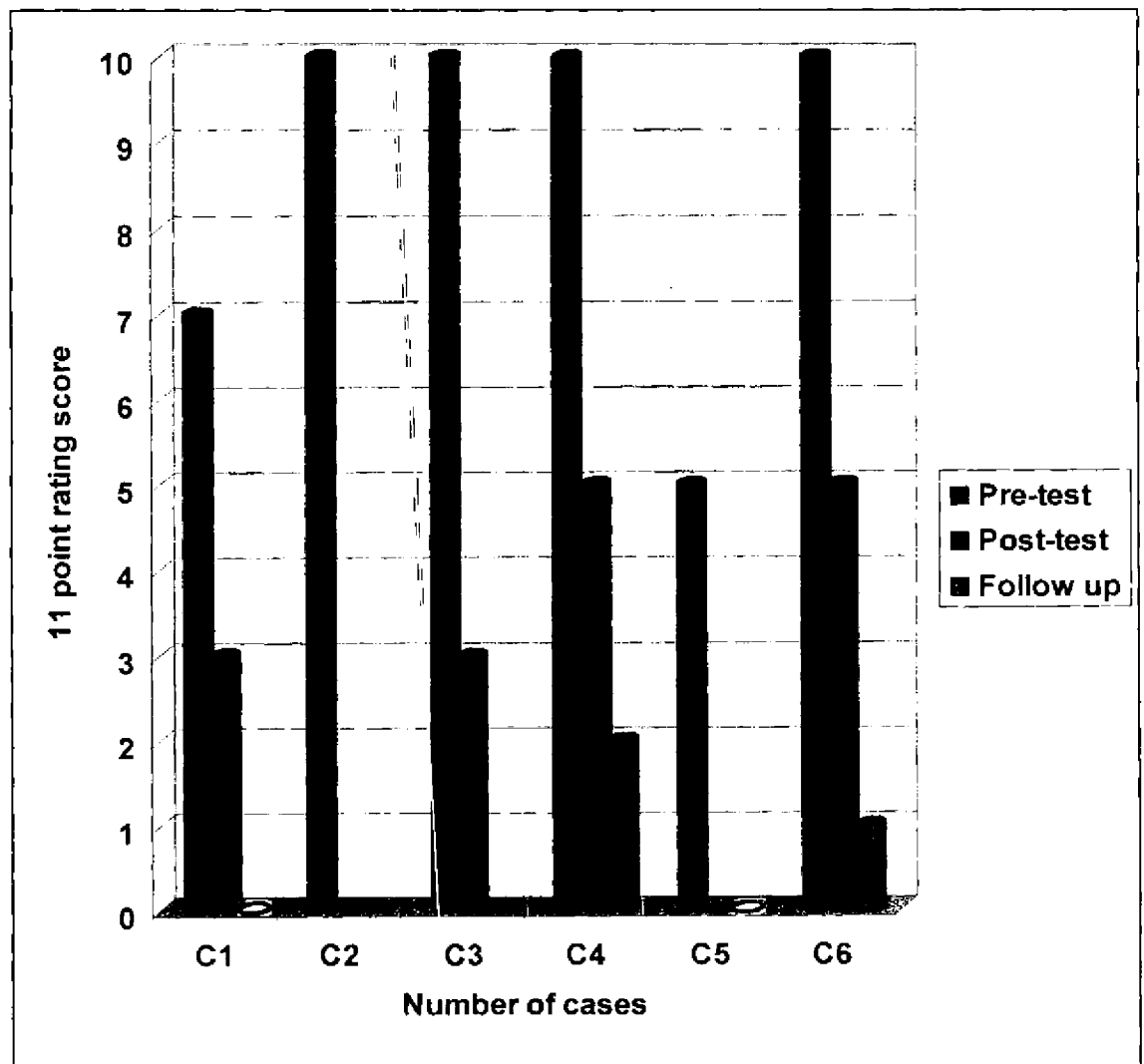


Figure 16: Presents graphical representation of improvement of six cases in motivational functioning level

Figure 16 shows the pre-test and post-test level of motivational functioning. In post-test phase, six out of six cases reported that their motivational problems were reduced. In follow up sessions, cognitive functioning level was much better than before (Here 0 = No problem, 10= Severe problem).

