Assessment of Depression, Anxiety, and Stress in Patients Having Type II Diabetes Mellitus Attending Secondary Care Hospital

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Abstract

Depression, diabetes mellitus, and anxiety are metabolic diseases causing chronic hyperglycemia and mood disorders and triggered by the body's fight or flight response to danger, respectively. Recognizing the pervasiveness of the factors mentioned above among the patients who suffer from Type 2 diabetes mellitus, determining how these conditions impair those people's quality of life, and evaluating the impact on patients' glucose levels is the main aim of this study. Over six months, a study was conducted among 150 patients at Vijaya Marie Hospital, Khairtabad, Hyderabad. The individuals having a history of Type 2 diabetes, as well as other comorbid illnesses, were included. Patients with prior clinical depression, anxiety, or stress were excluded. Data from all patients was gathered and analyzed using the Graph Pad Prism software. Among the 150 diabetic patients, age groups between 41 and 50 are more prevalent, 63 of whom were men and 87 of whom were women. According to their HbA1c levels, Type 2 diabetes mellitus is typically treated with lifestyle changes, pharmacological alterations, or both. In our study, people change their lifestyles in addition to taking different oral medications. The study also found that highly severe anxiety (27.3%), moderate depression (932%), and stress levels within normal limits (36%) were prevalent among the patients. The study found a significant association between a patient's Type 2 diabetes mellitus (DM) blood glucose levels and their mental state, with severe anxiety being an essential factor. Mental stress alters glycaemic levels, negatively impacting patients' quality of life and triggering diabetic distress, indicating that depression, anxiety, and stress can predict Type 2 DM risk.

***Keywords:** Anxiety, DASS-21, Depression, Diabetes Mellitus, Quality of Life, Stress.*

Introduction

Diabetes Mellitus is defined as **"Defects in insulin secretion, insulin action or both results in chronic hyperglycemia, which is a condition** that often characterizes diabetes mellitus, an array of metabolic disorders." These complications affect carbohydrates, proteins, and lipids, affecting target tissues like skeletal

muscles and adipose tissue. The type and length of diabetes produce various symptoms. If uncontrolled, it can lead to complications like stupor, coma, and death due to ketoacidosis or non-ketotic hyperosmolar syndrome [1-4]. In 2011, 366 million people had diabetes; by 2030, it is expected to increase to 552 million [5]. 80% of the cases are observed in underdeveloped and developing countries. By 2030, 439 million suffer from the disease [6, 7]. Risk factors vary by region, and prevalence is predicted to rise in adults aged 45-64 [8]. It can be divided into the following criteria [9, 10, 11]: Type 1diabetes (insulin deficiency resulting from beta cell destruction), Type 2 diabetes (insulin resistance caused from progressive loss beta cells ability to secrete insulin), Gestational diabetes mellitus (GDM) (diabetes was not overt before gestation that was discovered in the second or third trimester of pregnancy) and can be diagnosed by: Fasting plasma glucose (FPG) > /= 7 mmol/L (126mg/Dl), Plasma glucose after 2-hour OGTT>/=200mg/Dl (11.1mmol/L), Hb A1c >/= 6.5% (48mmol/mol) and Random plasma glucose >/=200mg/Dl (11.1mmol/L) [12].

