Original Article

Quality of life and depression among diabetic patients attending the lifestyle clinic of a teaching hospital, West Bengal

Gandhari Basu[1], Dipanjan Nandi[2], Sujata Biswas[3], Suman Kumar Roy[1]

[1]Departments of Community Medicine, [2]Medical Intern and [3]Physiology, College of Medicine & JNM Hospital, WBUHS, West Bengal, India

Abstract

Context: The coexistence of diabetes and depression has resulted in poor quality of life. Reported literature suggested the need for research for assessing the correlates of both quality of life along with depression in diabetic persons. **Aims:** To assess the quality of life (QOL), the prevalence of depression and associated factors in diabetic patients attending the lifestyle clinic of a tertiary healthcare facility in Eastern India. **Settings and Design:** This hospital-based descriptive, cross-sectional research recruited 219 patients with diabetes to assess the QOL and depression in the lifestyle clinic of a tertiary healthcare facility. **Methods and Materials:** The quality of life was assessed with the help of the World Health Organization (WHO) QOL BREF instrument. Depression was determined by a standardized Patient Health Questionnaire - 9(PHQ-9). The sociodemographic and diabetes-related information were collected by a semistructured questionnaire. Clinical and anthropometric examinations were conducted. **Statistical Analysis Used:** All the available data were initially coded and then analyzed using the SPSS 22.0 licensed software. **Results:** The participants had a median age of 54 years. Illiteracy was significantly more among females. Hypertension was the most common comorbidity. Gender-wise difference in mean of weight, height, hip circumference, and QOL score in the psychosocial domain was significant. The mean QOL score was least in the social domain and highest in the environmental domain. Literate patients had a statistically significantly better QOL. Depression was observed significantly more in females, illiterates, and unemployed respondents. **Conclusions:** Diabetic women with lesser literacy have an increased risk of poor QOL. Women, illiterates, and the unemployed suffered more from depression. Therefore, a target-specific, routine, and well-planned clinic approach is needed to improve the QOL and mental health of respondents.

Keywords: Depression, diabetes, lifestyle clinic, patient health questionnaire, Quality of Life

Introduction

Diabetes is a noncommunicable, lifestyle-related chronic disease with increasing prevalence in low- and middle-income countries. Diabetes has been projected as the seventh leading cause of death as per the World Health Organization (WHO) by 2030.[1] It has been noted that India is now the home of the highest number of diabetic patients in this millennium.[2] The age-standardized prevalence of persons with diabetes ranges from 8% to 18% in urban India.[3] Health-related quality of life (HRQOL) is defined as "an individual's or group's perceived physical and mental health over time" and it comprises aspects that can affect physical or mental health.[4] Reported literature suggested that depression is more among people with diabetes than nondiabetics. Moreover, this lifestyle disease with complications has a significant reverse impact on HRQOL.[5-8] In view of the limited studies on HRQOL among diabetic patients of the Eastern region, this current project was conducted to determine the quality of life, the prevalence of depression and the associated factors in diabetic patients attending the lifestyle clinic of a tertiary healthcare facility in Eastern India. Primary care physicians

Address for correspondence: Dr. Gandhari Basu, ABAKASH, Port Blair Lines, Chiriamore, Barrackpore, Kolkata - 700 120, West Bengal, India.
E-mail: gandhari.basu@gmail.com

Received: 21-08-2020 **Revised:** 27-10-2020
Accepted: 30-11-2020 **Published:** 30-01-2021

Access this article online

Quick Response Code:

Website: www.jfmpc.com

DOI: 10.4103/jfmpc.jfmpc_1709_20

How to cite this article: Basu G, Nandi D, Biswas S, Roy SK. Quality of life and depression among diabetic patients attending the lifestyle clinic of a teaching hospital, West Bengal. J Family Med Prim Care 2021;10:321-6.

are again gaining importance all over the world on the basis of their primary-level contact and rapport at the household level. Therefore, the present research would be beneficial for both the country and community to engage the physicians for the betterment of overall quality of life.