Part C: Overall subjective improvement in the reported problem areas

Table 16: Pre-test and post-test subjective report of cognitive problems of the patients

Pre- test	Post-test
Poor concentration (6 out of 6)	Beliefs that they can concentrate on their daily activities (5 out of 6).
Indecisiveness (5 out of 6)	They are trying to take there own decisions (4 out of 5)
Loss of memory (3 out of 6)	Memory problems partially reduced (2 out of 3)
Suicidal Thoughts (2 out of 6)	Condensed suicidal thoughts (2 out of 2)
Rumination (1 out of 6)	Partially reduced (1 out of 1)
Self-criticism (1 out of 6)	Partly reduced (1 out of 1)

Table 16 shows cognitive problems of the subjects in pre-test and post-test phases. In pre-test phase, six out of six patients complained about poor concentration, five out of six reported indecisiveness. Three out of six also reported loss of memory. Suicidal ideation and self-criticisms were informed by one out of six. In post-test phase, five out of six patients reported that they could concentrate on their daily activities. Four out of five Ss reported that now they could take their own decisions.

Table 17: Pre-test and post-test subjective report of behavioral problems of the patients

Pre-test	Post-test
Low activity level (3 out of 6)	Feel better than before and more active (3 out of 3)
Avoidance social interaction (4 out of 6)	Increased social interaction (3 out of 4)
Aggressive behavior (4 out of 6)	Reduced aggressive behavior (4 out of 4)
Fatigue (1 out of 6)	Compact fatigue (1 out of 1)
Avoidance [house hold works, conversation with caregivers] (1 out of 6)	Partially increased house hold works, conversation with caregivers (1 out of 1)
Crying (4 out of 6)	Control crying successfully (3 out of 4)
Passivity (2 out of 6)	Partially reduced passivity (1 out 2)

Table 17 demonstrate that four out of six patients, complained about avoiding social interaction, four out of six reported about aggressive behavior. Three out of six complained about lowered activity level, fatigue and crying. After post-tests, three out of six reported that they increased their social interaction. Three out of four informed that they could control their crying.

Table 18: Pre-test and post-test subjective report of motivational problems of the patients

Pre-test	Post-test
Loss of interest (4 out of 6)	Feel interested to do something creative (3 out of 4)
Loss of enjoyment (3 out of 6)	Enjoyed work in their daily life (2 out of 3)
Procrastination (1 out of 6)	Partly reduced procrastination (1 out of 6)
Low self esteem (2 out of 6)	Increased self-esteem (1 out of 2)
Loss of motivation (1 out of 6)	Motivated to do something (1 out of 6)

Table 18 shows four out of six patients complained about loss of interest and three out of six reported loss of enjoyment. Following intervention three out of four patients were interested to do something better. Two out of three also reported that they were enjoying their daily works.

Table 19: Pre-test and post-test subjective report of affective problems of the patients

Pre-test	Post-test
Depression (5 out of 6)	Depression reduced (5 out of 5)
Irritability (4 out of 6)	Partly reduced (3 out of 4)
Sadness (6 out of 6)	Decreased sadness (5 out of 6)
Anxiety (1 out of 6)	Reduced anxiety properly (1 out of 1)
Guilt (1 out of 6)	Managed guilty feelings (1 out of 1)
Anger (3 out of 6)	Diminished depression (2out of 3)
Frustration (1 out of 6)	Reduced frustration (1 out of 1)
Self-balm (1 out of 6)	Reduced self balm (1 out of 1)

Table 19 evinces that, five out of six complained depression and four out of six reported irritability. After intervention, five out of six patients reported decreased sadness. Three mentioned that now they could control their emotions successfully.

