

Prevalence of Depression, stress and anxiety symptoms among type 2 diabetics attending life style modification setting - A descriptive cross-sectional study

Shrimant Kumar Sahu¹, Manjusha Mohandas², M. Santhi Sree³, Jagat Jit Mohapatra⁴, Rohini Sharma^{5*}

¹Consultant Diabetologist, Department of Diabetes, Watumull Global Hospital and Research Centre, Rajasthan, India

²Clinical Psychologist, Department of Clinical Psychology, NIMHANS, Bangalore, India

³Associate Professor, Department of Community Medicine, Ananta Institute of Medical Sciences & Research Centre, Rajasthan, India

⁴Patient Relation Officer, Department of Diabetes, J. Watumull Global Hospital and Research Centre, Rajasthan, India

⁵Evidence scientist, Evidencian Research Associates, Bangalore, India

Received: 24-05-2021 / Revised: 25-07-2021 / Accepted: 16-08-2021

Abstract

Introduction: Coexistence of diabetes and depression, stress and anxiety increase the risk of diabetes complications and reduces the overall quality of life. **Objectives:** To assess the prevalence of depression, stress and anxiety among patients with type 2 diabetes mellitus attending a community-based and peer-led life style modification setting. **Materials and methods:** Descriptive study was carried out among 145 purposively selected clinically diagnosed type 2 diabetics attending community-based and peer-led life style modification setting from February 2019 to July 2019. Patients were interviewed regarding depression, stress and anxiety using the Patient Health Questionnaire-9 (PHQ- 9) and Generalized Anxiety Disorders-7 (GAD-7) and Cohen's perceived stress scale (PSS-10). Data were analysed using coGuide software. The level of statistical significance assumed in all the calculations was $p < 0.05$. **Results:** The mean age was 52.39 ± 5.79 years with equal proportion of males 73 (50.34%) and females 72 (49.66%). The mean duration of diabetes was 7.41 ± 6.39 years. The Cohen perceived stress score was low in 27 (18.62%), moderate in 101 (69.66%) and high in 17 (11.72%) participants. The GAD-7 anxiety score was mild in 55 (37.93%), moderate in 31 (21.38%) and high in 17 (11.72%) participants. The PHQ score was mild in 42 (28.97%) and was severe in only 8 (5.52%) participants. The association of depression, stress and anxiety was significant only for gender (p -value of 0.006). **Conclusion:** Prevalence of depression, stress and anxiety was mild to moderate among patients with type 2 diabetes mellitus attending a community-based life style modification setting

Keywords: Diabetes, Type II diabetes mellitus, Depression, Anxiety, Stress

This is an Open Access article that uses a fund-ing model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Diabetes is a lifelong journey that results in fundamental changes in the patients' lifestyles and may cause increased psychological anxiety and distress, financial burdens, and adverse health effects [1]. The number of people with diabetes in India has been projected to increase to 109 million by 2035. Diabetes is associated with an increased risk of both physical and psychological complications, both of which impact on mortality. Depression, stress and anxiety are highly prevalent psychological disorders in the diabetic population [2]. It was estimated that diabetic patients have at least twice the risk of depression or anxiety that is associated with increased risk of comorbidities, interference with daily activities and quality of life, higher health care costs, and more complications when compared to normal patients [3]. Worldwide estimates of the prevalence of depression and anxiety among diabetic patients appear to vary by nations; though data is scarce from developing countries, studies from Asia (including India) report prevalence rates of depression ranging from 17% to 44% and for anxiety it is from 4% to 58% [4]. A recent meta-analysis of 16