Subjects and Methods

An observational, descriptive, cross-sectional survey was carried out in the lifestyle clinic of a teaching hospital in Eastern India. An institutional ethical clearance certificate was obtained prior to field work. The study took three months to complete, two months for data collection, and one month for analysis and report writing. A predesigned, pretested, and structured proforma was used as the main tool of the research. The first part of the proforma had information on the socioeconomic and demographic data along with medical history, the second part consisted of locally translated WHOQOL-BREF and Patient Health Questionnaire – nine (PHQ-9), and the final part had the data regarding blood pressure, pallor, anthropometric measurements, and laboratory reports. After obtaining ethical clearance, consistency checking was done by translating and retranslating the predesigned questionnaire. The translated questionnaire was pilot-tested and modified accordingly. During the pilot study, the time taken to complete one interview was around ten minutes. All the adults with diabetes (as per WHO criteria), attending the lifestyle clinic of the hospital were the study participants.[9,10] The respondents aged older than 19 years of age with at least one report of fasting and postprandial blood glucose (FBG and PPBG in last three months) attending the clinic considered to be included in the survey. Pregnant females and participants with a known history of any mental disorder were excluded. Complete enumeration was done and confidentiality regarding the respondent identity was strictly maintained. Written consent in Bengali was obtained from the respondents after explaining to them the purpose of the study. After obtaining the consent, the study participants were interviewed by the investigator using the structured questionnaire. Attempts were made to provide the utmost privacy during the interview. Anthropometric and clinical examinations were carried out as per the structured proforma. The QOL was assessed with WHOQOL-BREF and it was also used to assess the physical, psychological, social, and environmental domains. The scores of each domain indicated the perception of an individual regarding their quality of life. A higher QOL is denoted by higher scores. There are many items under each domain. The mean item score within an individual domain was needed to calculate the domain score. Individuals were classified as having good QOL when the mean total score is 50% and above and as having poor QOL when the mean total score is less than 50%.[11,12] The responses of PHQ-9 were elicited to assess the prevalence of depression. This questionnaire is reported by the individuals themselves. This was used for the primary evaluation of mental health problems and major depressive disorder. The questionnaire evaluated the symptoms experienced by the patients in the last two weeks. Increased scores indicated that the patients themselves reported an increased level of severity in depression. Previous literature suggested grading of depression based on scoring. Scores 0 to 4 denoted minimal depression, scores 5 to 9 denoted mild depression, and scored 10 and above denoted moderate to severe depression.[13-15] Body weight was measured using a standard portable weighing scale. Regarding weight measurement, calibration of the instrument was considered to the nearest 0.1 kg. Measurement of height was done without shoes using a fixed wooden stand to which a steel tape was attached to the nearest 0.1 cm. Blood pressure was recorded with the help of a calibrated dial sphygmomanometer. Hypertension will be classified on the basis of The Seventh Report of the Joint National Committee.[16] The waist and hip circumference (WC and HC) were assessed with a measuring tape as per a standardized procedure.[17] The data were coded and analyzed with the help of SPSS 22.0 (licensed) and Stat Calc version 8.2. The mean (SE) value was calculated for quantitative variables. The mean score of WHOQOL and PHQ-9 was also calculated. Proportion was done for qualitative attributes. The association between the sociodemographic variables and QOL scores and depression grade was calculated by either Fisher's exact Chi square test or Yates corrected Chi square. Date of approval is 19.07.2018.

Results

Sociodemographic and economic profiles: The present study comprised 219 diabetic patients. More than half of them (56.7%) were aged more than 50 years and 42.9% were aged 30–50 years. The median age of respondents was 54 years. Every two of three patients were female and more than 40% were illiterate. Illiteracy was noted significantly ($P = 0.000$) more among females (53.9%) when compared to males (18.8%). There was a significant sex-wise difference in the proportion of employment. Marital disharmony was present among 14.7% of married participants. Modified Prasad's socioeconomic scale was used to assess the social class.[18] A total of 50.7% belonged to the upper middle class and 23.1% to the upper class.

Patients profile with regard to diabetes, addiction, and comorbidities: Eighty six (86) patients (39.3%) had associated comorbidities. High blood pressure (72, 83.7%) was reported as the most common morbidity. Other reported comorbidities were cardiac problems, joint problems, osteoporosis, hypothyroidism, respiratory illnesses etc., The respondents received medicine for associated comorbidities for an average of 61.11 months. Tobacco use (30.6%) was seen as the most common addiction with more than half using smokeless products and 44.8% being smokers. The period of smoking ranged between 6 months and 66 years. The average duration of smoking was 18 years. In the case of smokeless tobacco product use, the duration noted was a little less, varying from 3 months to 40 years. Among the diabetics, 26.0% discontinued treatment. The time interval between diagnosis and initiation of treatment was asked and coined as the treatment gap in our study. The average time gap was 6.38 months. Family history of diabetes and hypertension was reported by 76.7% and 16.9% respondents, respectively.

