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Research Paper

Depression among Diabetic Adults in Urban Areas of Cuttack City, Odisha

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ABSTRACT

The primary purpose of the present study is to examine the impact of diabetes and gender on the levels of depression among participants. The study will involve both quantitative and qualitative analysis. One hundred and twenty participants were selected purposively from Cuttack city of Odisha, India. The study has adopted 2(diabetics versus non-diabetics) × 2(adult males versus adult females) factorial design. The participants of these four quasi-experimental groups i.e., sixty diabetics (30 males and 30 females) and sixty non-diabetics (30 males and 30 females) were compared with respect to Beck Depression Inventory, and the obtained scores were analysed and interpreted by using Analysis of Variance (ANOVA) and percentage analysis. It is likely that the study would generate a number of major implications based on the findings.

Keywords: *Diabetes, Depression, Male, Female, ANOVA*

Diabetes mellitus (type-2 diabetes) is one of the most common chronic diseases in most countries with a continuous increase in numbers, in terms of incidence and prevalence. According to the International Diabetes Federation (IDF) 2019 report, approximately 463 million adults (20-79 years) were living with diabetes; by 2045 this will rise to 700 million. It is indicative from the statistics that diabetes poses a serious health threat to developing countries like India, as the region bears the greater proportion of the disease burden.

Diabetes is a clinical syndrome comprising a heterogeneous group of metabolic disease that is characterized by persistent hyperglycaemia (higher than normal blood glucose levels) and disturbances in carbohydrate, fat, and protein metabolism, defects in insulin secretion, insulin action or both of it. Diabetes can be classified into three major categories; Type-1 diabetes, Type-2 diabetes (also known as Diabetes Mellitus), and Gestational diabetes. The present paper focus on type-2 diabetes which occur when the body doesn't produce enough insulin for proper function, additionally muscle and tissue cells become resistant to the insulin. 90% cases of diabetes across the world are type-2.

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Depression and Diabetes

The World Health Organization (WHO) defines depression as "a common mental disorder that presents with depressed mood, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, low energy, and poor concentration." The International Classification of Diseases 10th edition (ICD-10) identifies depression as having three main symptoms: depressed mood, increased fatigue, and loss of interest or pleasure in activities. Other symptoms include loss of confidence; feelings of failure or excessive guilt; suicidal thought or acts; poor concentration/indecisiveness; slowing or agitation of movements; sleep disturbance and change in appetite. The presence of 4 symptoms (two of which require to be main symptoms) for a 2-week period indicates mild depression; six indicate moderate depression and eight or more suggest major depression.

Depression is a disabling illness affecting 121 million people worldwide. By 2030, depression is going to be the second largest contributor to the worldwide burden of disease. Between 5–10% of the overall population experience depression (Peyrot and Rubin, 1997) and it's 2–3 times more prevalent in people with diabetes, with the danger being bidirectional and not fully understood (Roy and Lloyd, 2012). Shoib et al., (2015) revealed that depression adds to treatment complexity, and is usually related with chronicity and negatively affects the course of diabetes. Depression can have a severe negative impact on quality of life and, for an individual with diabetes. Depression is positively related to poor glycaemic control and diabetes complications (Groot et al, 2001) also an increased risk of mortality (Winkley et al, 2012). Depression is notably more common in patients with DM than within the general population (Ali et al., 2006; Anderson et al., 2001; Roy and et al., 2012; Vancampfort, 2015). Albeit estimates vary between studies, from 8.7% to 17.6% counting on the standards used to assess depression (such as depressive symptoms versus major depressive disorder), rates of depression are consistently higher among people with DM than within the diabetes free population. Depression usually results in an unhealthy life style among patients with diabetes, which could also be one among the main factors contributing to decreasing lifetime.

