CHAPTER-II

REVIEW OF LITERATURE

2.1 Introduction

Anxiety and fear are the most common emotional disorders among patients with diabetes, which have also been proved by the outcome of many researches. (Peyrot & Rubin, 2000; Pibernik-Okanovic, 2005; Thomas et al. 2003). Both diabetes and depression belong to so called ‘life style’ or ‘civilization diseases’ (Burkitt, 1973) and their development may depend on life-style – in the case of type 2 diabetes in females (Hu, 2006). Depressive symptoms are among the major contributors to non-successive aging by the influence on both mental and physical health (George et al., 2007).

Depression may lead to an unhealthy life style among patients with high risk of coronary heart disease (Bonnet et al., 2005) and the life-style may be one of the major factors contributing to life span (Fraser & Shivalik, 2001). Additionally, good health perception and wellbeing exert an effect on the mortality ratio (Idler & Kasl, 1991). Numerous studies have confirmed that the course of depression in patients with diabetes is more severe, and the relapses of depression episodes are more frequent, especially in patients with unbalanced diabetes. Data from the National Health and Nutrition Examination Survey indicate that attaining good diabetes control is possible in only approximately 40% of patients, whereas as many as 20% have HbA1c ≥ 9%, i.e., exceeding the most liberal levels accepted for patients (Saddinne et al., 2002).

2.2 Purpose of review of literature

The review of related literature is a critical component of a research study. The purpose of a literature review is to convey the reader that ideas have been established on a topic and what are the strength and weakness. The
literature review allows the reader to be brought up to date regarding the stake of research in the field of familiarizes the reader with any contrasting perspectives and viewpoints on the topic. There are good reasons for beginning a literature review before starting a research paper. The reasons include:

- To see what has and has not been investigated
- To develop general explanation for observed variation in a behaviour phenomenon
- To identify potential relationship between concepts and to identify researchable hypothesis
- To learn how others have defined and measured key concepts
- To identify data source that researches have used
- To develop alternative research projects
- To discover how a research project is related to the work of others
- It can provide new ideas and approaches that may not have occurred to the investigator
- Provide networking opportunities with others individuals in the field

2.3 Literature related to Anxiety, Depression and Stress:

An investigation by *Naicker et al. (2017)* was documented the excess mortality risk associated with symptoms of depression and/or anxiety comorbid with type 2 diabetes. A Sample of 64,177 Norwegian adults from the Nord-Trondelag Health Study (HUNT 2), with linkage to the Norwegian Causes of Death Registry were included to assess all-cause mortality from survey participation. Cox proportional hazards models to examine mortality risk over 18 years associated with type 2 diabetes status and the presence of comorbid affective symptoms at baseline were used. The study provided the evidence that mortality risk in individuals with diabetes increased in the presence of depression or anxiety, or both. Mortality risk was lowest for symptoms of anxiety, higher for comorbid depression-anxiety, and highest for depression. Excess mortality risk associated with depression and anxiety was observed in
men with diabetes but not in women. The highest risk of death was observed in men with diabetes and symptoms of depression only.

An attempt was made by Shahi & Mohammadyfar (2017) to compare depression, anxiety, stress, quality of life, and alexithymia in people with type II diabetes and their non-diabetic counterparts. This study was a causal-comparative study. All the people suffering from type II diabetes who referred to the clinics of Semnan were selected. Sample consists of 60 patients (30 males and 30 females) were selected through random sampling technique and 60 healthy subjects were selected as the control group. Findings of this research revealed that people with diabetes suffer from several mental disorders that make it harder for them to continue living, regardless of the numerous difficulties that they experience due to this chronic disease.

A research by Bener, Ozturk & Yildirim (2017) was conducted to describe the level of glycemic control, complications and psychosocial functioning among DM patients using the Depression Anxiety Stress Scales instrument and its predictors among diabetic Turkish population. It was a cross-sectional study. Total 1,600 diabetic patients approached, 1,147 gave their consent. It was revealed from the findings that there were statistically significant differences between two groups regarding occupation, income, place of residence and consanguinity marriages. The most significant difference were observed for parameters such as family history of Diabetes Mellitus, physical activities, high blood pressure, stroke and macro vascular complications. The depression, anxiety and stress scores were significantly higher and more frequent in diabetic HbA1c ≥ 8 cases compared to HbA1c < 8. The multivariable logistic regression analysis revealed that high blood pressure, BDI-II depression, DASS21 stress, physical exercise, DASS21 depression, income, family history of diabetes, DASS21 anxiety and sleeping disturbance were the major significant contributors after adjusting for age, gender and other variables. The distribution depression, anxiety and stress scores in DM patients were higher in HbA1c ≥ 8 compared to HbA1c < 8. This research revealed that
there is an association between DM and depression, anxiety and stress symptoms in Turkish population.