Among the total respondents, 72 reported having high blood pressure and 59 took medication. The mean age of males was significantly more than that of females in the present survey. Similar gender wise significance in mean difference was recorded with respect to weight, height, and hip circumference.

Clinical findings: Pallor was observed in 58 (26.5%) diabetics. The prevalence of overweight and obesity was 42.0% as per body mass index. According to the classification of obesity by waist–hip ratio, overweight and obesity were significantly more prevalent among women than men (69.1% vs. 37.5%). Only 24.2% had normal blood pressure, while nearly half of the diabetics were in the stage of prehypertension [Table 1].

Quality of life among study respondents: Upon the analysis of the individual WHOQOL BREF scores, the mean score was seen least in the social domain followed by the psychosocial domain. The maximum score received in the social domain was only 14 in comparison to other domains. The average score obtained was highest in the environmental domain followed by the physical domain (25.38 and 22.27, respectively). It was seen that 48.0% of the patients had an overall good score [Table 2]. The obtained average scores by females in all domains were less but significantly low only in the psychosocial domain (F = 3.879, $P = 0.022$).

Depression among respondents: Depression among respondents was determined by PHQ-9. The mean (SE) total score obtained was 7.8+/- 3.44. The average score for PHQ-9 was highest when they were asked about feeling tired or having little energy. The scores obtained decreased gradually when asked for little interest, pleasure in doing things, trouble falling or staying asleep, and sleeping too much. Every three of four diabetics had mild to severe depression. There was no depression in 24.7% patients [Table 3].

Risk factors for QOL and depression: In all domains of QOL, females scored better than males. In the psychosocial domain, the difference in scores between gender was significant. It was seen that QOL was significantly better among literate patients in comparison to illiterate patients. Depression was observed significantly more in females, illiterates, and unemployed respondents ($P < 0.05$) [Tables 4 and 5].

Discussion

This present, hospital-based, cross-sectional study among 219 diabetic patients found that the mean age of males and females were 58.55 and 50.94 years, which is quite close to the mean age of patients of a study conducted in South India (59.56 and 60.90 years, respectively).[19] The study population aged between 22 and 88 years, similar to 30 to 70 years in a study from Karnataka.[20] In context with education level, illiteracy was present in 41.1% of patients, which is quite high in comparison with the earlier ones. The reason might be the place of residence, which still has less number of educational establishments.[11,19,20] In the South Indian study, nearly 69% of the respondents were unemployed, quite similar to the present one (66.3%). In our study, 16.9% used tobacco in any form in past, out of which, 81.1% were smokers. The proportion of tobacco use was three times more than that found by the study conducted in South India, where 89% never smoked and 6% were past smokers, which may be attributed to the local cultural factors.[11] Jali MV *et al.* in their study found nearly close mean fasting and postprandial blood sugar (PPBS) level to the current study. Hypertension, dyslipidemia, coronary artery disease, and cerebrovascular disease–like comorbidities were present among

Table 1: Clinical examination findings (*n*=219)

Variables	Frequency (%)
Presence of pallor	58 (26.5)
Classification of obesity (as per BMI)	
Underweight	5 (2.3)
Normal	122 (55.7)
Overweight	71 (32.4)
Obese	21 (9.6)
Blood pressure (JNC VI)	
Normal	53 (24.2)
Prehypertension	100 (45.7)
Hypertension	66 (30.1)

Table 2: Domain wise categorization of QOL scores

Domain scores	Good (>=50%)	Poor (<50%)
Physical	43.8%	56.2%
Psychosocial	45.7%	54.3%
Social relationship	53.0%	47.0%
Environmental	48.4%	51.6%
Total scores	48.0%	52.0%

Table 3: Prevalence of depression (*n*=219)

Depression	Frequency	Percentage
Minimal/no	54	24.7
Mild	103	47.0
Moderate	44	20.1
Severe	18	8.2