Table 20: Pre-test and post-test subjective report of somatic problems of the patients

Pre-test	Post-test
Loss of appetite (4 out of 6)	Partially increased appetite (3 out of 6) Increased appetite (1 out of 6)
Chest pain (1 out of 6)	Reduced chest pain (1 out of 1)
Palpitation (1 out of 6)	Diminished palpitation (1 out of 1)
Neck Pain (1 out of 6)	Reduced neck pain (1 out of 1)
Sweating (2 out of 6)	Reduced sweating (2 out of 2)
Premature ejaculation (1 out of 6)	Partially reduced (1 out of 1)
Weakness (2 out of 6)	Still they felt weak (2 out of 6)
Loss of sleep (3 out of 6)	Reduced sleep problems (2 out of 6)
Heaviness in chest (2 out of 6)	Reduced heaviness in chest (1 out of 2)
Pain of whole body (1 out of 6)	Reduced pain (1 out of 1)

Table 20 shows that one out of six patients reported chest pain, palpitation. Neck pain was reported by one out of six. Three out of six patients reported about sleep problems. After intervention chest and neck pain was reduced. Sleep problems were reduced after intervention reported by two out of six patients.

Table 21: Pre-test and post-test subjective report of negative thoughts

Pre-test	Post-test
I am hopeless (3 out of 6)	I am not hopeless if I try I will be successful in my life (2 out of 3)
My future was dark (5 out of 6)	If I try hard my future will be bright (4 out of 5)
Nobody loves me (1 out of 6)	My near and dear ones love me (1 out of 1)
Nobody care me (2 out of 6)	My husband and my son will care for me (1 out of 2)
I am failure (2 out of 6)	I have to try to succeed in my life (1 out of 1)
I am worthless (3 out of 6)	I am thinking all or nothing that is bad for me, everything was not in my control so, I don't have to worry (2 out of)
Why Allah gave me such pain (1 out of 6)	Diabetes was not a result of sin (1 out of 1)
I am not psychologically fit person (2 out of 6)	'Stress' doses not mean that I am psychologically unfit (2 out of 2).
I will die very soon (1 out of 6)	If I control my diabetes I will leave longer (1 out of 1)
Some time I feel to committed suicide (2 out of 6)	I will try to make my life happy, suicide was not a right option (2 out of 2)
She makes my life miserable (1 out of 6)	I am trying to understand her feelings, then she will also try to misbehave less with me (1 out of 1).
Probably I did something wrong that's why it was happen to me (1 out of 6)	Without my husband and daughter, I can pass my life by doing something that was very important for my cheerfulness (1 out of 1).
I feel uninterested about my atmosphere (1 out of 6)	I am not mentally sick, situation makes me upset (1 out of 1)
I have no self esteem (1 out of 6)	It will increase my self-esteem by my work (1 out of 1).
Every thing was my fault (1 out of 6)	One cannot make everybody happy (1 out of 1).
I never overcome this situation (1 out of 6)	At least, I have to try to change the situation and consult with my nearest one to help me (1 out of 1).

Table 21 revealed most of the patients complaint that 'my future is dark' (5 out of 6); 'I am hope less'(3 out of 6); 'I am a failure' (2 out of 6); 'I will die very soon' (1 out of 6). After intervention, patients were capable of altering their negative thoughts.

CHAPTER V

DISCUSSION

Chapter V

DISCUSSION

In this chapter, the main findings of the study, both qualitative and quantitative, have been presented with interpretations thereof.