A study by Jeong et al. (2017) was conducted to reveal the depression and mortality in people with Type2 Diabetes mellitus. A retrospective data from January 2003 to December 2013 were collected for adult type 2 diabetes mellitus (T2DM) patients older than 30 years using the National Health Information database maintained by the Korean National Health Insurance Service (NHIS). Demographic characteristics were analyzed with descriptive statistics, and the annual prevalence of depression was estimated. Mortality rates and hazard ratios for each age group (stratified into six age groups) of patients diagnosed with T2DM in 2003 were estimated using a Cox proportional hazard method, with the Kaplan-Meier cumulative survival curve showing the overall survival rates according to the T2DM status until the given year of 2013. It was revealed through this research that the annual prevalence of depression was consistently higher in T2DM group from 2003 to 2013. The mortality hazard ratio was higher in the depressed in all age groups, and the risk was higher in male groups and in younger-aged groups. Depression was significantly associated with a high mortality risk in T2DM patients.

A study was conducted by Sendhilkumar et al. (2017) to verify stress levels among adults aged >20 years with type 2 diabetes mellitus (DM), their relationship with socio-demographic and clinical characteristics and possible risk factors for stress and coping strategies. A mixed-methods study with quantitative methodology and qualitative methodology was carried out. Stress levels were assessed among type 2 DM patients attending a diabetes clinic using a 5-point perceived stress scale-10. One-on-one interviews were carried out with 376 participants with DM having high/very high stress levels to understand the reasons for perceived stress and explore their coping mechanisms. The perceived major stress inducers were related to family, work, financial issues, and the disease itself. Results of this study showed high levels of stress in more than one-third of DM patients.
Study conducted by Onyekachi (2017) was to understand the relationship between socio-demographic, socio-cognitive, and psychological health and to specifically provide elucidations for how these factors are related and differ across ethnicity, gender and type of diabetes. Additional investigations were carried out to assess the pattern of the psychological health of diabetic patients using socio-demographic and socio-cognitive factors, to find out whether variation occur in the psychological and socio-cognitive factors by gender, ethnicity and type of diabetes. Finally, an exploration of the contextual and explanatory factors perceived to have underlain the gender ethnicity and type of diabetes differences observed in the psychological status and socio-cognitive health was carried out. The results of this study revealed that how best diabetic patients should be supported in order to promote adherence, positive treatment processes, provide assistance to the physical discomfort associated with diabetes, and support pro-diabetes coping behaviors (diet), through psychotherapy so as to enhance optimal psycho-behavioral health.

Zaidi et al. (2017) conducted a research on Type 2 diabetes mellitus patients to measure the level of stress and its relationship and comparison with demographic variables. It was a cross sectional comparative study conducted in Faisalabad. Sample of 120 patients who have diagnosed type 2 diabetes mellitus (T2DM) between age ranges 20-50 years were selected randomly from different public hospitals of Faisalabad. Results revealed that there is a significant gender difference and significant age differences among T2DM patients. Stress is negatively linked with increasing age and positively linked with gender. Men and adults experience low level of stress as compared to women and early adults with T2DM.

An attempt was made by Abdulrahman (2017) on people with type 2 diabetes mellitus to assess the prevalence of anxiety and depression and to identify their associated risk factors. It was a cross-sectional, single-centre study that contained a sample of 300 adults from The Diabetic Center of King
Saud Hospital in the Qassim region. Hospital Anxiety and Depression Scale (HADS) were used to measure Anxiety and depression. Multivariable analysis using multiple logistic regression was conducted to evaluate the combined effect of various factors associated with anxiety and depression, adjusting for confounding variables. Anxiety was more common among patients who had poor social support. Anxiety was less common among retired people and those having diabetes for more than ten years. In contrast, depression was more common among patients who had received moderate or low social support but less common among those having diabetes for more than ten years. Findings of this study revealed that there is a high prevalence of anxiety and depression among adults with type 2 diabetes mellitus.