An earlier meta-analysis conducted by Nowen, and et.al. (2010) showed that diabetes is a risk factor for the development and/or recurrence of depression, and revealed that, compared with non-diabetic controls; people with type-2 diabetes have a 24% increased risk of developing depression. A meta-analysis of 10 studies with 51,331 individuals estimated the prevalence of depression to be almost doubled in people with diabetes compared to those without the condition (Roy et al., 2012). The overwhelming majority of the studies are conducted in Western countries, but a study of 213,797 people in 47 countries from round the world has shown that diabetics had a 2-fold greater prevalence of depressive symptoms than those without diabetes (Mommersteeg et al., 2013). As well as increased prevalence in people with diabetes, longitudinal studies indicate that diabetes diagnosis is a risk factor for incident depression (Nowen, 2010; Rotella, 2013). An analysis pooling data from 16 longitudinal studies involving 497, 223 participants with an average follow-up of 5.8 years indicated that people with diabetes have a 25 % increased risk of developing depression compared with controls without diabetes (Rotella, 2013). Khan, and et al., (2019) in their study found that, 15- 20% of people with diabetes are battling with a moderate to severe form of depression daily. Shafie, and et al., (2011) in their research found that, more than two third (74.4%) of patients were depressed; (24.8% mild, 37.6% moderate and 12% severely depressed), almost four out of five patients (88.8%) had diabetes complications. Ghosh and Mallika (2019) reported that, 40.5% of diabetics in their study were having depression, among those 27% had mild depression, 7.6% had moderate depression, 2.5%

had moderately severe depression and 2.5% had severe depression. Nevertheless, comorbid depression in diabetes is a considerable threat to quality of life in people with diabetes (Ali et al., 2010; Schram et al., 2009). Ravishankar et al., (2014) concluded that co-morbidity of depression is prevalent in diabetic population with three-time higher frequency and severity than the non-diabetic population. Krishna et al., (2018) revealed there have been significantly higher scores of depressions, within the diabetics in comparison to healthy controls. Poongothai et al., (2011) reported the prevalence of depression was significantly higher among diabetic subjects as compared to subjects without these complications.

A total of 42 eligible studies were identified; 20 (48%) included a non-diabetic comparison group. In the controlled studies, the odds of depression in the diabetic group were twice that of the non-diabetic comparison group. The prevalence of comorbid depression was significantly higher in uncontrolled (30%) than in controlled studies (21%), in clinical (32%) than in community (20%) samples. Nanayakkara, and et al., (2016) found that Twenty-nine percent of diabetes patients in their study had likely depression. Difficulty following dietary recommendations, smoking, forgetting medications, and diabetes distress were all associated with greater odds of depression whereas higher own health rating was associated with lower odds (all $p < 0.02$). Asiri et al., (2018) assess the prevalence and determinants of depression in the sufferers of diabetes and reported approximately half of the patients (47.4%) were depressed, mostly of the mild and moderate levels. Khan, and et al., (2019) in their study found that, 15- 20% of people with diabetes are struggling with a moderate to severe form of depression daily. The overall prevalence of depression among diabetes patients at the diabetes clinic was 87%. Most (56.7%) had minimal depression, 22.1% had mild depression, and 8.2% had moderate depression. None had severe depression. Khatun et al., (2017) found that the majority of the diabetic subjects were (57.4%) extremely depressed, where rest of the subjects were either moderate depressed (16.1%) or severe depressed (26.5%). Aminu, and et al., (2017) showed that, the prevalence of depression among patients with diabetes in the community was found to be 37.5%, most frequently, depression was mild (42, 21%) in nature with severe depression (9, 4.5%) seen the least. Joseph et al., (2013) among the participants, 71 (30.9%) diabetics met the criteria for moderate depression, 33 (14.3%) for severe depression, and the remaining 126 (54.8%) had no clinically significant depression. Mishra, and et al., (2017) found high prevalence of depression was found in diabetic patients.

Mathew et al., (2012) estimate the prevalence of depression among a consecutive group of patients with type-2 diabetes and assess its impact on glycaemic control. Of the 80 patients interviewed, 31 (38.8%) had depressive symptoms. Among them 20 (25%) had mild depression, 10 (12.5%) had moderate depression, and 1 (1.3%) had severe depression. Over one third of patients with type 2 diabetes mellitus of over 5-year duration had depressive symptoms. The study indicated that the presence of depressive symptoms was associated with a significant worsening of glycaemic control.