Table 4: Domain wise QOL scores among different sex

Domain scores	Gender		Statistics
	Male (*n*=80)	Female (*n*=139)	
Physical domain			
Good	41 (51.3)	81 (58.3)	χ^2=0.857, *P*=0.354
Poor	39 (48.7)	58 (41.7)	OR=0.739 (0.42-1.28)
Psychosocial domain			
Good	35 (43.8)	83 (59.7)	χ^2=4.583, *P*=0.032
Poor	45 (56.2)	56 (40.3)	OR=0.52 (0.30-0.91)
Social relationship domain			
Good	31 (38.8)	73 (52.5)	χ^2=3.142, *P*=0.067
Poor	49 (61.2)	66 (47.5)	OR=0.57 (0.32-1.00)
Environmental domain			
Good	39 (48.8)	74 (53.2)	χ^2=0.306, *P*=0.579
Poor	41 (51.2)	65 (46.8)	OR=0.82 (0.47-1.42)

Table 5: Risk factors of depression

Variables	Depression		Statistics
	Yes	No	
Age group (yrs)			
<= 54	79	32	χ^2=1.677, *P*=0.160
> 54	86	22	OR=0.63 (0.33-1.17)
Gender			
Male	51	29	χ^2=8.161, *P*=0.003
Female	114	25	OR=0.38 (0.20-0.72)
Family type			
Nuclear	83	35	χ^2=2.888, *P*=0.083
Joint	82	19	OR=0.54 (0.29-1.03)
Education			
Illiterate	75	15	χ^2=4.542, *P*=0.025
Literate	90	39	OR=2.16 (1.10-4.23)
Employment			
Unemployed	104	19	χ^2=11.706, *P*=0.000
Employed	61	35	OR=3.14 (1.65-5.96)
Residence			
Urban	38	18	χ^2=1.760, *P*=0.151
Rural	127	36	OR=0.59 (0.30-1.17)
Marital status			
Unmarried/others	35	8	χ^2=0.688, *P*=0.429
Married	130	46	OR=1.54 (0.66-3.58)
Social class			
Upper	37	15	χ^2=2.708, *P*=0.259
Upper middle	91	23	
Middle	37	16	
Marital disharmony			
Present	22	3	χ^2=1.725, *P*=0.143
Absent/can't say	143	51	OR=2.61 (0.75-9.10)

14% respondents in an earlier study.[3] A similar proportion of comorbidities were reported in previous researches. The findings were close to the present one, where hypertension was the most common one out of all the other comorbidities (83.7%). The prevalence was a little more maybe because of the tendency of adding extra salt in the diet.[20,21] The median period of diabetes was less in the current study than the study from urban South India, where it was eight years. The reason may be the overindulgence on carbohydrates by the population from South India.[15] On analysis of body mass index, the prevalence of overweight or obese was low in the current study than that in the studies conducted in South India. The reason may be again attributed to carbohydrate preference in the diet.[11,20]

The mean QOL score of the diabetic patients in our study was 75.31. Overall good QOL was reported by 48.0% of patients. The mean scores were low in all the domains in previous research.[3] The domain-wise scores were better in the earlier study. The study from South India revealed a higher mean for all the domains than the present study, whereas total good QOL, poor QOL scores were similar.[11,20] A study done by Somappa HK *et al.* found that the mean QOL scores in all domains were significantly higher among females, whereas in the current study, a significant difference was noted in the psychosocial domain. Reported literature revealed males, currently married and with increased body mass index (BMI), age, span of disease, count of symptoms and comorbidities were the risk factors for poor HRQOL scores.[11,19-21]