studies [5] had revealed an alarming significant association between depression and increased risk of mortality (odds ratio, OR = 1.5) in patients with diabetes. Stress is a nonspecific bodily response to any demand made upon it. As adherence to various self-management practices is the cornerstone of daily management of type 2 diabetes, perceived stress could negatively impact the long-term health outcomes of the affected individuals [6]. Stressful life events are, however, prone to happen and it is important to identify how perceived stress impacts blood glucose levels, of individuals with diabetes using perceived stress scale by Cohen's [7]. Depression has been recognized as a common comorbidity in patients with type 2 diabetes associated with poor glycaemic control, functional impairment, increased risk of diabetic complications and mortality, and reduced societal productivity [8]. The 9-item Patient Health Questionnaire (PHQ-9) is one of the most popular self-administered screening tools that has been validated in many populations [9]. There are many previous individual studies reported by Thour et al [2], Wolfram et al [10] and Wiernik et al [11] that hypothesized the association of stress, depression and anxiety on diabetes using these screening tools. In another cross-sectional study among adult patients with T2DM in five public primary care centres in the western region of Saudi Arabia by Alzahrani A et al [12] the prevalence of depression, anxiety, and stress were 33.8%, 38.3%, and 25.5%, respectively and the major predictors of psychological distress were age, sex, the presence of comorbidities, duration since T2DM diagnosis, and serum level of hemoglobin A1c. Another study by Gupta Y et al [13] from India reported the prevalence of depression as

*Correspondence

Dr. Rohini Sharma

Evidence scientist, Evidencian Research Associates, Bangalore India

E-mail: dr.rohini@beyonddpvalue.com

41% using (PHQ score ≥ 15). Depression was significantly more prevalent in rural subjects (57%) when compared to urban ones (31%, $P = 0.049$). Due to varying prevalence rate of diabetes as well as depression and anxiety from various parts of India, the exact disease burden still remains unclear. The prevalence of comorbid diabetes, depression and anxiety is limited in India. This study adds to the limited available information on the prevalence of anxiety, stress and depression checked using screening tools among diabetics in India. To the best of our knowledge, the utility of generalized anxiety disorders 7-item (GAD-7) scale, Patient Health Questionnaire (PHQ-9) and Perceived stress scale by Cohen's has been evaluated for the first time in India to study this association. This data will be helpful for the healthcare providers to plan collaborative care in healthcare settings.

Aims and objectives

To assess the prevalence of depression, stress and anxiety among type 2 diabetics attending a community-based peer-led lifestyle modification setting.

Materials and methods

Study design

A descriptive cross-sectional study

Source population

Subjects attending a community-based lifestyle modification setting

Study population

Subjects diagnosed with type 2 diabetes and attending a community-based lifestyle modification setting.

Study setting

The study was conducted at a community centre.

Study period

For a period of 6 months from February 2019 to July 2019

Sample size and sampling technique

All 145 patients with type 2 diabetes mellitus attending the lifestyle modification centre were selected according to convenience sampling for the feasibility of the study.

Ethical and informed consent

Prior permission was obtained from ethical members of the community centre and written informed consent was taken from all the subjects before the study started. Confidentiality was maintained all along.

Inclusion criteria

- Both male and females aged 18-60 years.
- Subjects who can comprehend the questionnaire
- At least diabetic since a year and on medication

Exclusion criteria

- Previous clinical diagnosis of anxiety, depression, and other psychiatric disorder.
- Taking drugs like-sedatives, glucocorticoids, and immune suppressive
- Not receiving any psychiatric treatment which could have an effect on the result.

Data collection

The psychological assessment was carried under a team of data collectors who were trained in the questionnaire (GAD-7, PHQ-9, PSS-10). Prior permissions were obtained from all the originators of the questionnaires to use them in this study.

Generalized anxiety disorder

The GAD-7 scale was used for evaluation of anxiety, and relevant clinical details were obtained. Anxiety was assessed by administering the GAD-7 scale. This scale is useful for evaluating the presence and severity of GAD in clinical practice. This tool has several advantages. First, a 7-item anxiety scale - the GAD-7 - is a useful tool with strong criterion validity for identifying probable cases of GAD. Second, the scale is also an excellent severity measure as increasing scores on the GAD-7 are strongly associated with multiple domains of functional impairment and disability days. Third, although many patients had anxiety and depressive symptoms, factor analysis confirms GAD and depression as distinct dimensions, GAD-7 measuring GAD with high sensitivity and specificity with appropriate cut-offs. It assesses the symptoms experienced by participants during the 2-week period

before they take the survey. On the basis of participant response to the frequency of any particular symptom (0 = not at all, 1 = several days, 2 = more than half of the days, and 3 = nearly every day), a total score ranging from 0 to 21 was obtained, with higher scores indicating patients increased self-report of anxiety severity. The division of GAD-7 scores into ratings of mild (5-9), moderate (10-14), and severe anxiety (≥ 15) was used in this study[14].