An Indian study conducted by Satpathy et.al. (2019) found that diabetics have significantly higher frequency of depression (35.6% vs. 16.7%), compared to non-diabetics. Ali et al., (2013) suggested that the relative risk for the diabetics to have co-morbid depression was 2.97 (95% confidence interval 1.41-6.24), diabetic patients had a higher score of BDI and prevalence of depression was 27.05% diabetic patients and 11.11% healthy controls. Trivedi (2009) stated that, patients with diabetes are more likely to experience depression than the population in general, additionally he stated, 54% patients have minimal depressive symptoms, 27% patients have minor depression and 12% have moderately major depression,

2% of the patients have severe major depression. The study concluded that any level of depression is associated with worse diabetes outcomes, poorer quality of life, increased functional impairment, increase in death rate and increased rate of complications. Review of literature suggests still there exists a "Bi-directional relation" between diabetes and depression. So, the current study examines whether diabetes has some impact on the level of depression among the participants.

Depression in diabetics affects the patient's ability to regulate the disease, also as self-care behaviours. Depression may impair type-2 diabetes self-care and increase physical inactivity and other behavioural risk factors like smoking and obesity. It can cause noncompliance and poor health behaviours. Consistent with Goldstein et al., (2017) findings that depression led to abnormally elevated blood glucose levels and insulin responses to glucose tolerance testing.

Gender and Diabetes

Gender refers to the roles, behaviours, activities, attributes and opportunities that a society considers appropriate for men and women. In the present scenario, when there are global concerns about gender equality and many international conventions have resolved against any form of discrimination against women, prioritizing women mental health does not seem to be justified (Sharma and Pathak, 2015).

Gender has been described as a critical determinant of mental health and mental illness. Gender differences have been reported mainly in the prevalence of common mental disorders, including depression, anxiety and somatoform disorders. Depression is not only the most common women's mental health problem, but may be more persistent in women than men (Patel et al., 1999; WHO, 2000). Most important is the finding that the higher rates of depression are related to a range of risk factors such as gender-based roles, stressors, negative life experiences, and events.

According to Gayle (2020), depression is predicted to be the second leading cause of global disability burden by 2020. It is twice as common in women. Gender-specific risk could be a likely cause. This includes; gender-based violence, socio-economic disadvantage, income inequality, low social status and rank, and responsibility for the care of others. The higher prevalence of major depression among females than males has been consistently observed among adults in the general population. Major depression occurs about twice as often in women as in men. Similar gender ratios in the prevalence of depression have been documented in many countries around the world, (Weissman & Olfson, 1995). More specifically, women tend to spend more time ruminating about sad moods or wondering about the reasons why unhappy events have occurred. Men tend to spend more time using distracting or action-focused coping, such as playing a sport or engaging in other activities that shake off the sad mood. A fair amount of research suggests that rumination will intensify and prolong sad moods (Hoeksema, Morrow, & Fredrickson, 1993). Mukrim and et al. (2019) found that female gender is more associated with depressive symptoms (71.2%, p-value = 0.043). Atadag and Oksuz (2017) revealed depression was found to be significantly higher in women.

Men are found to have lower rate of depression than women do. Kay (2009) revealed men's lower overall rate of depression than women reflect a number of issues, including psychosocial barriers to seeking help. Men's greater risk taking and substance abuse have health outcomes that can affect depression later in life. Women have greater emotional

literacy and are more likely to volunteer how they feel, while men are more likely to do something about their negative affect. While men are usually worry about talking about their depression, they will discuss their feelings if provided with a safe environment in which to do so. Lower rates of depression in men are not explained by superior mental health, but rather by a combination of factors related to: the differences in the expression of depression in men that are outside the standard diagnostic criteria for major depression, male methods of help seeking, personal beliefs, social context, and access to health services. Men who repress their emotions and are unable to articulate their distress and identify depression in themselves are more prone to a range of medical illnesses, including heart disease, sudden cardiac death, hypertension, as well as alcohol and substance abuse and risk of self-harm.

