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# Depression and its Association with Sociodemographic Factors and Self Care in Patients with Type-2 Diabetes Mellitus in a Tertiary Care Hospital

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**Abstract:** ***Data shows that stress and changing lifestyle are proving to be major contributors of depression in diabetic patients. It is having a deteriorating effect on self-care practice and quality of life. Objectives: 1) Aimed to investigate the extent of depression among diabetics; 2)To find out its association between socio-demographic factors, diabetic co-morbidities and self-care practices. Methods: A cross sectional study was carried out in the tertiary care hospital, Krishna Hospital and Research Centre, Malkapur, Karad, in western Maharashtra. The study was conducted during a period of two months from March 2014 to August 2014. A structured questionnaire prevalidated and modified, was used for collecting the data. Depression was evaluated using translated in vernacular language (Marathi) version of Beck Depression Inventory (BDI). Weight and height were measured with frequently standardized equipments. Blood sugar level was assessed by Glucose Oxidase Peroxidase method. Results: Mean age of diabetic subjects was 50.There was no statistical significance in income group, education and marriage of diabetic subjects suffering from depression. Prevalence of depression was significantly higher in group having long duration treatment, with co-morbidities like retinopathy ($p<0.05$), nephropathy($p<0.0001$), neuropathy($p=0.0002$), IHD($p=0.0002$) and obesity ($p<0.0001$). Conclusion: The prevalence of depression was high among diabetics. It was associated with obesity, mode of treatment, duration of disease and diabetic co morbidities. Therefore screening and management of depression is recommended to achieve optimum control of diabetes.***

**Keywords:** Diabetes, Depression, Socio-demographic factors

## 1. Introduction

Diabetes mellitus is a chronic debilitating condition associated with significant mortality and morbidity rate. WHO has projected that more than 300 million people would be suffering from diabetes by year 2025.[1] Considering the large population and increasing prevalence of diabetes mellitus of nearly 33 million diabetic subject, the burden of diabetes in India is enormous[2.] International Diabetes Federation has estimated that 23 million year of life are lost to disability and reduced quality of life associated as a result of complications associated with diabetes[3].

Depression is another chronic condition affecting quality of life of patient suffering from it. Globally, more than 350 million people of all ages suffer from depression[4] .It is associated with poor healthcare (i.e. smoking, physical inactivity, increased calorie intake, etc) that increase the risk of type 2 diabetes[5]. It is also related to central obesity and potentially to impaired glucose tolerance [6]. A meta-analysis has established there is significant association between depression and hyperglycemia in both type1 and type2 and that the presence diabetes doubles the risk of co-morbid depression.[6]

All the diabetic face co-morbidities, long duration of strict diet, glucose monitoring and overall cost of treatment contribute to depressive symptoms among diabetic patient. Diabetes thus has a complex relation with depression. A study conducted about relationship between diabetes and depression states that, 'the etiology is unknown but complex, and biological, genetic and physiological factors remain as potential contributors. Several neuro-endocrinal and neurotransmitter abnormalities are common to both depression and diabetes have been identified contributing to speculations[7].

On a world-wide level the data concerning relation between depression and diabetes is abundant but this relation has not yet been studied extensively in all the regions of India. A study from analysis of urban population from Delhi has already established the relation between diabetes and depression in urban population in India[8] but such analysis based on rural population are very few. Present study aimed to throw some light on the correlation between diabetes and depression in the region of rural Western Maharashtra.

## 2. Material and Methods

A cross sectional study among diabetic patients attending a tertiary care hospital was carried out of Western Maharashtra, India. The study was conducted from March 2014 to August 2014. All known diabetic patients coming to give sample for blood analysis to biochemistry department and qualifying the selection criteria were taken as study subjects. Patients diagnosed with diabetes mellitus and currently taking hypoglycemic drugs and those who had given their written informed consent were included in the study. Patients having past history of any kind of known psychiatric disorders, family history of psychiatric disorders, other severe chronic disease or infections, geriatric population(above age of 60 years), having communication barriers(language barrier) were excluded. The study was


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approved and cleared by Institutional Ethics Committee of Krishna Institute of Medical Sciences.