5.1 Quantitative findings

This study showed that there is a significant relationship between blood glucose level and depression in diabetic patients. About one forth of the subjects of this study had varying degrees of depression (Table 3). Anderson (2001) observed that diabetic patients are more vulnerable to develop depression. In order to maintain sound life diabetic patients have to follow 3D's namely diet, drug, and discipline. One can manage diabetes by following 3D's but sometimes it becomes difficult for a patient to do so. Internal factors such as low self-esteem and other environmental factors (i.e. social stigma, financial crisis) make them upset. As a result, they are unable to adhere to 3D's. Therefore, blood glucose level remains high and the patient develops depressive symptoms. A study by Lustman, et al. (2000) showed that there is an association between uncontrolled blood glucose level and depression. According to their findings, depression has been found to be associated with hyperglycemia, diabetes-related complications, and perceived functional limitations of diabetes.

In this study a significant positive correlation ($r = 0.10$ $P < 0.02$) was found between depression and fasting blood glucose level (Figure 3). Positive relationship implies that the level of depression tends to increase with fasting blood glucose level.

To see whether there was any relationship between non-fasting state and depression, correlation, regression analysis are done (Figure 4). It was found that there was a significant relationship ($r = 0.103$ $P < 0.003$) between blood glucose level after breakfast and depression. After feeling diagnosed as diabetes many patients become

depressed due to the stress of having and treating diabetes. If patients are suffering from both depression and diabetes, they often make each other worse. When patients feel depressed, they might not follow all diabetes treatment regimens. On the other hand, for some patients, depression might heighten appetite and stress of being depressed, increases insulin resistance and makes the blood glucose level higher. As a whole, it would become a vicious cycle and makes total scenario worse. In clinical practice, identification of depression in diabetes is often overlooked for a variety of reasons such as societal disapproval of depression, complicity between the physicians and the patients (e.g. not discussing depressive symptoms), and wrongly considering depression as a 'normal consequence of difficult medical illnesses. The potential benefits of treatment are thereby missed. That is how depression often becomes undiagnosed and revolves into silent killer for diabetic patients. Eren, Erdi and Ozcankaya (2003) found the same results in their study. According to their findings, major depressive disorder was more frequent in diabetic patients with poor glycemic control than those with good glycemic control. They also found that there was a strong association between the level of HbA1c and depressive symptom. The above findings also correspond to those of studied by De Groot et al., (2001); Egede and Zheng (2003); Penninx, (2002). They suggest that, when depression accompanies diabetes, there is evidence of poorer glycemic control, decreased physical activity, higher obesity and potentially more diabetes end-organ complications and impaired function.

5. 2 Qualitative findings:

Qualitative findings of the present study are divided into three parts.

5.2.1 Part A: Qualitative case study method was employed in this study. Six patients were purposively selected to find out the effectiveness of psychological intervention on management of T2DM and depression. All of them had depressive symptoms and the depression level was measured by administering depression scale (Uddin & Rahman, 2005) and crosschecked by Diagnostic and Statistical Manual of Mental Disorder (DSM-IV-TR). History taking and formulation sharing were done by using in-depth interview. Goals and intervention plans were set jointly according to patients needs. The intervention plans were arranged to deal with maintaining factors. In post-test

phase, after receiving intervention five out of six patients reported that their goals were achieved fully and one out of this six informed that her goal was achieved partially. Appropriate intervention approaches were applied by using different kinds of cognitive behavior therapy techniques such as activity schedule, graded task assignment, ventilation, assertion training, relaxation, distraction, role-play, sleep hygiene, scheduling for mastery and pleasure, identifying automatic thought, thought challenge, modifying automatic thought, couple therapy etc.

All the six patients reported to be less depressed after receiving psychological intervention (CBT). Five out of six informed that they could apply these techniques in real life situations and manage their depression applying cognitive behavior therapy. One patient reported that she was still trying to cope with vulnerable situations. This study also corroborated by findings of studies by De Jong et al., (1986), DeRureis and Beck, (1988). Most of the patients verbally reported that relaxation and distraction are effective among all the CBT techniques Pignatello et al., (1986) also got similar results. Gonder and Frederick et al.,(2002) suggested that by administering behavioral techniques and giving training on coping skills could improve glycaemic control and later on it could increase psychological well-being.