According to Bohra (2015), depression is widely prevalent in women in India across all age groups. The multiple roles played by Indian women contribute to stress, thereby making her susceptible to depression, which is often under-reported due to stigma. The influence of female hormones during the reproductive years contributes to the premenstrual dysphoric syndrome, depression during pregnancy, postpartum depression. Arvind et al., (2019) conducted a study across 12 states in India, found that prevalence was among females (3.0%, n=18 217). Abate (2013) conducted a meta-analysis showed that male sex is 63% less likely to develop depression than female sex. Lim et al., (2018) indicated the prevalence of depression was significantly higher in women (14.4%). According to Frazier et al., (2012) women reported greater overall depressive symptoms (BDI-II mean = 11.89, S.D. = 9.68) than men (BDI-II mean = 9.00, S.D. = 7.93) ($P < 0.000$). Kohli (2019) stated that more women suffer from depression in India than men do. The prevalence of depressive disorders stood at 3.9 per cent among women, and 2.7 per cent among men. Dandona (2018) revealed that puberty, pre-menstrual problems, pregnancy, postpartum depression, menopause and peri-menopause, life circumstances and culture, unequal power and status may contribute to depression in women. These issues can cause feelings of negativity, low self-esteem and lack of control over life. Often women work outside the home and still handle home responsibilities. Typically, studies report that women have a prevalence rate for depression up to twice that of men (Bebbington, 1996; Nolen-Hoeksema, 1987). In the ensuing years, with changing gender roles, technological advancements, affluence, and globalization, there are likely to be many more challenges for both men and women. It must be understood that women's mental health and men's mental health are complimentary. A balanced approach is needed.

The present study is concerned, because studies related to the psychological status of patients with chronic illness are limited. There exists a great need to take care of the psychological well-being of those patients, especially with the increased cost and demands for healthcare services worldwide. Reviewed literature has found many global as well as Indian studies on diabetes and depression. Not even a single study on comparing the level of depression among diabetic and non-diabetic adults in urban area of Cuttack city of Odisha have been found in the previous literature. Cuttack, a city of Odisha as considered among diabetes hotspots in country (The Times of India newspaper, 2016). Cuttack are among top 20 districts with high prevalence high blood sugar level (>150 ml/dl), a marker of diabetes among 284 districts of nine states which were part of the recent clinical anthropometric and biochemical survey conducted by the Registrar General of India. Total 3.1% people in Cuttack have blood sugar above 150 ml/dl. For >110 mg/dl Cuttack comes 47th rank with 11.6% people. These are much higher compared to findings of an earlier survey in the 1990s where the percentage varied from 0.8% in rural areas to 8% in urban areas. So, keeping this in the view, the researcher attempted to examine the following objectives.

Objectives of the Study

- To empirically examine the impact of diabetes on severity of depression among the participants.
- To empirically examine whether there is any significant difference on depression measure between males and females.
- To analyse the severity level of depression among diabetic participants.

METHODOLOGY

An Overview of Design

The study involves quantitative and qualitative analysis i.e., mixed design. 120 participants were selected. The study has adopted 2(diabetics versus non-diabetics) × 2 (adult males versus adult females) factorial design. The participants of these four quasi-experimental groups were compared with respect to the dependent measure i.e., level of depression. 60 diabetics (30 males and 30 females) and 60 non-diabetics (30 males and 30 females) were given the Beck Depression Inventory measure. The data were analysed using IBM SPSS Statistics for Windows version 20.0. Fisher's Two-way ANOVA were used for comparison regarding quantitative variables, giving General Linear Models- Univariate command as the design requires two-way ANOVA procedure that designates a single dependent variable and utilizes two independent variables to gain an understanding of how the independent variables influence the dependent variable. Qualitative data were expressed as number and percentage. A 5% was chosen as a level of significance in all statistical tests used in the study.