A cross-sectional research by Thomas et al. (2016) was conducted to determine whether type 2 diabetes contributes to the presence of depressive and anxiety disorder diagnoses in low-income adults with hypertension, asthma, and/or arthritis, , this study administered a structured diagnostic interview to low-income primary care patients diagnosed with type 2 diabetes, hypertension, arthritis, and asthma, as well as to those with no chronic illness, to determine the 12-month prevalence of depressive and anxiety disorders. A logistic regression (LR) model was used to assess whether a diagnosis of depression and/or anxiety was associated with type 2 diabetes after adjusting for known risk factors. A high prevalence rate of depressive and/or anxiety disorders was found in the total sample and in all three illness groups: type 2 diabetes, other chronic illnesses, and no chronic illness. It was further concluded by the researcher that positive contribution of type 2 diabetes to increased rates of depressive and/or anxiety disorders in patients with hypertension, asthma, and/or arthritis and support prior research that type 2 diabetes may serve as an indicator of depression and anxiety in low-income adults treated in primary care clinics.

A study conducted by Mota et al. (2016) analyzed the prevalence of diabetes mellitus (DM) and pre-diabetes, and their association with cardio-
metabolic, socio-demographic, and lifestyle risk factors in the Romanian population aged 20-79 years. It was an epidemiological study with a stratified, cross-sectional, cluster random sampling design. Socio-demographic, lifestyle, data were collected through self and interviewer administered questionnaires, and biochemical assay and oral glucose tolerance tests were performed. Total of 2728 participants were selected randomly as sample. This study concluded that a high prevalence of impaired glucose regulation in the adult Romanian population, providing data on the prevalence of DM and pre-diabetes and their association with several risk factors. The prevalence of DM increased with age and was higher in men than in women.

*Chew et al. (2016)* conducted a study to examine the prevalence of DRD and depression, and their associated factors in Asian adult T2DM patients. This study was conducted in three public health clinics measuring Diabetic Related Distress (DRD) (Diabetes Distress Scale, DDS), and depression (Patient Health Questionnaire, PHQ). Patients who were at least 30 years of age, had T2DM for more than one year, with regular follow-up and recent laboratory results (<3 months) were consecutively recruited. Associations between DRD, depression and the combination DRD-depression with demographic and clinical characteristics were analysed using generalized linear models. From 752 invited people, 700 participated. It was revealed that DRD and depression were common and correlated in Asian adults with T2DM at primary care level. Socio-demographic more than clinical characteristics were related to DRD and depression.

An attempt was made by *Habtewold, (2016)* to investigate the socio-demographic, clinical, and psycho-social factors associated with co-morbid depression among type 2 diabetic outpatients presenting to Black Lion General Specialized Hospital, Addis Ababa, Ethiopia. In the present study random sample of 276 type 2 diabetic outpatients were included. Type 2 diabetes patients were evaluated for depression by administering a validated nine-item Patient Health Questionnaire (PHQ-9). Risk factors for depression among type
2 diabetes patients were identified using multiple logistic regression analysis. The investigation concluded that depression is a common co-morbid health problem. The presence of diabetic complications, low monthly family income, diabetic nephropathy, negative life event, and poor social support were the statistically significant risk factors associated with depression. Further, it was also confirmed in this research that the lumber of mental health mainly depression is high in the population with type 2 diabetes mellitus co-morbidity.

Rajput et al. (2016) conducted an investigation on patients of Type 2 diabetes mellitus (T2DM) patients in Rohtak district of Haryana in India to study the prevalence and predictors of depression and anxiety. Four hundred ten consecutive patients having T2DM and 410 healthy controls matched for age and sex were included in this investigation. Socio-demographic and relevant clinical variables were collected. For evaluation of depression and anxiety, Hamilton Depression Rating Scale and Hamilton Anxiety Rating Scale were used respectively. The present findings revealed that diabetic cases had significantly higher depression and anxiety as compared to healthy controls. The risk factors for depression and anxiety were age, female sex, insulin therapy, and diabetic complications. It was found that a significantly larger proportion of diabetic patients had depression, anxiety and comorbid depression and anxiety as compared to healthy controls. Diabetic females had higher depression and anxiety than males. The major predictors for a severe form of depression and anxiety among T2DM cases were age, female sex, insulin therapy, retinopathy, nephropathy, and ischemic heart disease.