Patients with Type-2 diabetes mellitus can experience both short and long-term complications. Macrovascular complications include high blood pressure, dyslipidemia, heart attacks, coronary heart disease, stroke cardio, vascular disease, and peripheral vascular disease. Microvascular complications include Retinopathy, nephropathy, neuropathy, and cancer. The primary cause of mortality and morbidity is cardiovascular disease in both diabetes and prediabetes. Atherogenesis is a vital effect caused by oxidative stress. It may also cause LDL oxidation [13]. Diabetic neuropathy: Amputations, foot ulcers, non-healing skin, and sexual dysfunction may be associated with diabetes mellitus [14]; diabetic nephropathy: Early manifestation in diabetic nephropathy is the existence of traces of urinary protein (microalbumin), which is only detected by specific testing which otherwise is not detectable by regular urine analysis [15], Diabetic retinopathy: Destruction of retinal vessels resulting in oedema and or haemorrhage into the retina or vitreous humour because of vascular permeability is caused by chronic hyperglycemia [16], Patients suffering from cancers along with diabetes have greatest threat of cancers like colorectal cancer [17], liver cancer [18], bladder cancer [19], breast cancer [20, 21], kidney cancer [22], which vary sub-site to sub-site of specific cancer."Depression causes a persistent feeling of sadness and loss of interest; it is a pervasive but serious disorder." Basic activities like feeling, thinking, and other daily chores are greatly influenced by depression. It is also commonly called major depressive disorder, Anger, annoyance, or hostility; feeling tight, restless, or "on the edge"; a decrease in interest in one's work, family, or formerly fun activities; problems with sexual performance and desire; feeling melancholy, empty, or hopeless are all signs of depression. Aches and pains in the body, headaches, cramps, or digestive problems; being extremely tired; having trouble falling asleep or sleeping too much; eating excessively or not eating at all; having thoughts of suicide or attempts at suicide. Psychotherapy, including cognitive behavioural therapy, family-focused therapy, and interpersonal therapy, are some treatment options. Antidepressants, mood stabilizers, and antipsychotic medications are commonly used drugs. When psychotherapy and medications are not fruitful, brain stimulation therapies like electroconvulsive therapy (ECT) for depressive disorder with psychosis or repetitive transcranial magnetic stimulation (RTMS) for severe depression can also be tried. Acupuncture, meditation, faith, and nutrition are some substitute treatments [23]. Anxiety is a usual reaction to threats. Panic disorder, phobia, social anxiety disorder, obsessive-compulsive disorder, separation anxiety disorder, illness anxiety disorder, and post-traumatic stress disorder (PTSD) are different types of anxiety disorders. The

Treatment typically consists of psychotherapy and medication. Drugs like benzodiazepines, buspirone, antidepressants, and beta-blockers are used to treat anxiety disorder [16, 21]. Stress is any physical, mental, or emotional condition that results in tension in the body or mind. Stress can be external (from the environment, psychological, or social situations) or (illness or from a medical procedure). Symptoms of stress include [19, 22] Emotional symptoms like Getting easily frustrated, annoyed, and moody, Feeling very overwhelmed, like things are out of hand, Facing a challenge to relax and calm the mind, Feeling worthless (low self-esteem), lonely and depressed, Limiting communication with other individuals; Physical symptoms like Weakness, Persistent headaches, Suffering from diarrhoea, constipation and nausea and various other stomach problems, Body aches, pains and tense muscles, Increased heartbeat and chest pain, Insomnia, Frequently catching colds and infections, Loss of sexual desire and or ability; Cognitive symptoms like Constantly worrying, Thoughts racing through mind, Disorganization and forgetfulness, Lack of focus, judgment, Being pessimistic only focusing on the negatives.

Materials and Methods

Study Design and Tools

A prospective observational study was carried out over six months in the Department of General Medicine at Vijaya Marie Hospital, Khairtabad, Hyderabad. This study is designed and examines various aspects of widespread presence and extrapolation of future outcomes of depression, anxiety, and stress in individuals having Type 2 DM attending secondary care hospitals. Patient case sheets were selected based on annexation and detachment criteria. Both inpatients and outpatients with a record of Type 2 diabetes, as well as those who had other comorbid health conditions, were included in the study. Patients who have previously had clinical depression, anxiety, or stress and patients undergoing surgery were excluded from the study.

Sample Size

A prospective ethnographic study was conducted among 150 patients to increase the precision of the parameter.

Sampling and Data Collection

Patient records from outpatient and inpatient hospitals were obtained, and prescriptions were collected and analyzed. Prospective data of the patient were obtained about age, gender, comorbidities, DM history, hereditary history of depression, anxiety and stress, and current DM drugs.

Statistical Analysis

All subjects' data was collected and evaluated using GraphPad Prism software. The significance of the data was summarized.

Results

One hundred fifty patient case records were received, analyzed, and categorized based on age and sex group.

Based on gender, it was found that females are more affected than males. On considering the age, people in the age group of 41-50 were highly affected, followed by 51-60, 61-70, 31-40, 21-30, 71-80, and the least affected were in the age group of 81-90.

A study based on comorbidities revealed that the highest number of patients had hypertension and other conditions, whereas only 18% of the population had no comorbidities. On considering drug modifications, the highest number of individuals fall under the category of lifestyle modifications + oral medications followed by lifestyle modifications + oral medications + insulin, only lifestyle modifications + insulin.