In the present study, five out of the six patients were females and only one of the patients was male. It may be due to social restriction that females have to suppress their emotions and they could not share their problems with others. A study by Pajer, (1994) evince that women are twice more likely than man to be diagnosed as depressed. Nolen-Hocksema (1990) conducted a research on sex differences in depression; He found that women feel more depressed than the man and they respond to the depressing life events differently. Women have unique psychosocial stressors that can initiate depression and impede recovery. As for example, conflict between domestic and personal demands and gender discrimination.

At the end of the psychological intervention, it was found that all the patients' depression scale score and blood glucose levels decreased. It was due to the regular

monitoring of their daily diabetes treatment regimen, which was the effect of patient's improved knowledge about diabetes and its association with depression.

Therefore, it can be concluded that cognitive behavior therapy is an effective intervention method for reducing depression in diabetic patients. This result was corroborated by the findings of Wang et al., (2008).

5. 2. 2 Part B: Pre-test and post-test assessment of the functional levels were done by administering 11-point rating scale. In this scale 10 means most severe problem and 0 means no problem. All the six patients who received psychological intervention reported that they had serious problems in the functional levels in the pre-test phase. The patients were asked to tell about their social, occupational, somatic, motivational, cognitive, behavioral current level of functioning in this session.

In the pre-test, Case 1 reported that her cognitive and somatic level of functioning was hampered. She rated her problems 10 out of 10 on the 11-point rating scale. In the post-test phase, Case 1 reported that her cognitive problem reduced completely and rated her problem 0 out of 10 and for somatic level 5 out of 10. She rated her problems 1 out of 10 for somatic problems and 0 out 10 for cognitive problems in follow up session. She also informed that she was functionally able to cope with her problems.

Case 2 reported that, all of her areas of functioning level were poor in pre-test phase. She rated her social problems 5 out of 10, occupational problems 2 out of 10, behavioral problems 10 out of 10, somatic problems 5 out of 10, cognitive problems 10 out of 10 and motivational problems 10 out of 10. Case 2 informed that her problems gradually declined at the post-test phases.

Case 3 was severely depressed in the pre-test phase. His functional levels were ruined and got suicidal ideation. He rated his social problems 5 out of 10, occupational problems 5 out of 10, behavioral problems 2 out of 10 and so on in the post-test phase. He rated his somatic problems 1 out of 10, occupational problems 0 out of 10,

behavioral problems 1 out of 10, somatic problems 0 out of 10, cognitive problems 2 out of 10 and motivational problems 0 out of 10 in the follow up session. He reported that he was able to manage all his functional levels and his suicidal ideation reduced.

Case 4 developed psychological problems due to her chaotic family relationship. At cognitive, social, occupational, somatic, motivational and behavioral levels, she rated her problems 10 out of 10 in the pre-test. She informed that her functional levels improved significantly in the post-test. At the follow up session she reported that all her functional levels were satisfactory and steady.

Case 5 rated her problems 10 out of 10 in social, behavioral, cognitive and somatic levels in the pre-test phase. Most of the functioning levels of Case 5 improved following psychological intervention (CBT). In the follow up session, she reported that she was functioning normally in her daily activities.

Case 6 informed that her husband's death negatively affected her in all six areas of functioning. She rated all her functional levels 10 out of 10 in the pre-test session. She reported that she was trying to progress in all her functional levels in the post-test. She reported at follow up session that in the behavioral, motivational and cognitive level, she could manage her problems successfully. She rated her problems 0 out of 10, 1 out of 10 and 1 out of 10 in behavioral, motivational and cognitive respectively at the post-test phase. However, in the social, occupational and somatic level she was trying to get better than before in the post-test phase. The rate of improvement for Case 6 was lower than that of others because of her real life problems. It was a case of bereavement (she lost her husband). This loss was an obstacle to her progress. However, in the follow up session, she reported that she was successful in overcoming her problems.