The overall prevalence of depression was 75.3% among diabetics in the present study. However, the proportion is comparable but quite more than those reported from previous literature. The reason may be the use of different scales or taking only the clinically significant cases as depression. Another reason could be selection bias as hospital settings attract patients with active signs and symptoms.[15,22-26] Depression was significantly more common among women than men. Similar findings were reported in earlier studies. A widely prevalent explanation for this difference might be the different social roles played by women.[15,22-25] Most of the women were unemployed and homemakers in our research. Unemployment had a significant association with depression. Similar findings were observed in earlier studies too.[15,22,25,27] Reported literature did not find any significant association between age and depression, like the present study.[15,25,27,28] In previous researches, being unmarried, including singlehood and widowed status, had a strong association with depression, different than the current one.[15,29] Different studies have established a strong association between education level and the presence of depression like the present study.[25,29,30] While depression was significantly more in rural people than urban residents, the findings of the present study were different.[15,23,25] Joseph *et al.* in their study have demonstrated a significant association with increased age, female, low social class, unskilled, retired, and overweight respondents. Jain *et al.* had also found an association with body mass index.[25,26] A cross-sectional study done among 153 diabetics from Western India revealed the significant association of various QOL domains and high blood pressure, BMI, education, family history, income, management and complications.[31] A study conducted outside India in 408 diabetic patients revealed a significant association of diet, drinking, and foot care with high HRQOL scores while lower HRQOL scores had strong association with unemployment, old age, single status, and widow.[32]

To summarize, the present study participants' median age was 54 years. Every two of three patients were female. Illiteracy and unemployment were significantly more among females. High blood pressure was noted as the most common comorbidity and tobacco use was the most common addiction. Family history of diabetes was quite high. Gender-wise significance in difference was observed in mean weight, height, and hip circumference. Mean WHOQOL BREF scores were least in the social domain. Nearly half of the diabetics had an overall good score. Mild to severe depression was seen in every three out of four diabetics. Depression was observed significantly more in females, illiterates, and unemployed respondents. In this study, there was a significant association between QOL scores and the level of education which is a reflection of unemployed patients having poor quality of life. This research

also established a significant association between depression and gender, education, and employment.

Acknowledgements

We like to thank Mr Prasanta Das, the group D staff of the Department of Community Medicine of the attributed institution for his active involvement and all the respondents, their caregivers, and local administration for their unconditional support. We also extend our sincere gratitude to ICMR for selecting this topic as an STS.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Key Messages

The present study revealed that illiterate diabetic women have poor QOL and mental health in comparison with diabetic men. Therefore, well pronged strategies must be identified for the betterment of QOL and mental health and more directed towards women.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. PLoS Med 2006;3:442.
2. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes-estimates for the year 2000 and projections for 2030. Diabetes Care 2004;27:1047–53.
3. Jali MV, Kambar S, Jali SM, Gowda S. Familial early onset of type-2 diabetes mellitus and its complications. N Am J Med Sci 2009;1:377–80.
4. Centers for Disease Control and Prevention. Measuring healthy days: Population assessment of health-related quality of life. [cited 2020 May 03]. Available from: https://www.cdc.gov/hrqol/pdfs/mhd.pdf.
5. American Diabetic Association. Depression. [cited 2020 May 03] Available from: http://www.diabetes.org/living-with-diabetes/complications/mental-health/depression.html.
6. Eljedi A, Mikolajczyk RT, Kraemer A, Laaser U. Health-related quality of life in diabetic patients and controls without diabetes in refugee camps in the Gaza strip: A cross-sectional study. BMC Public Health 2006;6:268.
7. Lee WJ, Song KH, Noh JH, Choi YJ, Jo MW. Health-related quality of life using the EuroQol 5D questionnaire in Korean Patients with Type 2 Diabetes. J Korean Med Sci 2012;27:255–60.
8. Jiang L, Beals J, Whitesell NR, Roubideaux Y, Manson SM. AI-SUPERPFP Team. Health-related quality of life and help seeking among American Indians with diabetes and hypertension. Qual Life Res 2009;18:709–18.
9. Definition of key terms. World Health Organization. [cited 2020 Apr 30] Available from: http://www.who.int/hiv/pub/guidelines/arv2013/intro/keyterms/en/.
10. Definition and diagnosis of diabetes mellitus and intermediate hyperglycaemia. Report of a WHO/IDFConsultation. [cited 2020 May 03] Available from: https://apps.who.int/iris/bitstream/handle/10665/43588/9241594934_eng.pdf?sequence=1&isAllowed=y.
11. Manjunath K, Christopher P, Gopichandran V, Rakesh PS, George K, Prasad JH. Quality of life of a patient with type 2 diabetes: A cross-sectional study in rural South India. J Family Med Prim Care 2014;3:396–9.
12. WHOQOL-BREF introduction, administration, scoring and generic version of the assessment. Field Trial Version, December 1996. [cited 2020 May 03] Available from: https://www.who.int/mental_health/media/en/76.pdf.
13. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: Validity of a brief depression severity measure. J Gen Intern Med 2001;16:606–13.
14. Reddy P, Philpot B, Ford D, Dunbar JA. Identification of depression in diabetes: The efficacy of PHQ-9 and HADS-D. Br J Gen Pract 2010;60:239–45.
15. Aminu AS, Chandrasekaran V, Nair S. Depression among patients with diabetes: A community-based study in South India. J Med Sci 2017;37:237-44.
16. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. [cited 2020 May 03] Available from: https://www.ncbi.nlm.nih.gov/books/NBK9633/.
17. Coming of age: Adolescent health. World health organization. [cited 2020 May 03]. Available from: http://www.who.int/health-topics/adolescents/coming-of-age-adolescent health.
18. Singh T, Sharma S, Nagesh S. Socio-economic status scales updated for 2017. Int J Res Med Sci 2017;5:3264-7
19. Somappa HK, Venkatesha M, Prasad R. Quality of life assessment among type 2 diabetic patients in rural tertiary centre. Int J Med Sci Public Health 2014;3:415-7.
20. Raghavendra N, Viveki RG, Gadgade A. An observational study to assess the health-related quality of life of type 2 diabetes mellitus patients attending a tertiary care hospital, Belagavi. Int J Community Med Public Health 2017;4:3347-53.
21. Patel B, Oza B, Patel K, Malhotra S, Patel V. Health related quality of life in type-2 diabetic patients in Western India using World Health Organization Quality of Life –BREF and appraisal of diabetes scale. Int J Diabetes Dev Ctries 2014;34:100-7.
22. Das R, Singh OP, Thakurta RG, Khandakar MR, Ali SN, Mallick AK, *et al.* Prevalence of depression in patients with type II Diabetes Mellitus and its impact on quality of life. Indian J Psychol Med 2013;35:284–9.
23. 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 Endocrinol Metab 2015;19:252–5.
24. Anantha EVM, Gopalakrishnan S, Umadevi R. Prevalence of depression in patients with type 2 diabetes mellitus and its association with fasting blood sugar levels, in an urban area of Kancheepuram district, Tamil Nadu. Int J Community