Cohen's perceived stress scale

The PSS-10, (Cohen et al., 1983) measures an individual's appraisal of their life as stressful (i.e., unpredictable, uncontrollable and overloading). Item examples include, 'How often have you felt nervous or stressed?' and 'How often have you felt confident about your ability to handle your personal problems?' People rated how often they had experienced these feelings in the last week on a Likert scale from 0 = never to 4 = very often. PSS-10 scores were obtained by reversing the scores on the four positive items; the items were 4, 5, 7 and 8. Total scores range from 0 to 40, with higher scores indicating greater overall distress. Coefficient alpha reliability was 0.86 for a newly diagnosed breast cancer population consistent with alphas from 0.75 to 0.86 in the general literature (Cohen et al., 1983)[7].

Patient health questionnaire

The PHQ-9 is derived from the DSM-IV diagnostic criteria, and consists of 9 questions pertaining to the frequency of depressive symptoms during the preceding two weeks. Each item is scored from 0 (not at all) to 3 (nearly every day), with a total score ranging from 0 to 27. Cut-off values of 5, 10, 15 and 20 have been widely used to define mild, moderate, moderately severe, and severe depressive symptoms (Kroenke et al., 2001)[9].

Investigations: The values of the glucose measures - HbA1c and systolic blood pressure and diastolic blood pressure were measured. Next, questionnaire studies were carried out which was accompanied by brief information such as: age, sex, place of residence, education, marital status, professional activity, body mass, height, used stimulants, comorbidities, the duration of diabetes, the occurrence of diabetes complications and the taken drugs.

The questionnaire was filled in personally and anonymously by the patients.

Life style modification centre

The study was an inpatient holistic intervention conducted in Nadiad and Bhavnagar in Gujarat. Vegetarian diet, daily practice of Raja Yoga Meditation, attending daily class on positive thoughts, avoidance of tobacco, refraining from consumption of alcohol or any harmful substances, along with the associated beliefs listed above, form a part of "Brahma Kumari's Raja Yogi Lifestyle". The patient after screening for inclusion and exclusion criteria were taken for the study. 4 camps were conducted.

Study variables

Prevalence of depression, stress and anxiety were considered as dependent or primary outcome variables. Age, sex, marital status, residence, religion, level of education, duration of diabetes, having diabetic complications, smoking status, status of alcohol consumption, comorbidities were considered as independent variables.

Statistical analysis: The statistical analysis was performed using the coGuide software. The level of statistical significance assumed in all the calculations was $p < 0.05$. Basic statistics, i.e., the mean and the standard deviation were calculated for quantitative data. The Chi-square test were used for checking the occurrence of relationships between the considered variables. The reliability of the applied questionnaires was checked by calculating the Cronbach's alpha coefficient (> 0.7 was considered acceptable) for (GAD-7, PHQ-9, PSS-10) coGuide version V.1.0 was used for statistical analysis[15].

Results

The mean age was 52.39 ± 5.79 years in the study population. Proportion of males was 73 (50.34%) and 72 (49.66%) were female, majority of 135 (93.1%) was married. Majority as 71 (49.10%) were graduated and professionals, 37 (25.52%) did high school and 20 (13.79%) completed higher secondary. Hindu were 144 (99.31%) and 139 (95.86%) were living in urban area. Majority 106 (73.10%) were

from nuclear family. The mean duration of diabetes was 7.41 ± 6.39 (in year), majority 73 (50.3%) had diabetes >5 years in study population. As onset of disease, majority 108(74.5%) reported insidious. Diabetes diagnosed through Routine check-up for other illness in 84(57.9%) and in 40(27.6%) it was diagnosed while health screening. Majority of 114(78.6%) had obesity, 53(36.6%) had

hypertension, 50(34.5%) had dyslipidaemia and 41(28.3%) had OA. Majority of 30(20.7%) had neuropathy followed by 3 (2.1%) had retinopathy and 1 (0.7%) had Neuropathy as micro vascular complications where Macro vascular Complication reported as 7 (4.8%) with CAD followed by 2 (1.4%) with PVD and 9 (6.2%) had ED as Other Complication. (Table 1)