Reports from all the six patients therefore, led to the recommendation that psychological intervention (CBT) was an effective approach for reducing depression in diabetics (Figure 11-16).

5.2.3 Part C: Subjective improvements of the patients were also shown in this study. All the patients verbally reported their gradual progress. It was found at the pre-test and post-test symptoms assessment. In the pre-test phase, six patients reported about cognitive, somatic, motivational, behavioral, affective and negative thoughts about depression and diabetes related complications. Six out of six patients reported that they got concentration problems in their daily activities. Moreover, they could not take their own decisions, and two out of six informed that they had suicidal ideations. In the behavioral level, three out of six reported that their activity level was lower before intervention. Four out of six patients reported that they were avoiding their social interactions. One of the patients complained about fatigue. Patients also reported that they got loss of interest, loss of enjoyment, depression, irritability, sadness, loss of appetite, sweating, loss of sleep, self-balm, anger, guilt, weakness, passivity etc. in the pre-test phases. In the post-test phase, six out of six patients informed that now they were feeling better and could concentrate on their daily activities. With the help of the in-depth interview, the researcher identified their negative thoughts. Such as "Everything is my fault", "I will never overcome this situation", "Why Allah give me such pain?", "I am a bad mother" "I am not psychologically fit" "My mother dose not love me" "Life was meaning less" "I am not a good wife" and "My daughter never understand my feelings" etc. After receiving intervention, they informed that they could manage their depressive symptoms and negative thoughts. Verbal report also pointed out that all of them got psychological intervention (CBT) to reduce their depressive symptoms. The results (Tables 16-21) showed that psychological intervention (CBT) was an effective intervention method to reduce depressive symptoms and control blood glucose level. According to the objective, the results were in the expected direction.

5.3 Outcome of psychological intervention as shown on depression scale score

By administering depression scale of Uddin & Rahman (2005) in the pre-test phase among six diabetic patients, it was found that all of them were suffering from depression in varying degrees. In the first session, it was found that out of six patients two were severely depressed, one was moderately depressed and three were mildly depressed. In the post-test phase, it was found that their depression level decreased. This result also shows that psychological intervention (CBT) was an effective method for decreasing clinical level of depression in diabetic patients. A study by Snoek & Skinner, (2002) suggested that CBT was beneficial for depression, blood glucose monitoring and subsequent blood glucose regulation. The same researchers also suggested the inclusion of CBT along with diabetes education.

In the present study participants with less than one year's and more than ten year's of T2DM were found to experiencing relatively sever depression than those having T2DM for 1-10 years. It may be due to the shock of first diagnosis and they have to restrict their previous life style.

Diabetes is a chronic disease for millions of people; diabetes and depression are unpleasant facts. A chronic illness is a condition that lasts for a very long time and usually cannot be cured completely, although some illnesses can be controlled through diet, exercise, and certain medications. In fact, depression is one of the most common complications of chronic illness like diabetes, hart attack, cancer etc. In the present study it was found that the patients having more than 10 years of T2DM patients have more depression than 1-10 years of diabetes patients.

In conclusion, it may be said that there is a significant relationship between uncontrolled blood glucose level and depression. It may also be concluded that the psychological intervention (CBT) is an effective method of dealing with depression in diabetes.

Implication of the study

- Bangladesh is a developing country. In Bangladesh, diabetes is growing in an epidemic form. At this time, depression is common among most of the diabetic patients. By acquiring proper knowledge, health professionals can understand diabetes, depression and its related problems better.
- Association between blood glucose level and depression is clearly shown by this study.
- If depression in diabetes is left untreated a patient may become a social burden. Therefore, by taking proper action, health professionals could prevent depression in diabetic patients.