Participants

In the present study, 120 diabetics and non-diabetics were selected based on non-random sampling i.e., purposive sampling technique. Sixty diabetics were selected from different private diabetes clinic and sixty non-diabetic participants were selected from different colonies in urban area of Cuttack city of Odisha, India. Six private diabetes clinics in the urban area of Cuttack city have been identified and respective doctors of these clinic were contacted. Persons with diabetes were randomly sampled at diabetes clinic after obtaining permission from clinic administrators and the individual client attending the outpatient clinics. At each diabetic care facility, 10 persons with diabetes were identified among those waiting for doctor's consultation, selecting an equal number of males and females. The researcher used structured standardized questionnaires, and interviewed an equal number of persons with diabetes in following age (aged 40-60 years). It took 10-20 minutes for a single participant to fill-up the Beck Depression Inventory, and total data collection procedure took approximately two months. All the participants were equated in terms of their demographic characteristics (age, educational level, socioeconomic status, marital status, etc.). Participants aged 40-60 years, with middle socioeconomic status, and with a basic level of education, i.e. intermediate level and married persons only were considered. Patients attending Diabetes clinic, between 1st December 2019 and 30th January 2020, who had already been diagnosed by a physician of having type-2 diabetes mellitus (T2DM) for more than 5 years according to their personal medical record, were eligible to be included in the study. Patients who were ailing, and having emergency medical condition were not taken into consideration. According to American Psychological Association's ethical code of conduct, the ethical issues are discussed with all the participants, and informed consent regarding their right to deny participating in the study was taken. The detail purpose of research was made clear to all the participants and written consent was received from them before the administration of the tool.

Measure of Depression

To measure severity of depression, the Beck Depression Inventory (1973) were used. The BDI-II Second edition is a 21 item self-report instrument designed to assess the severity of depression in adults and adolescents aged 13 years and older. The tool consisting of 21 items that are self-rated on a 4-point scale ranging from 0 to 3. The scale is having Chronbach's alpha of 0.92.

RESULTS OF THE STUDY

Depression Comparisons

Table 1: Analysis of Variance Performed on Depression Scores of Participants.

Sources	Df	MS	F
Status	1	100..40	13.29**
Gender	1	54.67	0.72
Status x Gender	1	0.13	2.2
Error	116	75.47	

Note: **P < .01

Table 2: Mean Ratings on Depression Scores of Participants

Groups	Male		Female		Combined
	M	**SD**	**M**	**SD**	**M**
Diabetic	20.00	10.51	8.96	10.05	19.48
Non-Diabetic	11.83	7.45	5.56	5.96	13.70
Combined	15.91		17.26		

Table 3: Severity Levels of depression among Diabetic adults

Levels of Depression	Number(N=60)	Percentage
Total Depressed	50	83.33%
Mild Mood Disturbance	15	25%
Borderline Clinical Depression	13	21.66%
Moderate Depression	12	20%
Severe Depression	6	10%
Extreme Depression	4	6.66%

Analysis of Level of Depression

The data on depression has been collected by using Beck Depression Inventory, which consist of 21- question multiple-choice self-report inventory. The items are relating to symptoms of depression such as hopelessness and irritability, cognitions such as guilt or feelings of being punished, as well as physical symptoms such as fatigue, weight loss, and lack of interest in sex.

The Analysis of Variance (ANOVA) is computed on depression scores indicates significant main effect for diabetes, $F(1,116) = 13.29$, $P < 0.1$ (see Table 1). As shown from Table 2, diabetic participant's level of depression is higher as compared to non-diabetic participants ($M = 19.48$ & $M = 13.70$ respectively). Results also reveal non-significant effect for gender, $F(1, 116) = 0.72$, $P > .05$, and diabetes × gender interaction, $F(1, 116) = 0.78$. That shows level of diabetes and gender combinedly have no effect on depression scores of participants.

Percentage analysis is computed on depression scores of only diabetes participants (N=60) indicates that total 83.33% among them are depressed, and are differed in severity level i.e.

with mild mood depression (25%), with borderline clinical depression (21.66%), with moderate depression (20%), with severe depression (10%), and with extreme depression (6.66%), (see Table 3).