Information regarding the socio-demographic factors and components of diabetic evaluation considered[7] was taken from patients by a prevalidated and modified semi-structured questionnaire.

Depressive features were assessed using Beck Depression Inventory (BDI-II Scale) [9,10]. BDI is a widely used valid scale for detecting prevalence of depression.[6,7] This questionnaire consists of 21question items measure designed to document a variety of depressive symptoms, including sadness, guilt, loss of interest, social isolation, and suicidal ideation, the individual experienced over the past week. Responses to 21 items are made on 4 point ranging scale from 0 to 3, where 0 is minimum and 3 is maximum possible score. (Total score can range from 0 to 63). A score of 14 and more will be classified as having depression.

Accordingly the study sample was divided into: Normal/ Minimal: score 1-13, Borderline: score 14-19, Moderate: score 20-28 and Severe: score 29-63.

The translation of BDI was done in vernacular language (Marathi). Either the Marathi version or the English version was used according to preference of patients.

A written informed consent was taken from the study subjects before filling the proforma. Afterwards the BDI scale was given to the study subjects and subject was left alone for a period up to 1 hr so that he/she can fill up the BDI scale without interruptions and external influencing factors.

Weight of all subjects was recorded to nearest 500 gm and height of all the subjects measured by measuring tape fixed to the wall to the nearest 1cm.Body mass index (BMI) was calculated using formula, weight (kg)/height ($m^2$). A person was considered to be obese if BMI $\geq$25kg/$m^2$. Fasting blood glucose level of all subjects was assessed by Glucose Oxidase Peroxidase (GOD POD) method in the clinical biochemistry lab.

Subjects were assured the confidentiality of the data.

Presence of diabetic co morbidities like retinopathy, nephropathy, neuropathy and ischemic heart disease were assessed by records and history given by patients. Self Care Practice Score (SCPS) was obtained of subjects by assessing intake of fruits and vegetables, intake of fatty food, physical activity before and after detection of diabetes and tobacco & alcohol addiction.

Positive self care practice included
a) Intake of fruits and vegetables 5 times a week
b) (b)Intake of fatty food not more than 6 times a week.
c) Physical activity before detection of diabetes.
d) Physical activity after detection of diabetes. {Physical activity was defined as exercise for more than 30 minutes on 5 or more days per week.}
e) No alcohol addiction
f) No tobacco addiction.

Presence of positive self care practice was given 1 point and their absence was given 0 point. Thus SCPS was obtained where 6 was the highest score possible and 0 was the lowest score.

**Sample size calculation**
The sample size for the study was calculated using the formula:
$n=4pq/l^2$.
A minimum sample requirement was 80 so we have taken one hundred diabetic individuals as study subjects.

**Statistical analysis**
The data was compiled and analyzed using GraphPadInStat–[DATASET1-ISD].

Chi-square test was used to assess relationship between BDI score and each possible correlation factor.

Spearman Rank's correlation was used to assess relation between SCPS and depression in patients with diabetes.

## 3. Results

In this study 100 subjects were studied. The prevalence of depression as per BDI scale[9] in study sample was found to be 36%.The mean age of diabetic sample was 50.There was no statistical significance in gender, income group, education and marriage of diabetic study sample suffering from depression. Prevalence of depression was higher among obese diabetic people ($p<0.0001$) Table no.1. It was also noted that prevalence of depression increased with increase in duration of disease since the diagnosiswhich was statistically significant ($p=0.0397$). The mode of treatment was also significantly associated ($p<0.0001$). Depression was found to be more in patients who were on both oral medications with insulin injection than those who took only oral medications Table no.1C.

SCPS($p=0.0109$) were negatively correlated with BDI score. It was also observed that there was significant prevalence of depression in diabetics with co morbidities like retinopathy ($P = 0.029$), nephropathy ($P < 0.0001$), neuropathy ($P = 0.0002$) and Ischemic Heart Diseases (IHD)($P = 0.0002$) Table no.3. Mean blood glucose level increases with increase in BDI score Table no.4. For normal diabetic it was 150.72, for borderline cases it was 160.77, for moderate 189.25 and for cases of severe depression it was 222.81.