A review conducted by Bădescu et al. (2016) was aimed to show the links between depression and diabetes. It was revealed that there is linkage between depression and diabetic patients. It was further revealed that there is also bidirectional relationship between diabetes and depression, a complex relation that might share biological mechanisms, whose understanding could provide a better treatment and improve the outcomes for these pathologies (Berge, 2015; Moulton, 2015).
Rehman & Kazmi (2015) conducted a cross sectional study to evaluate the prevalence and comparison of depression, anxiety and stress in patients with type-2 diabetes. The sample consisted of patients with type -2 diabetes (N=240), having complications (foot ulcers, nephropathy) n=120 and without complication n= 120. DASS was used to measure the depression, anxiety and stress. It was revealed in the research that the 47.9%, 69.6% and 62.9% patients with type-2 diabetes were afflicted by depression, anxiety and stress respectively. The depression in diabetes patients with complications was significantly higher than the depression in patients without complications. The anxiety in patients with complications was significantly higher than the anxiety in patients without complications. The stress in patients with complications was significantly higher than the stress in patients without complications. The depression in female patients was significantly higher than the depression in male patients. The anxiety in female patients was significantly higher than the anxiety in male patients. The stress in female patients was significantly higher than the stress in male patients. It was further concluded by the investigator that the high prevalence of depression, anxiety and stress in patients with type2 diabetes was observed. The diabetes patients with complications (foot ulcers, nephropathy) and female patients have higher levels of depression, anxiety and stress compared to diabetes patients without such complication and male patients.

Habtewold, Radie & Sharew (2015) conducted a study to assess the prevalence of co-morbid depression among type 2 diabetic outpatients. Institution based cross-sectional study design was conducted on a random sample of 276 type 2 diabetic outpatients from Black Lion General Specialized Hospital. Systematic random sampling technique was used to get these individual patients from 920 type 2 diabetic outpatients who have an appointment during the data collection period. Patients’ depression status was measured using Patient Health Questionnaire 9 (PHQ 9). Total 264 type 2 diabetic outpatients were interviewed. The prevalence of depression among
type 2 diabetic outpatients was 13%. This study revealed that depression is a common comorbid health problem in type 2 diabetic outpatients.

Islam, Rawal & Niessen (2015) conducted a cross-sectional study among 515 patients with type 2 diabetes in a tertiary hospital in Dhaka city. We assessed depression using Patient Health Questionnaire-9 (PHQ-9) with predefined cut-off scores of 5, 10, 15 and 20 to indicate minimal, mild, moderate, moderately-severe, and severe depression. Associations between depression and its associated factors were explored using uni-variate and multivariate regression. Overall, 61.9% participants had depressive symptoms, and the prevalence was higher among females as compared to males. One-third (35.7%) of participants had mild depression and 36.2% had moderate to severe depression. Patients with diabetes, especially females, those having other complications, and major life-events should routinely be screened for symptoms of depression with adequate management of these conditions.

Another cross-sectional study involving the use of self-administered questionnaire was conducted by Tan et al. (2015) in eight primary care private and government clinics in Pulau Pinang and Melaka, Malaysia. The validated DASS-21 questionnaire was used as a screening tool for the symptoms of DAS. A total of 320 patients with diabetes from eight centres were enrolled via convenience sampling. Depression was found to be significantly associated with marital status and family history of DAS; anxiety was significantly associated with monthly household income, presence of co-morbidities and family history of DAS; and stress was significantly related with work and family history of DAS.

To evaluate the frequency of depression among Saudi patients, and to correlate between the presence of depression and type of diabetes, a descriptive research was conducted by Gemeay et al. (2015) with a convenient subject of 100 male and female patients (27 subjects with Type 1 diabetes, 29 subjects with Type 2 diabetes, and 44 subjects with gestational diabetes) from March to June 2014 at Al-Solimania Primary Health Care Center, Al-Olaya, Riyadh,
Kingdom of Saudi Arabia. Patients were interviewed individually using an interview questionnaire sheet formulated by researchers to assess lifestyle items, and Beck depression inventory was used to screen for depression. This study revealed that there is an association between diabetes and depression although the correlation between depression and diabetes is not significant, while there is significant relation with changes in body image.