Table 1: Baseline socio-demographic characteristics and clinical parameters of the study population (N=145)

Parameter	Variables	Summary
Age (mean±SD)		52.39± 5.79 (range 35 to 60)
Gender	Male: female (ratio)	73:72
Marital status	Single	4 (2.8%)
	Married	135 (93.1%)
	Widower/widow/divorced	6 (4.1%)
Education	Illiterate	4(2.76%)
	Middle school	13(8.97%)
	High school	37(25.52%)
	Higher secondary	20(13.79%)
Religion	Graduate and professional	71 (49.10%)
	Hindu	144(99.31%)
	Muslim	1(0.69%)
Locality	Urban	139(95.86%)
	Rural	6(4.14%)
Type of family	Nuclear	106(73.10%)
	Joint	39 (26.90%)
Duration of diabetes in years	<1 year	17 (11.70%)
	1 to 5 years	55 (37.9%)
	>5 year	73 (50.3%)
Mode of onset	Acute	14(9.7%)
	Sub-Acute	23(15.9%)
	Insidious	108(74.5%)
Co-Morbid conditions	Obesity	114(78.6%)
	Hypertension	53(36.6%)
	Dyslipidemia	50(34.5%)
	Hypothyroidism	22(15.2%)
	Cataract	11(7.6%)

Never smokers were 134 (92.4%), 8 (5.5%) were past smokers and 3 (2.1%) were current smokers. Alcohol habit was found only in 7(4.8%) participants. Majority 120 (82.8%) were doing sedentary work, followed by 21 (14.5%) working in light outdoor places, whereas 137 (94.5%) participants were vegetarian. (Table 2)

Table 2: Baseline lifestyle-related characteristics of the study population (N=145)

Lifestyle-related characteristics	Parameter	Summary
Smoking	Current	3(2.1%)
	Past	8(5.5%)
	Never	134(92.4%)
Alcoholic	Current	7(4.8%)
	Past	4(2.8%)
	Never	134(92.4%)
Type of work/ occupation	Sedentary	120(82.8%)
	Light outdoor	21(14.5%)
	Heavy outdoor	4(2.8%)
Dietary preference	Mixed vegetarian & non vegetarian	8(5.6%)
	Vegetarian	137(94.5%)

The Cohen perceived stress score was low in 27(18.62%), moderate in 101(69.66%) and high in 17(11.72%) participants. The GAD-7 anxiety score was mild in 55 (37.93%), moderate in 31 (21.38%) and high in 17(11.72%) participants. The PHQ score was mild in 42 (28.97%) and was severe in only 8(5.52%) participants. (Table 3)

Table 3: Summary of stress, anxiety and PHQ scores in the study population (N=145)

Baseline	Summary
Cohen perceived stress total score	18.77 ± 5.77 (ranged 1 to 33)
Low stress	27 (18.62%)
Moderate stress	101(69.66%)
High perceived stress	17 (11.72%)
Anxiety Severity	7.77 ± 4.91 (ranged 0 to 20)
Minimal anxiety	42(28.97%)
Mild anxiety	55 (37.93%)
Moderate anxiety	31 (21.38%)
Severe anxiety	17 (11.72%)
PHQ	8.34 ± 6.24 (ranged 0 to 27)

Normal	9 (6.21%)
Minimal depression	41 (28.28%)
Mild depression	42 (28.97%)
Moderate depression	27 (18.62%)
Moderately severe depression	18 (12.41%)
Severe depression	8 (5.52%)

The association of depression, stress and anxiety with different demographic parameters like Age, Education, locality, type of family and Duration of diabetes found to be insignificant with a *p* value (0.369, 0.478, 0.345, 0.574, 0.515) respectively. Between gender there was statistically significant difference in severity of disease observed with a *p*-value of 0.006. (Table 4)

Table 4: Association of depression, stress and anxiety with demographic parameters (N=145)