**Table 1:** Sociodemographic factors, self care practices, clinical profiles, co-morbiditiesof patients with type 2 diabetes mellitus admitted to tertiary care hospital inKarad city, Western Maharashtra

| Variable | Non depressed diabetic subjects (N=64) | Depressed diabetic subjects (N=36) | $\chi^2$ | p |
|---|---|---|---|---|
| **A. Sociodemographic factors** | | | | |
| **Age (years)** | 49.45 | 50.94 | - | - |
| **Duration of illness** | | | | |
| <5 years | 24 (37.5) | 6 (16.66) | 6.451 | 0.0397* |
| 5-10 years | 26 (40.62) | 15 (41.66) | | |


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| | | | | |
|---|---|---|---|---|
| >10 years | 14 (21.87) | 15 (41.66) | | |
| **Gender** | | | | |
| Male | 30 (46.87) | 21 (58.33) | 0.8020 | 0.770 NS |
| Female | 34 (53.125) | 15 (41.66) | | |
| **Marital status** | | | | |
| Married | 59 (92.18) | 34 (94.44) | 0.0002667 | 0.9870 NS |
| Unmarried | 5 (7.81) | 2 (5.55) | | |
| **Education** | | | | |
| Illiterate | 6 ( 9.37) | 9 (25) | 8.313 | 0.1398 NS |
| Primary | 14 (21.87) | 4 (11.11) | | |
| Secondary | 11 (17.18) | 9 ( 25) | | |
| Higher secondary | 12 (18.75) | 8 (22.22) | | |
| Graduate | 17 (26.56) | 5 (13.8) | | |
| Post graduate | 14 (21.87) | 1 (2.77) | | |
| **Income per month** | | | | |
| >40,000 | 11 (17.18) | 5 (13.88) | 0.4510 | 0.7981 NS |
| 20,000-40,000 | 26 (40.62) | 17 (47.22) | | |
| <20,000 | 27 (42.18) | 14 (38.88) | | |
| **C. Clinical Profile** | | | | |
| Obesity | 11 (17.18) | 29 (80.55) | 35.954 | <0.0001* |
| **Mode of treatment** | | | | |
| Oral hypoglycaemic drugs | 4 (6.25 | 3 (8.33) | 24.760 | <0.0001* |
| Insulin injection | 57 (899.06) | 17 (47.22) | | |
| Oral hypoglycaemic drugs + Insulin injection | 3 (4.68) | 16 (44.44) | | |

*Data was expressed as Mean ± S.D or Number (%); NS: not significant, *-Significant*

**Table 2:** Self care practice score according to variations

| Self care practice score BDI grade | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Normal | 0 | 0 | 1 | 5 | 24 | 19 | 15 |
| Borderline | 0 | 1 | 1 | 2 | 1 | 3 | 1 |
| Moderate | 0 | 0 | 5 | 1 | 4 | 3 | 3 |
| Severe | 0 | 1 | 0 | 3 | 3 | 2 | 2 |

*Self care practices Spearman Rank Co relation:r = -0.2535 [corrected for ties], P= 0.0109 Significant.*

**Table 3:** Diabetic Co-morbidities andBDI Grade wise classification

| Co-morbidities | Normal | Borderline | Moderate | Severe | □2 | p |
|---|---|---|---|---|---|---|
| Retinopathy | | | | | | 0.0291 |
| Yes | 16 | 4 | 10 | 5 | 9.013 | |
| No | 48 | 5 | 6 | 6 | | |
| Nephropathy | | | | | | <0.0001 |
| Yes | 7 | 7 | 10 | 10 | 44.523 | |
| No | 57 | 2 | 6 | 1 | | |
| Neuropathy | | | | | | 0.0002 |
| Yes | 11 | 5 | 8 | 8 | 19.516 | |
| No | 53 | 4 | 8 | 3 | | |
| IHD | | | | | | 0.0002 |
| Yes | 9 | 4 | 10 | 6 | 20.182 | |
| No | 55 | 5 | 6 | 5 | | |

*IHD- Ischemic Heart Disease*

**Table 4:** Blood Glucose Level: Mean & Standard Deviation as per BDI grade

| | Mean ± S.D |
|---|---|
| Normal | 127.80 ± 29.29 |
| Borderline | 160.77 ± 50.78 |
| Moderate | 189.25 ± 33.48 |
| Severe | 222.81 ± 54.44 |