Med Public Health 2017:9:3399-406.

25. Joseph N, Unnikrishnan B, Raghabendra Babu YP, Kotian MS, Nelliyanil M. Proportion of depression and its determinants among type 2 diabetes mellitus patients in various tertiary care hospitals in Mangalore city of South India. Indian J Endocr Metab 2013;17:681-88.
26. Jain A, Sharma R, Choudhary OK, Yadav N, Jain G, Manju M. Study of fatigue, depression, and associated factors in type 2 diabetes mellitus in industrial workers. Ind Psychiatry J 2015;24:179–84.
27. Goldney RD, Phillips PJ, Fisher LJ, Wilson DH. Diabetes, depression, and quality of life: A population study. Diabetes Care 2004;27:1066-70.
28. Anderson RJ, Freedland KE, Clouse RE, Lustman PJ. The prevalence of comorbid depression in adults with diabetes: A meta-analysis. Diabetes Care 2001;24:1069-78.
29. Sotiropoulos A, Papazafiropoulou A, Apostolou O, Kokolaki A, Gikas A, Pappas S. Prevalence of depressive symptoms among non insulin treated Greek type 2 diabetic subjects. BMC Res Notes 2008;1:101.
30. Poongothai S, Anjana RM, Pradeepa R, Ganesan A, Unnikrishnan R, Rema M, *et al.* Association of depression with complications of type 2 diabetes – The Chennai Urban Rural Epidemiology Study (CURES- 102). J Assoc Physicians India 2011;59:644-8.
31. John R, Pise S, Chaudhuri L, Deshpande PR. Evaluation of quality of life in type 2 diabetes mellitus patients using quality of life instrument for Indian diabetic patients: A cross-sectional study. J Midlife Health 2019;10:81–8.
32. Aschalew, AY, Yitayal M, Minyihun A. Health-related quality of life and associated factors among patients with diabetes mellitus at the University of Gondar referral hospital. Health Qual Life Outcomes 2020;18:62.