Demographic parameters	Severe Disease		Chi square	P value
	Yes	No		
Age Group				
Up To 50 (N=45)	11 (24.44%)	34 (75.56%)	0.806	0.369
>50 (N=100)	18 (18%)	82 (82%)		
Gender				
Male (N=73)	21 (29.17%)	51 (70.83%)	7.511	0.006
Female (N=72)	8 (10.96%)	65 (89.04%)		
Education				
Illiterate (N=4)	2 (50%)	2 (50%)	3.498	0.478
Middle School (N=13)	3 (23.08%)	10 (76.92%)		
High School (N=37)	9 (24.32%)	28 (75.68%)		
Higher Secondary (N=20)	3 (15%)	17 (85%)		
Post-Graduate Or Professional Degree (N=71)	12 (16.9%)	59 (83.1%)		
Locality				
Rural (N=6)	2 (33.33%)	4 (66.67%)	0.695	0.345
Urban (N=139)	27 (19.42%)	112 (80.58%)		
Type Of Family				
Joint (N=39)	9 (23.08%)	30 (76.92%)	0.316	0.574
Nuclear (N=106)	20 (18.87%)	86 (81.13%)		
Duration of diabetes				
<1 Year (N=17)	2 (11.76%)	15 (88.24%)	1.327	0.515
1 To 5 Years (N=55)	10 (18.18%)	45 (81.82%)		
>5 Years (N=73)	17 (23.29%)	56 (76.71%)		

Discussion

The study aimed to assess the prevalence of depression, stress and anxiety among type 2 diabetics attending a community-based, peer-led lifestyle modification setting in India. The mean age was 52.39± 5.79 years in the study population with almost equal male and female ratio. The mean duration of diabetes was 7.41± 6.39 years. The Cohen perceived stress score was moderate among 101 (69.66%) participants. The GAD-7 anxiety score was moderate in 31 (21.38%) participants. The PHQ score was severe in only 8(5.52%) participants. The association of depression, stress and anxiety with different demographic parameters like Age, Education, locality, type of family and Duration of diabetes found to be insignificant with a P value (0.369, 0.478, 0.345, 0.574, 0.515) respectively. Between gender there was statistically significant difference (p value of 0.006). Of 145 patients with type 2 diabetes mellitus, nearly 53(36%) of the patients exhibited moderate to severe depression and majority 118 (83%) showed perceived stress and nearly 48 (33%) had generalized anxiety disorders. This finding was very much similar to a cross-sectional study by Sharma K et al [16] in Nepal where out of 296 patients with type 2 diabetes mellitus, more than half (57.8%) of the patients exhibited depression and nearly half (49.7%) showed generalized anxiety disorders. Regarding severity of depression, 42 (28.97%), 45(31%), 8(6%) patients had mild, moderate, and moderately severe, and severe depression, respectively. Although data related to severity from India are limited, a study in Saudi Arabia showed mild, moderate, severe, and extremely severe depression among 9.3%, 14.0%, 7.1%, and 3.3% of patients with type 2 DM, respectively [17]. Regarding severity of anxiety 55 (37.93%), 31 (21.38%) and 11 (17%) had mild, moderate and severe anxiety. Our finding is slightly higher than the finding reported by the study in India which showed overall prevalence of anxiety among 34% of patients where mild, moderate, and severe anxiety was found in 22%, 8%, and 4%, of

patients, respectively, by GAD-7 scale [18]. In the present study 73 (50.3%) participants reported >5 years of duration of diabetes. This finding was similar to a cross-sectional study by Geleta BA et al [19] in southwest Ethiopia where the mean duration of stay with type 2 diabetes was 5.5 (SD = 3.9). Unlike the current study, the measurement tool used to measure depression was Beck Depression Inventory (BDI) scale questionnaire. Respondents aged 52.39± 5.79 (range 35 to 60) years 40–49 years more often showed emotional states of depression, stress and anxiety. This finding was similar to a cross-sectional study by [20] where logistic regression analysis indicated that age 40–49 years (OR=2.57, 95% CI: 1.59–4.13) as a predictor of depression and anxiety. Unlike the current study, the measurement tool used to measure depression, stress and anxiety was DASS-21. In the present study almost equal male and female ratio was observed 73:72. This finding was in contrast to a multicentric study by Ali Khan K et al [21] where there was a slight preponderance of females (57.5%) and Anxiety and Depression was measured by using the Hospital Anxiety and Depression Scale (HADS). Various factors, such as age, education, locality, type of family and duration of diabetes were predicted to be associated with depression, stress and anxiety. But our study failed to prove this association. This finding was in contrast to a study by Camara A, [22] among African patients in Guinea, where variables such as gender, marital status, level of education, DM duration, smoking status, number of doctor's visits, DM therapy, and comorbidities, were predicted to be associated with depression, stress and anxiety. In the current study high perceived stress was observed in 17 (11.72%) participants. This finding can be compared to a subset analysis of the nationwide cross-sectional survey, conducted across Indian zones under the National Multicentric Diabetes Control Program by Mishra A et al [23] where people with prediabetes were under more stress as compared to those with diabetes in India. The life style modification