On considering the complications associated with diabetes, the majority of the population had no complications, while 21% had diabetic retinopathy, 7%-foot ulcers, 6% had cardiovascular diseases and diabetic

nephropathy, 2% had diabetic neuropathy, and 1% underwent foot amputation.

Based on the calculation of depression using DASS, 21 subjects with moderate depression are high 49 (32.67%). Table 1 below shows the extremity levels of depression in the study population.

Table 1. Grouping of Subjects with Depression Based on a Calculation Using DASS 21

Depression	Frequency	Percentage
Normal	15	10.000%
Mild	10	6.667%
Moderate	49	32.667%
Severe	38	25.333%
Extreme severe	38	25.333%

Based on the calculation of anxiety using DASS, 21 subjects with extremely severe anxiety are high, 41 (27.33%), and normal anxiety is 16 (10.67%). Table 2 below shows the extremity levels of stress in the study population.

Table 2. Grouping of Subjects with Anxiety Based on the Calculation Using DASS 21

ANXIETY	FREQUENCY	PERCENTAGE
Normal	16	10.667%
Mild	23	15.333%
Moderate	40	26.667%
Severe	30	20.000%
Extreme severe	41	27.333%

It is based on the stress calculation using DASS, 21 subjects with everyday stress 54 (36.00%). Table 3 below shows the extremity levels of stress in the study population.

Table 3. Grouping of Subjects with Stress Based on the Calculation Using DASS 21

Stress	Frequency	Percentage
Normal	54	36.000%
Mild	46	30.667%
Moderate	44	29.333%
Severe	4	2.667%
Extreme severe	2	1.333%

On comparing all three parameters' subjects with depression are high at 38.84%, followed by stress and anxiety. Table 4 indicates the percentage of depression, anxiety, and stress, and Figure 1 shows the graphical representation of depression, anxiety, and stress in the patients.
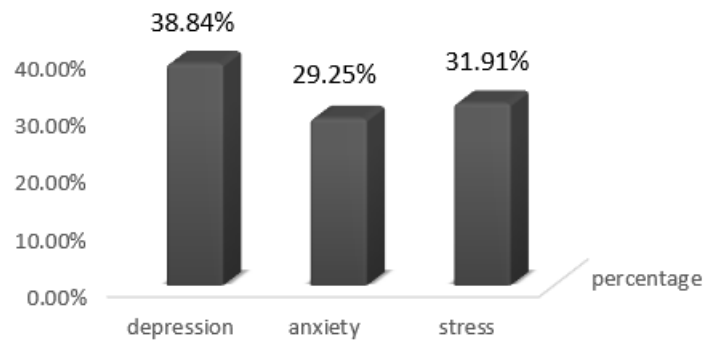
Figure 1. Representation of % Levels of Depression, Anxiety and Stress

Table 4. Grouping of Subjects with Depression, Anxiety, and Stress Based on %

Factor	Frequency	Percentage
Depression	3031	38.844%
Anxiety	2282	29.245%
Stress	2490	31.911%

Table 5 below indicates the conclusion of the level of depression, anxiety, and stress in patients with Type 2 DM, and Figure 2 shows the graphical representation of depression, anxiety, and stress in the patients.

Table 5. Level of Depression, Anxiety, and Stress in Type 2 DM Patients

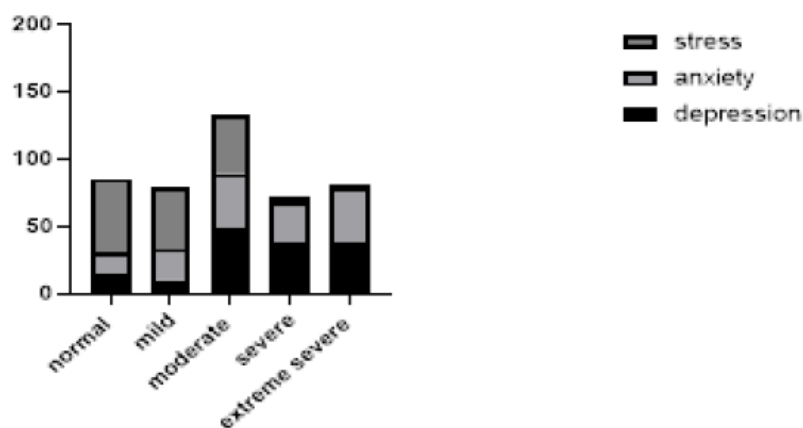| FACTORS	Normal	Mild	Moderate	Severe	Extreme severe
Depression	15	10	49	38	38
Anxiety	16	23	40	30	41
Stress	54	46	44	4	2

Figure 2. Graphical Representation of the Level of Depression, Anxiety, and Stress

However, if we consider individually the severity of depression, anxiety, and stress in Type 2 DM subjects, extremely severe anxiety condition patients are observed more. Therefore, among depression, anxiety, and stress in Type 2 DM subjects, subjects with moderate level depression state are more, but however extremely severe anxiety state also.