Suggestions for further study

- **Holistic treatment:** Holistic approach is essential for the treatment of depression in diabetics. Patients need to be encouraged to take integrated medical, psychological and social services.
- **Patient involvement in their own care:** There is a strong and widely held view that the trend of involving patients in decisions about healthcare is strategically important to the improvement of health, in addition to social care services. It is recommended that there should be user involvement at each stage of the patient's care pathway.
- **Awareness:** To reduce the personal and economical impact of living with both conditions (diabetes and depression), further researches are required to improve the level of awareness. Increased targeted investments in more effective preventive measures are recommended.
- **Education:** Education is the foundation of patient care and is critical in enabling people to manage their condition on a daily basis. It is recommended to have access to the structured education program from the point of diagnosis and management.
- Additional multicenter trial is recommended.
- Availability of psychological service in every diabetic hospital and health care center is also recommended.

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APPENDICES

Appendix 1

Intervention instruction:

No of session	Session Plan
Session 1 (First session was baseline sessions)	1. Establish rapport 2. Monitor blood glucose level 3. Inquiry regarding expectation of therapy 4. Pinpointing most urgent and accessible problems (hopelessness, loss of functioning). 5. Explanation of cognitive behavior therapy with emphasis on the rationale for assignment and homework and also explain patient about relationship between T2DM and depression. 6. Use depression scale 7. Feed back
Session 2	1. Review of the first session 2. Monitor blood glucose level 3. Use depression scale 4. Preparation of agenda and focus on the problems to be explored 5. Psycho-education about depression and T2DM 6. Administer Depression scale 7. Use five factor model to identify thought, feelings and behavior. 8. Feed back regarding today's session
Session 3	1. Preparation of agenda 2. Inquiry regarding effects of first interview 3. Use depression scale 4. Review of homework assignment 5. Discussion of reaction to pervious interview 6. Discussion the automatic negative thought 7. Demonstration of the use of wrist counter for clicking negative

	automatic thoughts 8. Preparation for homework 9. Feedback regarding today's session
Session 4	1. Follow some general format as in third interview 2. Monitor blood glucose level 3. Use depression scale 4. Use relaxation technique 5. Further instruction in identifying negative automatic thought (use role play, guided discovery etc.). 6. Explanations of how these automatic thoughts represent distortion of reality and are related to other symptoms of depression. 7. Elicitation automatic thoughts, specifically relationship to homework assignment. 8. Shearing formulation
Session 5	1. Follow some general format as in previous interview 2. Review activity schedule 3. Use depression scale 4. Review and discussed automatic thoughts 5. Demonstrate to the patient ways of evaluating and correcting cognitive distortion 6. Instruction to use daily record of dysfunctional thoughts. 7. Feed back regarding today's session
Session 6, 7 and 8	1. Follow some general format as in previous interview 2. Use depression scale 3. Monitor blood glucose level 4. Techniques used to eradicate psychological blocks to return the premorbid level of functioning 5. Further demonstration of rational response to automatic thoughts 6. Further homework assignment

	7. Discussion the concept of basic assumption 8. Monitoring blood glucose level 9. Prepared the patient for termination 10. Feed back regarding today's session
Session 8-12	1. Follow some general format as in previous interview 2. Monitor blood glucose level 3. Use depression scale 4. Again formulation sheared 5. Increase responsibility for homework assignment 6. Identification and discussion of basic assumptions. Testing the validity of these assumptions 7. Prepared the patient for termination 8. Feed back regarding today's session
Closing interviews 13-15 (up to 20)	1. Follow some general format as in previous interview 2. Monitor blood glucose level 3. Use depression scale 4. Emphasis on continuation of homework assignment and practicing other strategies after the termination 5. Emphasis CBT as a learning process that continues throughout the individual's life.