program to reduce the levels of HbA1c and to reduce the burden of depression, stress and anxiety was very much similar to Kerala diabetes prevention program (K-DPP) [24] where the context was interlinked with evidence-based behaviour change techniques that benefited policy makers, action implementers, service providers, and eventually wider populations in India and similar countries. The lessons learnt from the implementation of such interventions would also have applicability to other rapidly developing low- and middle-income countries in the Asia, Pacific and African regions where there is an urgent need of such interventions to control psychological burden of diabetics.

Strength

This study adds to the limited information available regarding anxiety and depression and stress among type 2 diabetics attending a community centre for life style modification in India. According to authors knowledge, this was the first study to examine co- occurrence of depression, anxiety and stress among type 2 diabetics attending a life style modification centre in India using three different scales.

Limitations

It is descriptive cross-sectional study which could not explore the causal relationship between anxiety, stress and depression with other associated factors. The study was conducted at a life style modification centre and only type 2 diabetic patients were considered which did not allow for generalizability of the findings to the entire diabetics. The study sample was also low that can affect the study findings. The study was based on participants response to questionnaire and hence can be subjected to recall bias. Considering these limitations, further multicentric interventional population-based studies are recommended to support the findings of the present study.

Conclusion

Depression, stress and anxiety was high among type 2 diabetics. An integrated model to manage symptoms of depression, stress and anxiety is to be developed focusing on early screening and counselling by psychiatrists. While planning and implementing the program for this risk groups in the healthcare settings, early screening and counselling can enhance the efficacy of treatment regimens and reduce overall burden and improve quality of life of diabetics.

Acknowledgement

We acknowledge the technical support in data entry, analysis and manuscript editing by "Evidencian Research Associates."

References

- Jia Z, Li X, Yuan X, Zhang B, Liu Y, Zhao J, et al. Depression is associated with diabetes status of family members: NHANES (1999–2016). *J Affect Disord.* 2019;249:121–6.
- Thour A, Nagra R, Gosal A, Sehrawat T, Das S, Gupta Y. Anxiety among patients with diabetes mellitus evaluated using generalized anxiety disorder 7-item scale. *J Soc Heal Diabetes.* 2016;4(2):133–6.
- Albekairy A, Aburuz S, Alsabani B, Alshehri A, Aldebasi T, Alkatheri A, et al. Exploring factors associated with depression and anxiety among hospitalized patients with type 2 diabetes mellitus. *Med Princ Pract.* 2018;26(6):547–53.
- Rajesh Rajput, Pratibha Gehlawat, Deepak Gehlan, Rajiv Gupta and MR. Prevalence and predictors of depression and anxiety in patients of diabetes mellitus in a tertiary care center. *Indian J Endocrinol Metab.* 2016;20(6):746–51.
- van Dooren FEP, Nefs G, Schram MT, Verhey FRJ, Denollet J, Pouwer F. Depression and Risk of Mortality in People with Diabetes Mellitus: A Systematic Review and Meta-Analysis. *Berthold HK, editor. PLoS One.* 2013;8(3):e57058.
- Ahola AJ, Forsblom C, Harjutsalo V, Groop PH. Perceived Stress and Adherence to the Dietary Recommendations and Blood Glucose Levels in Type 1 Diabetes. *J Diabetes Res.* 2020;2020:3548520.
- Cohen.s T. A Global Measure of Perceived Stress. *J Heal Soc Behav.* 1983;24:385–96.
- Zhang Y, Ting R, Lam M, Lam J, Nan H, Yeung R, et al.