*p< 0.0001 → extremely significant F = 30.908*

Mean B. S. level was directly proportional and significant for BDI grading

## 4. Discussion

The relationship between diabetes and depression has been under lot of speculationswith it being the subject of many research and meta-analysis internationally[7,12,13,14,15]. A few studies have already reported the prevalence of depression among diabetic population in different parts of India like Southern,[11,16] Northern,[17] and Eastern[18] regions of India. This study hereby is the first to report the prevalence of depression in diabetic population in rural Maharashtra, Western part of India. Along with prevalence of depression in diabetic patient, its association with socio demographic factors have been studied and established[8,11]. Present study tried to find not only association between depression and diabetes but also association between self-care habits and diabetic co-morbidities and its relation with depression in diabetic population. It has shown from the results clearly that prevalence of depression in diabetic population was found to be 36%. It helps to add-on to the available limited data and is first of its kind from western Maharashtra.

Number of depressed people were found more having income less than 20,000 compared to those having earning more than 40,000. This can be attributed to the burden of cost of treatment of diabetes. However it does not have statistical significance in this study. Education also, it was observed in this study, does not affect the prevalence of depression in diabetes. These may due to the fact that irrespective of educational status there is less awareness about such psychological conditions and so there is no detection nor steps taken to treat it. About 40% of unmarried persons in the study were suffering from depression compared to those 57.62% of married persons. This value was not statistically significant. But as there were only seven unmarried persons in study sample compared to ninety three married, the findings regarding marriage and depression cannot be correctly commented on. That is why the given study sample could not provide a more clear interpretation of this variable.

A significant difference was found in the depression among obese and overweight people compared to others (p<0.0001). Their BDI was considerably higher compared to others. It was also seen that depression increases with duration of disease. The more severe cases of depression had diabetes for more than 10 years. Similar observations have been made in other studies.[8] Mode of treatment is also a significant variable. Patients on both oral and insulin therapy were found to have significantly higher BDI score than those who were on oral therapy alone.


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Glycemic control is important factor to be considered. Patients with diabetes having higher score of BDI are negatively associated with glycemic control[14]. However patients with diabetes having low BDI score tend to have good glycemic control[14]. Similar results were obtained in this study also. But it is not clear whether poor glycemic control is cause or result of depression in patients with diabetes. Diabetic co-morbidities such as retinopathy, neuropathy, nephropathy and IHD are major factors in prevalence of depression[19]. The presence of these co-morbidities increases the chance of a person having depression.[19] This is because all the mentioned ailments affect the quality of life of a person and also leads to many secondary complications which are detrimental to mental and physical health of a person.[14,19,20]

Good self care practices and depression level are interrelated to each other. It was observed that patient having less BDI score have scored better in self care practices compared to patients with more. A depressed person has natural of tendency to ignore his own personal care with decreased physical activity, poor diet control and addictions.[19,20] Additionally these habits lead to depression.

It is essential that there be more co-ordinate efforts to spread awareness about this problem in general population and also among people of medical profession and in health care fields. This will help in early detection and treatment of depression. Interventions to manage psychiatric illness in patients with diabetes are effective and improve functioning and quality of life of patient.[15] It may greatly reduce the burden of disease and help in proper control of diabetes in people.

It is important to follow self-care practices in patients having diabetesand have good glycemic control to avoid depression and related complications. Further research should be carried out in different geographical settings and different parts of India with larger sample size to add to the limited data available about psychiatric illness in diabetic patients. It is also imperative that other parallel studies be carried out to find the cause behind the association between depression and diabetes to get a clear picture of it. Because a complete realization of emotional condition is important for better recovery and better quality of life.

## 5. Conclusion

It can be concluded that prevalence of depression increases in patients with diabetes. But this is dependent on multiple variables like obesity, mode of treatment and duration of disease. Presence of diabetic co-morbidities greatly increases the chances of having depression.