*Khan et al. (2014)* investigated to determine the frequency of depression among patients with type-II diabetes mellitus in Peshawar at Khyber Teaching Hospital, Peshawar, from March to September 2010. Depression was assessed by using Beck Depressive Inventory-II (BDI-II). Out of 140 patients with type-II diabetes, 85 (61%) were women and 55 (39%) were men. Eighty four (60%) patients presented with severe depression. It was confirmed in the research that depression was higher in females than males and widows. Depression was high in diabetic patients, especially in females and widows.

To find out the prevalence and factors associated with anxiety and depression among type 2 diabetes outpatients in Malaysia, a cross-sectional single-centre study with universal sampling of all patients with type 2 diabetes was conducted by *Ganasegeran et al. (2014)*. A Sample of 169 patients with type 2 diabetes age range of 18 to 90 years who acquired follow-up treatment from the endocrinology clinic were selected for this study. The validated Hospital Anxiety and Depression Scale (HADS), was administered. Findings revealed that from 169 patients surveyed, anxiety and depression were found in 53 (31.4%) and 68 (40.3%), respectively. In multivariate analysis, age, ethnicity and ischaemic heart disease were significantly associated with anxiety, while age, ethnicity and monthly household income were significantly associated with depression. It was also concluded in this study that socio-demographics and clinical health factors were important correlates of anxiety and depression among patients with diabetes.

*Azad et al. (2014)* carried out a study to see the frequency of depression in patients with established type-2 diabetes attending a diabetes clinic in a
tertiary care hospital. Sample of 110 patients having chronic type-2 diabetes were selected in this cross sectional study, Hospital Anxiety and Depression Scale was administered to assess depression and anxiety in these patients. Results of this study confirmed that high incidence of depression and anxiety in patients with chronic type-2 diabetes is there. Nearly half of the sample was found to have anxiety and depression in this research. Females, due to less education and being housewives, were found to be affected more and control of diabetes have little effect on anxiety and depression in patients with chronic type-2 diabetes patients.

A research was made to observe the association of depression, anxiety, and stress with Type 2 diabetes (T2DM) in Bahrain. The country has very high prevalence of T2DM. It was a cross-sectional research by Almawi et al. (2014) which involves administration of Depression Anxiety Stress Scales (DASS)-21 structured depression, anxiety, and stress scale to 143 T2DM patients and 132 healthy controls. Results revealed a positive contribution of T2DM to increased depressive and/or anxiety and/or stress disorders among the patients examined, thereby recommending counseling for T2DM patients.

A study was conducted by Siddiqui (2014) to estimate the prevalence of depression in patients in India with T2D and to compare it with a non-diabetic group; and to determine the association of depression with glycaemic control and complications of diabetes in patients with T2D. 260 subjects of Indian origin (162 men and 98 women; 130 with known T2D and 130 controls without T2D) were evaluated. Socio-demographic profile, duration of diabetes, presence of complications and other medical variables were also analysed. Findings of this study demonstrated that there is a higher prevalence of depression in Indian patients with T2D, which is almost twice that in those without T2D.

This research study conducted by Madhu et al. (2013) intends to assess for undiagnosed depression and its predictors among adult diabetic patients. A Sample of 100 patients with type 2 diabetes mellitus attending
the diabetic clinic of a tertiary care hospital was selected. Depression was assessed using Patient Health Questionnaire-9 (PHQ-9). Chi-square test was performed and odds ratios (OR) with 95% confidence interval (95% CI) were obtained. Mann Whitney U and Pearson correlation tests were done. Logistic regression was carried out to determine the predictors of depression and adjusted odds ratios with 95% confidence intervals were obtained. Subjects with diabetes are highly prone for co-morbid depression.

A study was conducted by Masmoudi et al. (2013) to estimate the prevalence of anxiety and depression using the Hospital Anxiety and Depression Scale (HADS) in a population aged over sixty years with type 2 diabetes and to study the impact of anxiety and depression on glycemic balance and disease outcome. We found a relationship between these disorders and complicated diabetes. The subjects having imperfectly balanced diabetes had a higher average anxiety score than those having a good glycemic control. No relationship was found between diabetes balance and depression. This research indicated that association between anxiety and depressive disorders and diabetes is frequent and worsens patients’ outcome, in terms of diabetes imbalance as well as in terms of diabetic complications.

