

Access this article online

Quick Response Code:



Website:

www.jehp.net

DOI:

10.4103/jehp.jehp_127_24

Uncovering the hidden burden: A mixed methods study on the implementation of depression screening among persons with type 2 diabetes mellitus seeking health care in an urban primary health center of South India

Ojaswini Trivedi¹, Pracheth Raghuvver¹

Abstract:

BACKGROUND: Diabetes is linked with depression, but screening rates for depression are low, indicating a need for periodic assessments among those with diabetes. The study aimed to determine depression prevalence and associated factors in persons with type 2 diabetes mellitus (T2DM) in an urban primary care setting of Karnataka, as well as implementation challenges in depression screening for persons with T2DM as perceived by healthcare providers.

MATERIAL AND METHODS: A mixed-methods study was performed for 6 months in 2022–2023 at an Urban Primary Health Centre (UPHC) in Bengaluru. The sample size was calculated to be 110, and convenience sampling was applied to select persons with T2DM. The participants were screened for depression using Patient Health Questionnaire-9. Key informant interviews were performed among various health care providers of the UPHC. Data were captured using EpiCollect Version 5.0. Univariate logistic regression was performed to find the factors associated with depression.

RESULT: Of the 110 participants, 60 (54.5%) screened positive for depression. Men had 0.474 (95% Confidence Intervals—CI: 0.126, 1.782) lesser odds of depression when compared with women ($P = 0.269$). Those with comorbidities had 1.975 more odds (95% CI: 0.538, 7.252) when compared with absence of comorbidities ($P = 0.305$). Statistically significant associations were not found with any of the factors. Key facilitators for screening were willingness to implement screening, empathetic attitude, and awareness of mental health, whereas the challenges included lack of training in mental health assessment and patient reluctance to adhere to treatment due to stigma.

CONCLUSION: The study found that 54.5% of persons with T2DM seeking health care at the UPHC screened positive for depression. Several challenges in implementing depression screening for T2DM in primary care settings were noted.

Keywords:

Depression, primary health care, screening, type 2 diabetes mellitus

¹Department of
Epidemiology, National
Institute of Mental Health
and Neurosciences
(NIMHANS), Bengaluru,
Karnataka, India

Address for correspondence:

Dr. Pracheth Raghuvver,
Department of
Epidemiology, National
Institute of Mental Health
and Neurosciences
(NIMHANS), Bengaluru,
Karnataka, India.
E-mail: prach1986@gmail.
com, pra6358@nimhans.
ac.in

Received: 19-01-2024

Accepted: 28-05-2024

Published: 28-10-2024

Introduction

Non-Communicable disease (NCDs) are the leading causes of ill health

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

in the world and account for seven of ten deaths worldwide each year.^[1] NCDs cause 35 million of the 53 million deaths worldwide; more than three-quarters of

How to cite this article: Trivedi O, Raghuvver P. Uncovering the hidden burden: A mixed methods study on the implementation of depression screening among persons with type 2 diabetes mellitus seeking health care in an urban primary health center of South India. *J Edu Health Promot* 2024;13:398.

these deaths occur in low- and middle-income countries annually.^[2] According to the 2014 World Health Organization (WHO) report, around 5.87 million (60%) deaths in India are attributed to NCDs; 1 in 4 Indians have a high risk of dying from NCDs before they reach the age of 70 years.^[3] NCDs threaten progress toward the 2030 Agenda for Sustainable Development, which includes a target of reducing the probability of death from any of the four main NCDs between ages 30 and 70 years by one-third by 2030.^[4]

Diabetes is one of the leading NCDs that is regarded as a major public health concern. An estimated 537 million adults aged 20–79 years worldwide (10.5% of all adults in this age group); this number is projected to increase to 783 million by 2045.^[5] India ranks second among the top ten countries or territories for number of adults (20–79 years) with diabetes in 2021 with the number of diabetics in the country increasing from 74.2 million to 124.9 million in 2045.^[6] With the implementation of the National Program for Prevention and Control of NCDs (NP-NCDs) under the Ministry of Health and Family Welfare (MoHFW), Government of India, setting up NCD clinics, increased awareness of risk factors and opportunistic screening at primary health care levels are urgent requirements.^[7]

Diabetes mellitus (DM) has been bidirectionally associated with depression.^[8] Persons who are depressed are more likely to develop DM either because of the metabolic abnormalities caused by the drugs used to treat depression or because of poor food choices or lack of physical activity that may accompany major depressive episode.^[5] According to several studies, the risk factors for depression include female gender, middle age, unmarried, low income, disability, family history of depression, adverse childhood experiences, other psychiatric disorders, and chronic or disabling medical conditions such as DM.^[9] The reasons for the high comorbidity of depression and diabetes are not fully understood, and therefore, periodic screening of depression amongst persons with type 2 diabetes mellitus (T2DM) becomes the need of the hour.

Furthermore, there is a dearth of studies focusing on screening for mental health problems among persons with NCDs seeking health care at the primary care settings. In this context, this mixed-methods study was conducted to determine the prevalence and factors associated with depression among persons with T2DM seeking health care at an Urban Primary Health Centre (UPHC) and to understand the challenges in implementing depression screening for persons with T2DM in primary care settings.