Measuring depressive symptoms using the Patient Health Questionnaire-9 in Hong Kong Chinese subjects with type 2 diabetes. *J Affect Disord.* 2013;151(2):660–6.

- Kroenke K, Spitzer RL, Williams JBW. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med.* 2001 Sep;16(9):606–13.
- Wolfgang P, Zhang L, Simpson P, Fiallo-Scharer R. Clinical associations of quarterly Patient Health Questionnaire-9 depression screening results in adolescents with type 1 diabetes. *Pediatr Diabetes.* 2020;21(5):871–7.
- Wiernik E, Nabi H, Thomas F, Pannier B, Hanon O, Simon T, et al. Association between current perceived stress and incident diabetes is dependent on occupational status: Evidence from the IPC cohort study. *Diabetes Metab.* 2016;42(5):328–35.
- Alzahrani A, Alghamdi A, Alqarni T, Alshareef R, Alzahrani A. Prevalence and predictors of depression, anxiety, and stress symptoms among patients with type II diabetes attending primary healthcare centers in the western region of Saudi Arabia: A cross-sectional study. *Int J Ment Health Syst.* 2019; 13(1):1–7.
- Gupta Y, Sehrawat T. Depression among patients with diabetes mellitus in North India evaluated using patient health questionnaire-9. *Indian J Endocrinol Metab.* 2015;19(2):252.
- Spitzer RL, Löwe B. A Brief Measure for Assessing Generalized Anxiety Disorder. *Arch Intern Med.* 2006;166(10):1092.
- BDSS Corp. Released 2020. *coGuide Statistics software, Version 1.0, India: BDSS corp.* Available from: <https://www.co-ungana.com>, Adhikari S, Bista Pandey A, Sharma M. Depression and Anxiety among Patients with Type II Diabetes Mellitus in Chitwan Medical College Teaching Hospital, Nepal. *Nurs Res Pract.* 2021;2021:8846915.
- Alzahrani A, Alzahrani A. Prevalence and predictors of depression, anxiety, and stress symptoms among patients with type II diabetes attending primary healthcare centers in the western region of Saudi Arabia: a cross-sectional study. *Int J Ment Heal Syst.* 2019;13(1):1–7.
- Thour A, Nagra R, Gosal A, Sehrawat T, Das S, Gupta Y. Anxiety among patients with diabetes mellitus evaluated using generalized anxiety disorder 7-item scale. *J Soc Heal Diabetes.* 2016;4(2):133–6.
- Geleta BA, Dingata ST, Emanu MD, Eba LB, Abera KB, Tsegaye D. Prevalence of Diabetes Related Distress and Associated Factors Among Type 2 Diabetes Patients Attending Hospitals, Southwest Ethiopia, 2020: A Cross-Sectional Study. *Patient Relat Outcome Meas.* 2021;12:13–22.
- Fisekovic Kremic MB. Factors associated with depression, anxiety and stress among patients with diabetes mellitus in primary health care: Many questions, few answers. *Malaysian Fam Physician.* 2020;15(3):54–61.
- Khuwaja AK, Lalani S, Dhanani R, Azam IS, Rafique G, White F. Anxiety and depression among outpatients with type 2 diabetes: A multi-centre study of prevalence and associated factors. *Diabetol Metab Syndr.* 2010;2(1):1–7.
- Camara A, Balde NM, Enoru S, Bangoura JS, Sobngwi E BF. Prevalence of anxiety and depression among diabetic African patients in Guinea: Association with HbA1c levels. *Diabetes Metab.* 2014;41(1):62–8.
- Mishra A, Podder V, Modgil S, Khosla R, Anand A, Nagarathna R, et al. Higher Perceived Stress and Poor Glycemic Changes in Prediabetics and Diabetics Among Indian Population. *J Med Life.* 2020;13(2):132–7.
- Mathews E, Thomas E, Absetz P, D'Esposito F, Aziz Z, Balachandran S, et al. Cultural adaptation of a peer-led lifestyle intervention program for diabetes prevention in India: The Kerala diabetes prevention program (K-DPP). *BMC Public Health.* 2018;17(1):1–13.

Conflict of Interest: Nil Source of support:Nil