Table 6 below shows the P-value of different groups.

Table 6. P-value Calculation

	Normal	**Mild**	**Moderate**	**Severe**	**Extreme severe**
Minimum	15.00	10.00	40.00	4.000	2.000
Maximum	54.00	46.00	49.00	38.00	41.00
Range	39.00	36.00	9.000	34.00	39.00
Mean	28.33	26.33	44.33	24.00	27.00
P value (two-tailed)	0.158	0.1294	0.0034	0.1443	0.1640
Std. Deviation	22.23	18.23	4.509	17..78	21.70
Std. Error of Mean	12.84	10.53	2.603	10.26	12.53
A lower 95% CI of the mean	-26.90	-18.95	33.13	-20.16	-26.91
The upper 95% CI of the mean	83.56	71.62	55.53	68.16	80.91
Minimum	15.00	10.00	40.00	4.000	2.000

Discussion

Diabetes mellitus is a collection of metabolic disorders characterized by persistently high blood sugar levels brought on by deficiencies in the action or secretion of insulin or both. Progressive loss of β-cell mass function is the cause of Type 2 diabetes. The morbidity and mortality of people with diabetes will grow due to prolonged high glucose levels and microvascular and macrovascular consequences, regardless of the aetiology of the disease [22].

In our study, 150 people with Type 2 diabetes and Type 2 diabetes with concomitant conditions were included. Females comprise more than 150 subjects than males (M=63; F=87), and the study's age range is 21 to 90. However, more people (34), 23%, are between 41 and 50 [q]. We noticed that the individuals also had comorbid conditions, including HTN, hypo- and hyperthyroidism, etc. HTN, however, is the comorbidity with Type 2 diabetes mellitus that is most frequently seen. Sixty-nine patients in total have been observed. Subjects with Type 2 DM, HTN, and other conditions are 50, whereas those with Type 2 DM, HTN, and others are 19. We also observed participants who had no comorbid conditions. There are 24 of them. According to their HbA1c levels, patients with Type 2 DM are often treated with lifestyle changes and medication. In our study, the percentage of participants who changed their lifestyles and oral medication was significant (84) [23].

We used the DASS-21 questionnaire to determine the generality of stress, depression, and anxiety in 150 patients with Type 2 diabetes. Finally, we discovered that 39% of the 150 subjects had depression, 29% of them had anxiety, and 32% of them had stress. However, when individual factors are considered in Type 2 DM participants, the moderate depression state is high (49), the severe anxiety state is high (41), and the usual stress state is high (54) [22, 23].

Conclusion

This leads us to conclude that a statistically significant association exists between a patient's Type 2 DM blood glucose levels and their mental state. Our research supports the significance level of p=0.0001 (p-value). Extremely high levels of severe anxiety are present in our investigation. According to the results of our study, mental stress changes the

glycaemic levels of Type 2 DM patients, which negatively impacts their quality of life and triggers diabetic misery. Therefore, Type 2 DM risk is predicted by depression, anxiety, and stress.

Funding

Conflict of Interest

The authors declare that there are no conflicts of interest in this study. The authors are responsible for the content and writing of the papers.

Acknowledgement

Author Contributions

Siddhartha Lolla, Vinod Kumar Nelson: study design, Data curation, methodology, visualization, and writing - original draft. **Reshma Ajay:** Formal analysis, methodology, writing – original draft. **Dr. K. Atchuta Kumar:** Data analysis, Data interpretation, analysis. **Emani Sai Sri Jayanthi:** Data curation, analysis, and writing – review/editing. **Challa Srilekha, Rajalakshmi subburam:** Data interpretation and formal analysis, investigation, Review, and editing.

Ethical Approval and Consent to Participate

The Institutional Ethical Committee approves the patient's informed consent and protocols.

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