Appendix 2

ডায়াবেটিস রোগির বিষন্নতা পরিমাপক

নামঃ

বয়সঃ

লিঙ্গঃ

ঠিকানাঃ

বৈবাহিক অবস্থাঃ

অবিবাহিত	বিবাহিত	তালাকপ্রাপ্ত	বিপত্তীক	আলাদা
১	২	৩	৪	৫

শিক্ষাগত যোগ্যতাঃ

নিরক্ষর	প্রাথমিক	মাধ্যমিক	উচ্চমাধ্যমিক	ডিগ্রি	অনার্স	মাষ্টার্স ও তার উপর
১	২	৩	৪	৫	৬	৭

পেশাঃ

গৃহীনি	চাকুরী	ব্যবসা	বেকার	অন্যান্য
১	২	৩	৪	৫

প্রথম যখন ডায়াবেটিস ধরা পরে তখন ব্লাড গ্লুকোজ লেবেল কত ছিল?

বর্তমান ব্লাড গ্লুকোজ লেবেল কত?

ক্রমিক নং	বিবৃতি সমূহ	একবারেই প্রযোজ্য নয় (১)	প্রযোজ্য নয় (২)	মাঝামাঝি (৩)	কিছুটা প্রযোজ্য (৪)	পুরোপুরি প্রযোজ্য (৫)
১	আমার অশান্তি লাগে					
২	ইদানিং আমি মন মরা থাকি					
৩	আমার ভবিষ্যত অন্ধকার					
৪	ভবিষ্যতে আমার অবস্থা দিন দিন আরো খারাপ হবে					
৫	আমার সব শেষ হয়ে গেছে					
৬	আমি মনে করি যে, বর্তমান জীবনটা খুব বেশি কষ্টকর					
৭	বর্তমানে আমি অনুভব করি যে মানুষ হিসাবে আমি সম্পূর্ণ ব্যর্থ					
৮	আমি কোথাও আনন্দ-ফুর্তি পাইনা					
৯	নিজেকে খুব ছোট মনে হয়					
১০	সব কিছুতে আমার আত্মবিশ্বাস কমে গেছে					
১১	আমার মনে হয় মানুষ আমাকে করুণা করে					
১২	জীবনটা অর্থহীন					
১৩	প্রায়ই আমার কান্না পায়					
১৪	আমি প্রায়ই বিরক্ত বোধ করি					
১৫	আমি কোন কিছুতেই আগ্রহ পাইনা					
১৬	আমি ইদানিং চিন্তা করতে ও সিদ্ধান্ত নিতে পারিনা					
১৭	আমি আজকাল অনেক কিছুতেই মনোযোগ দিতে পারিনা					
১৮	আমি আগের মতো মনে রাখতে পারিনা					
১৯	আমি দুর্বল বোধ করি এবং অল্পতেই ক্লান্ত হয়ে পড়ি					
২০	আমি এখন কম ঘুমাই					
২১	আমি এখন বেশি ঘুমাই					
২২	আমার মেজাজ খিটখিটে হয়ে গেছে					
২৩	আমার ক্ষুধা কমে গেছে					
২৪	আমার ক্ষুধা বেড়ে গেছে					

২৫	আমার ওজন কমে গেছে (ইচ্ছাকৃত ভাবে ওজন নিয়ন্ত্রণের চেষ্টা করার ফলে নয়)					
২৬	আমার মনে হয় যে আমার কাজকর্মেও গতি কমে গেছে					
২৭	হাসির কোন ঘটনা ঘটলেও আমি আর হাসতে পারিনা					
২৮	যৌন বিষয়ে আমার আগ্রহ কমে গেছে					
২৯	সামাজিক কাজকর্মে আগের মতো অংশগ্রহণ করতে পারিনা					
৩০	শিক্ষা বা পেশাগত কাজকর্ম আগের মতো করতে পারিনা					

Severity of Depression	Scale score
Cut off point	94
Minimal depression	30-100
Mild depression	101-114
Moderate depression	115-123
Severe depression	124-150

নোটঃ বর্তমান স্কেলটি ঢাকা বিশ্ববিদ্যালয়ের চিকিৎসা মনোবিজ্ঞান বিভাগের অধীনে মোঃ জহির উদ্দিন কর্তৃক এম. ফিল এর অংশ হিসাবে ২০০৫ সালে প্রকাশিত হয়েছে।