An investigation by Kaur et al. (2013) was done to determine the prevalence and predictors of depression, anxiety and stress symptoms in Type II diabetics attending government primary care facilities in the urban area of Klang Valley, Malaysia. A Sample of 2508 eligible consenting respondents participated in this research. The Depression, Anxiety and Stress Scale (DASS) 21 questionnaire was used to measure depression, anxiety and stress symptoms. It was revealed in the investigation that prevalence of depression, anxiety and stress symptoms was high among Type II diabetics, with almost a third being classified as anxious.

An attempt was made by Hosoya et al. (2012) to examine the relationship between the severity of depressive symptoms and the burden through diabetes care, or diagnosed diabetes in patients with type 2 diabetes,
irrespective of the diabetic complications and glycemic control. A sample of 126 outpatients with type 2 diabetes were selected, who then had completed the Beck Depression Inventory-II (BDI-II), Problem Areas in Diabetes (PAID) scale, and Short Form-36 (SF-36). The results proved that diabetes-related emotional distress is significantly related to the severity of depressive symptoms in patients with type 2 diabetes, independent of the severity of complications and glycemic control. Moreover, the severity of depressive symptoms is negatively correlated with comprehensive health-related QOL in patients with type 2 diabetes.

A cross-sectional study was conducted by Manoudi et al. (2012) in association with the endocrinology department of the Mohammed VI university hospital. This investigation was an attempt to evaluate the prevalence of depressive disorders in patients with diabetes and to explain their socio-demographic and clinical profile. This investigation included 187 patients. The scales used were the Mini International Neuropsychiatric Interview (MINI) and Hamilton's depression. Socio-demographics and diabetic characteristics were evaluated by self-questionnaire. It was concluded in the result that diabetes and depressive disorders are public health problems due to their prevalence and their cost. The prevalence of major depressive disorders found among our population of diabetics justifies their research by doctors.

In 2012, Roy et al. conducted a cross-sectional research on random sample of 417 out-patients from three diabetes clinics in Bangladesh. Depressive symptoms were measured using previously developed and culturally standardized Bengali and Sylheti versions of the World HealthOrganization-5 Well Being Index (WHO-5) and the Patient Health Questionnaire-9 (PHQ-9) with predefined cut-off scores. Data was collected using standard assisted collection and audio questionnaire methods. Relationship between depression and patient characteristics were explored using regression analysis. Results of this study revealed that prevalence of depressive symptoms was 34% (PHQ-9 score ≥ 5) and 36% (WHO-5
score < 52) with audio questionnaire delivery method. The prevalence rates were similar regardless of the type (PHQ-9 vs. WHO-5) and language (Sylheti vs. Bengali) of the questionnaires, and methods of delivery (standard assisted vs. audio methods). It was further revealed that depression was strongly associated with poor glycaemic control and number of co-morbid conditions. This study further confirmed that prevalence of depression is common in outpatients with type 2 diabetes in Bangladesh.

_Bener, Al-Hamaq & Dafeerah (2011)_ conducted a research to determine whether there is a relationship between high depression, anxiety, and stress symptoms in Diabetes Mellitus (DM) patients in comparison to a group of controls. It was a matched case-control study. A Sample of 889 DM patients and 889 healthy subjects matched for age, gender and ethnicity from Primary Health Care (PHC) Centres of the Supreme Council of Health, State of Qatar, were included in this study. Face to face interviews were conducted with DM patients and controls using a questionnaire which captured the socio-demographic characteristics of subjects and the short version of the Depression Anxiety Stress Scale (DASS)-21 questionnaires. Moreover, questionnaire based on the Hospital Anxiety and Depression Scale (HADS) to assess the validity of DASS-21 were used. This research revealed that diabetic cases had significantly higher depression, anxiety and stress scores compared to healthy controls. Specifically, anxiety scores were higher more frequently among diabetic patients as compared to depression and stress scores.

_Wu et al. (2011)_ investigated the relationships between self-care behaviour, diabetes education difficulties, depression and anxiety among patients with type-2 diabetes in Taiwan. Sample of 312 patients beyond the age of 18 years and diagnosed with type-2 diabetes were selected. Different questionnaires were used to collect demographic, disease characteristics, self-care behaviour, diabetes education difficulty, depression and anxiety data. Findings of this study revealed that rate of disturbance for depression and anxiety among type-2 diabetes patients were lower than those in Western
countries. Anxiety was positively correlated with age, diabetes education difficulty and depression, but negatively correlated with body mass index (BMI). It was further concluded in this research that depression and anxiety are common among patients with diabetes and can have significant effects on the outcome of their medical illness.