## References

[1] King H, Aubert RE, Herman WH. Global burden of diabetes, 1995-2025: Prevalence, numerical estimates and projections. *Diabetes Care* 1998; **21**:1414-31.
[2] Ramchandran A, Snehalatha C, Kapur A, Vijay V, Mohan V, Das AK, *et al.* High prevalence of diabetes and impaired glucose tolerance in India: National Urban Dietary Survey. Diabetologia 2001;44:1094-101
[3] International Diabetes Federation. The human, social and economic impact of diabetes, 2008. www.idf.org/sites/default/files/Diabetes_and_Depression.pdf. [accessed on 2014 august 22]
[4] Depression fact sheet N 369 Available from www.who.int/mediacentre/factsheets/fs369/en/Accessed on October 2014.
[5] Strine TW, Mokdad AH, Dube SR, Ballus LS, Gonzalez O, Berry JT, *et al*. Theassociation of depression and anxiety with obesity and unhealthy behaviour among community-dwelling US adults. *Gen Hosp Psychiatry* 2008; **30**:127-37.
[6] Weber B, Schweiger U, Deuschle M, Heuser I. Major depression and impaired glucose tolerance. *ExpClinEndocrinol Diabetes* 2000; **108**:187-90.
[7] Lustman PJ, Griffith LS, Gavard JA, Clouse RE. Depression in Adults with Diabetes. *Diabetic Care*1992; **15**:1631-9.
[8] Joshi A, Joshi A, Maseeh A, Jha PK, Bhatt M, Vyasa B. A study of prevalence of depression in diabetes mellitus: analysis from urban India.Department of Psychiatry, Hassan Institute of Medical Sciences, Hassan, Karnataka, India*Indian J Med Sci*2011; **65**:497-501.Beck A, Ward C, Mendelson M. An inventory for measuring depression. *Arch Gen Psychiatry* 1961; **4**: 53-63.
[9] www.nctsn.org/content/beck-depresssion-inventory-second-edition-bdi-ii; accessed on 02/07/14
[10] Guruprasad KG, Niranjan MR, Ashwin S.A study of association of depressive symptoms among the type 2 diabetic outpatients presenting to a tertiary care hospital. *Indian J Psychol Med*2012; **34**: 30-33.
[11] Bell RA,Smith SL, Arcury TA, Snively BM, Stafford JM, Quandt SA. Prevalence and correlates of depressive symptoms among rural older, Aferican-American, native American and whites with diabetes. Diabetes care 2005;28:823-9.
[12] Ruan Yu, Li Y-Hua, Li Hong. Depression in newly diagnosed type 2 diabetes. International Journal of Diabetes in Developing Countries.April-June 2010 vol30 issue2.
[13] Lustman PJ, Andrson RJ, Freeland KE, de Groot M, Carney RM. Depression and poor glycemic control: A meta-analytic review of the literature. *Diabetes care* 2000;**23**:434-42.
[14] Jadoon NA, Shahzad MA, Munzir W, Bashir I. Sociodemographic, clinic and lifestyle factors associated with psychiatric illness among individuals with diabetes. *Int J Diabetes Dev Ctries* 2012; **32**: 98-104.
[15] Madhu M, Abish A, Anu K, Jophin RI, Kiran AM, VijayakumarK.Predictors of depression among patients with diabetes mellitus in Southern India.*Asian J Psychiatr*2013;**6**:313-317.
[16] Thour A, Das S, Sehrawat T, Gupta Y.Depression among patients with diabetes mellitus in North India evaluated using patient health questionnaire-9.*Indian J EndocrinolMetab* 2015;**19**:252-255.
[17] Das R, Singh O, Thakurta RG, Khandakar MR, Ali SN, Mallick AK, Roy P, BhattacharryaAK.Prevalence of depression in patients with type II diabetes mellitus and its impact on quality of life.*Indian J Psychol Med* 2013;**35**:284-289.
[18] Wayne J. Katon.Am J Med. 2008 Nov; 121 (11 suppl. 2): s8-15. Doi: 10.1016/j.amjmed.2008.09.008.


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[19] Elizabeth H.B.Lin, *et al*. Relationship of depression and diabetes self-care, medication adherence and preventive care. Diabetes Care September 2004 vol.27 no.9 2154-2160.

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