DISCUSSION AND CONCLUSION

The objective of the study was to examine the impact of diabetes on the measures of depression among participants and as well as among male and female participants using Beck Depression Inventory. The result of the present study found that diabetics scored higher in depression inventory in compared to their non-diabetic counterparts. Some supportive studies reported that the incidence of depression is 2-3 times higher among diabetics than in non-diabetics (Anderson et al., 2001; Pouwer, Geelhoed, Tack et al., 2010). Another study found that 88% of participants reported that their life would be better if they were not diabetics (Lustman et al., 2000). A meta-analysis showed the symptoms of depression in diabetic groups were twice that of non-diabetic comparison groups (Anderson et al., 20001). Studies indicated that, between 1.2- and 1.6-times higher prevalence of major depressive disorder among adults diagnosed with type-2 diabetes compared to those without diabetes. The occurrence of major depression in diabetes mellitus is mostly estimated to be around 12% (ranging from 8-18%); 15-35 % of individuals with diabetes mellitus report milder types of depression (Gigantesco Massocco et al., 2015). It is estimated that individual with diabetes mellitus are 1.4-3 times likely to suffer from comorbid depression. Prevalent of depression in diabetes mellitus particularly with respect to patients with other chronic diseases is debatable issue. Schram et al., (2009), have found that diabetes patients have an increased risk for depressive symptoms, which may have an additional negative effect on their quality of life. Taj and et al., (2005) found that, diabetics have high level of depression and low level of psychological well-being than non-diabetics. According to Kelly and Ismail (2015), people with T2D, compared with those who do not have T2D, have poorer general mental health, and are more likely to be depressed. The study also showed that diabetes has strong influence on the psychological well-being of the patients and impair their activities and routine life. The study also suggests that patients with poor metabolic control have high level of depression. The study implied that, in a selected group of patients, diabetes has an impact on the psychological wellbeing of the patients due to restrictions in diet, need for discipline or due to complications.

The study also revealed the severity level of depression among diabetes adults. Poor glycaemic control increases the risk of diabetes complications. The long-term stress and strain of diabetes management, multiple fingers stick to check blood sugar levels, daily injections of insulin, and the worry of complications, can lead to a decreased quality of life (QOL) and an increased likelihood of depression (Huang et al., 2011). It has been suggested that 1 in 3 diabetic patients suffers from depression, leading to loss of function and reduced quality of life (Jude et al., 1995). The majority of the cross-sectional analyses controlled for the behavioural risk factors for T2D such as obesity, family history, poor diet, and lack of physical activity. The study has also reported that, diabetics may tend to view the world negatively and to be more affected by, and likely to report, stressors.

The management of depression affects course and outcome of diabetes that lead to improvement in glycaemic control (Kirkman. et al., 2012). Improving treatment adherence helps to combat diabetes as well as depression. Age, Gender, Marital Status, Duration of Diabetes, Family history, Glycemic control, Medications, and Co-morbidities were found to be significantly associated with depression with a p-value. The early detection and prompt treatment with lifestyle modifications can prevent depression among diabetics. There should

be a dedicated counsellor in diabetes clinics for routine screening of depression among all T2DM patients to identify the high-risk patients requiring urgent psychologist consultation. Researcher recommend further detailed studies in this area for better understanding of the association and recommend psychological support in the management plan of diabetes. Therefore, regular screening of depression should be integrated in standard diabetes care and can go a long way in improving the quality of life of these patients. Further community-based studies are required to assess the magnitude of the comorbidity and improving the management of these patients. Therefore, the care of individuals with diabetes mellitus (DM) should include the screening and possible treatment of depression in order to achieve and sustain treatment goals. For both issues hereby needed comprehensive intervention.

Additionally, the current study found no significant differences in male and female participants in depression measure. The gender gap seems to be specific to Western Europe and North America. Agricultural societies show little or no gender difference in rates of depression (McCarthy, 1990). Data from non-Western countries are skimpy, but reports from India, Thailand, Rhodesia, and Sri Lanka report no excess of depression among women. One should not be surprised that the gender gap is culture specific. The incidence, patterning, and epidemiology of many disorders differ considerably from one cultural setting to another (Demyttenaere et al., 2004; World Health Organization, 2000). As some researches shows, depression appears to be nearly absent in some parts of the world.

Male and female participants show equal levels of depression, and several risk factors have been studied that might account for equality of gender in rates of depression. Some research (Schimelpfening, 2020) indicates that not only men experience depression differently than women do, but depression among men may also be underdiagnosed. Men tend to experience symptoms such as anger, irritability, sleep disturbances, and substance use. They are also more likely to describe depressive symptoms as "stress" rather than feelings of sadness. One study published in JAMA Psychiatry found that when depression was measured with these so-call "male symptoms," men actually had somewhat higher rates of depression (26.3% for men and 21.9% for women). The study implicates that men and women are equally affected by depression, and should be treated in a balanced manner. Future studies should focus on the management of diabetes patients having co-morbidity with depression.

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Conflict of Interest

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