*Sahoo & Khess (2010)* conducted a study to determine prevalence of current depressive, anxiety, and stress-related symptoms on a Dimensional and Categorical basis among young adults in Ranchi city of India. A stratified sample of 500 students was selected to be representative of the city's college going population of which 405 were taken up for final analysis. Data were obtained using Depression, Anxiety, and Stress Scale to assess symptoms on dimensional basis and using Mini International Neuropsychiatric Interview to diagnose on categorical basis. Mean age of students was 19.3 years with an average education of 14.7 years. Ranging from mild to extremely severe, depressive symptoms was present in 18.5% of the population, anxiety in 24.4%, and stress in 20%. Clinical depression was present in 12.1% and generalized anxiety disorder in 19.0%. Comorbid anxiety and depression was high, with about 87% of those having depression also suffering from anxiety disorder.

An attempt was made by *Collins, Corcoran & Perry (2009)* to identify the prevalence and major determinants of anxiety and depression symptoms in patients with diabetes. A cross-sectional study of 2049 people with Types 1 and 2 diabetes, selected from patients experiencing three different models of care in Ireland. Anxiety and depression symptoms were assessed with the Hospital Anxiety and Depression Scale (HADS). On the basis of the results it was revealed that there was evidence of high levels of anxiety and depression symptoms in patients with diabetes, Diabetes complications, smoking, uncertainty about glycaemic control and being an ex-drinker or a heavy drinker were risk factors for both higher anxiety and depression scores in multivariate analysis. Female gender and poor glycaemic control were risks factors
associated only with higher anxiety scores. Higher socio-economic status and older age were protective factors for lower anxiety and depression scores. Type of diabetes, insulin use, marital status and models of care were not significant predictors of anxiety and depression scores. It was concluded by the researchers that the prevalence of anxiety and depression symptoms in patients with diabetes is considerably higher than in general population samples.

A research was conducted by Delahanty et al. (2007) to characterize the determinants of diabetes-related emotional distress by treatment modality (diet only, oral medication only, or insulin). A sample of 815 primary care patients with Type 2 diabetes completed the Problem Areas in Diabetes (PAID) Scale and other questions. Scores were significantly higher among insulin-treated as compared with oral-treated or diet-treated patients, but not different between oral- vs. diet-treated patients. Group scores remained similar, but the statistical significance of their differences was reduced and ultimately eliminated after sequential adjustment for diabetes severity, HbA(1c), body mass index, regimen adherence, and self-blood-glucose monitoring. Not accepting diabetes diagnosis was a top concern for oral- and diet-treated patients, and unclear management goals distressed diet-treated patients. Results also revealed that primary care patients treated with insulin reported higher diabetes-related emotional distress compared with oral- or diet-treated patients. Greater distress was largely explained by greater disease severity and self-care burdens.

Miller, Pallant, Negri (2006) revealed in a cross-sectional study, through the administration of EPDS and DASS-21 on a sample of 325 primiparous mothers, who ranged in age from 18 to 44 years. Recruited through mother's groups and health centres in Melbourne Australia, inclusion was limited to mothers whose babies were aged between 6 weeks and 6 months. The EPDS identified 25% women as possibly depressed (using a cut-off of over 9), of which the DASS-21 corroborated 58%. In the total sample, 61 women (19%) were classified by the DASS-21 to be depressed. Using broader
criteria for distress, it was observed by the DASS-21 that a further 33 women (10%) showed symptoms of anxiety and stress without depression. A total of 41 women (13%) had symptoms of anxiety either in isolation or in combination with depression. The DASS-21 identified 7% of the sample as being both anxious and depressed. This at-risk sub-group had higher mean EPDS and DASS-depression scores than their depressed-only counterparts. The prevalence of anxiety and stress in the present study points to the importance of assessing postnatal women for broader indicators of psychological morbidity than that of depression alone.

Katon et al. (2004) conducted a research to determine the behavioral and clinical characteristics of diabetes that are associated with depression after controlling for potentially confounding variables. A population-based mail survey was sent to patients with diabetes from nine primary care clinics of a health maintenance organization. The Patient Health Questionnaire was used to diagnose depression, and automated diagnostic, pharmacy, and laboratory data were used to measure diabetes treatment intensity, HbA(1c) levels, and diabetes complications. Independent factors that were associated with a significantly higher likelihood of meeting criteria for major depression included younger age, female sex, less education, being unmarried, BMI ≥ 30 kg/m(2), smoking, higher non-diabetic medical co-morbidity, higher numbers of diabetes complications in men, treatment with insulin, and higher HbA(1c) levels in patients <65 years of age. Smoking and obesity were associated with a higher likelihood of meeting criteria for major and minor depression. Diabetes complications and elevated HbA (1c) were associated with major depression among demographic subgroups: complications among men and HbA(1c) among individuals <65 years of age. Older patients with a higher number of complications had an increased likelihood of minor depression.

Tankova et al. (2004) in their randomized, controlled study examined the effect of a 5-day teaching program for diabetic patients on their quality of
life 1 and 2 years afterwards. Sample of 319 insulin-treated patients were followed up at re-education sessions 1 and 2 years after the program. A group of 241 insulin-treated patients were also followed up and served as a control group. At baseline and 1 and 2 years later, patients’ well-being was assessed using a standard 22-item questionnaire. Findings showed that there was a significant increase in overall well-being of patients at 1 year and 2 years after the program due to a reduction in depression and anxiety and an increase in positive well-being after 1 year and to a decrease in depression and increase in positive well-being after 2 years as compared to the control group. There was an improvement in glycemic control of the educated patients as compared to the control group. The results from the study also demonstrated that structured Patient Education improved patients’ well-being 1 and 2 years after the teaching program and reduce their Anxiety and Depression.

A cluster randomized controlled trial by Davies et al. (2008) on the effectiveness of the Diabetes Education and Self Management for ongoing and newly diagnosed (DESMOND) program for people with recent diagnosis of Type 2 diabetes was made. It was found that the intervention group had a significantly lower depression score at 12 months compared to the control group. Participants in intervention group learned about the nature of diabetes and diabetes self-management techniques to reduce their Depression, and adjust with diabetes.

In similar study by Surwit et al. (2002), stress management improved long-term glycemic control in Type 2 diabetes. Patients with Type 2 diabetes were randomized to undergo a five-session group diabetes education program with or without stress management training. They found that a cost-effective, group stress management program in a “real-world” setting can result in clinically significant benefits for patients with Type 2 diabetes because participants in the intervention group learned about the nature of diabetes and making appropriate lifestyle changes and dealing adequately with stress and psychological aspects of diabetes and awareness, prevention, detection,
treatment of acute/chronic complications of diabetes to reduce their Stress and adjust with diabetes.

**Rubin et al. (1993)** in their study evaluated the effect of a Diabetes Education Program and incorporating coping skills training on emotional well-being and diabetes self-efficacy. Sample consisted of 91 adults. The study assessed depression, anxiety, self-esteem, diabetes-specific knowledge and self-efficacy. Participants improved initially on all measures and maintained the improvements at 1-year follow-up on measures of anxiety, self-esteem, and diabetes-specific knowledge and self-efficacy. Subjects in intervention group learned about the nature of diabetes as well as diabetes self-management techniques which included nutrition management, increasing physical activity and exercise, daily control, self-monitoring of glucose, knowledge of HbA1c and initiating treatment. Those in the intervention group also learned about making appropriate lifestyle changes, dealing adequately with stress, the psychological aspects of diabetes and awareness, prevention, detection, treatment of acute/chronic complications of diabetes to reduce their Anxiety, Depression and to increase their self-esteem, diabetes-specific knowledge and self-efficacy.

**Cox et al. (1984)** evaluated the effect of stress on blood glucose levels in 59 insulin-dependent diabetic patients age ranges 18–78 yrs. In the present research it was revealed that there was a significant positive correlation between a hassles scale and hemoglobin A₁ levels (an index of blood glucose fluctuation). Social supports, Type A behavior, and reported therapeutic compliance neither correlated with hemoglobin A₁ nor influenced the hassles–hemoglobin A₁ relationship. It perceived stress as a potent factor in blood glucose control. However, results also suggested that different stressors may have differential effects for different diabetic patients.