Materials and Methods

Study design and settings

A mixed-methods study with a cross-sectional study

and a descriptive qualitative component was conducted for 6 months from October 2022 to March 2023. The study site was an UPHC in Bengaluru Urban district, Karnataka, a Southern state of India.

Study participants and sampling

The eligible participants were persons with T2DM and aged ≥ 18 years, seeking healthcare from the NCD Clinic at the UPHC. Persons on treatment for depression and those unable to communicate verbally were excluded.

The sample size was estimated by using the formula $n = Z^2 * p * q / e^2$. Here, n is required sample size and Z is standard normal deviate, i.e. 1.96 at 5% significance level. The prevalence of depression in T2DM is 50%. The permissible error in the estimate of p : “ e ” was set at 20%. With 95% confidence limits and in addition to a 10% nonresponse error, the sample size was estimated to be 110. Convenience sampling was applied to select the study participants.^[10,11]

For the qualitative phase, health care providers (HCPs) involved in providing care/treatment for persons with T2DM at the UPHC were included. The HCPs include four different cadres of staff, namely, the Junior Health Assistants (JHAs), staff nurses, laboratory technicians, and the Medical Officer (MO) of the PHC.

Data collection tool and technique

The data collection tools included a semistructured proforma to gather the sociodemographic information like age, gender, residence, education, working status, and economic status. Furthermore, information pertaining to duration of diabetes, medications used, presence of complications, history of comorbid conditions, and consumption of tobacco and alcohol were collected. For depression screening, Patient Health Questionnaire-9 (PHQ-9) was used.^[12] It has 9 items, and each item was scored on a 0–3 scale, with a total score ranging from 0 to 27 (1–4: minimal depression, 5–9: mild depression, 10–14: moderate depression, 15–19: moderately severe depression, and 20–27: severe depression). For the present study, we divided the participants into two categories, that is, those who scored ≤ 9 (includes minimal and mild depression) and those who scored ≥ 10 indicates screened positive for depression (includes moderate, moderately severe, and severe depression).

Systematic qualitative enquiry was carried out through Key Informant Interviews (KIIs) of the health care providers at their workplace. Telephonically, a brief description was given before the interview. Interview guides were prepared for different cadres of HCPs that consisted of broad open-ended questions and probes. The interviews were conducted in local language (*Kannada*) or Hindi for the JHAs, staff nurses, and laboratory

technicians and English for the Medical Officer (MO), UPHC. Only the participant and the investigators were present during the KII along with the note-taker. Reasons for nonconsent and drop outs were noted. Each interview lasted for about 30–45 minutes. Audio recording (after consent) and verbatim notes were taken during the KIIs, the summary was read back to the participants at the end of the interview to ensure participant validation.

Ethical consideration

Ethical clearance was obtained from the Institutional Ethics Committee. Detailed information pertaining to the nature, objectives of the study, and test procedures was provided to the study participants, and written informed consent was obtained.

Statistical analysis

The data were captured using EpiCollect Version 5.0 and analyzed using the Statistical Package for Social Sciences (SPSS), Version 26 (Chicago. Inc). Continuous variables were expressed in terms of Means and Standard Deviation, while proportions were used to express categorical variables. Univariate logistic regression was performed to find out the factors associated with depression. Crude odds ratios (OR) with 95% confidence intervals (CIs) were computed for all the study variables.

For the qualitative data, thematic analysis by manual coding was performed by two researchers independently to generate various categories or themes under the broad topics: Human resource-related, patient-related, and health system-related facilitators and challenges. Any discrepancy in coding was resolved through discussion and referral back to the audio files if necessary. The transcripts and analysis were reviewed further to reduce subjectivity in analysis and increase interpretive credibility. The codes were then organized into categories, and common themes were presented in flow diagrams.

Results

Quantitative results

A total of 110 persons with T2DM seeking health care in the UPHC during the study period who fulfilled the eligibility criteria participated in the study. All eligible persons who were approached completed the study. Therefore, there were no nonrespondents.

The mean age of the study participants was 57.55 ± 11.09 years. More than half, 62 (56.4%), were 50–69 years old. There were more women participants: 73 (66.4%) when compared to men 37 (33.6%). Around 30 (27.3%) were illiterates and 26 (23.6%) were educated up to high school. The mean duration of diabetes among the study participants was 107.19 months. More than

a third of the participants, 43 (39.1%), were diagnosed with diabetes for a duration of 13–60 months. Majority, 87 (79.1%), reported a family history of diabetes. Around 80 (72.7%) consumed oral hypoglycemic drugs, and 20 (18.2%) took both oral hypoglycemic tablets and insulin injections. More than half, i.e. 56 (50.9%), reported suffering from at least one diabetes-related complication [Tables 1 and 2].

A total of 60 (54.5%) had a PHQ-9 score of ≥10 and thereby screened positive for depression. The average PHQ-9 score among participants was 10.24 ± 5.18. The PHQ-9 scores ranged from a minimum of 0 to a maximum of 21. Of the 110, 33 (30%) screened positive for mild depression (PHQ-9 score of 5–9). A total of 25 (22.7%) had moderately severe depression (PHQ-9 score of 15–19). It was found that 4 (3.6%) had severe depression with a PHQ-9 score of 20–27.

Men had 0.474 times (95% CI =0.126–1.782) lesser odds of screening positive for depression as compared with women (*P* = 0.269). Those with diabetes for

Table 1: Sociodemographic profile of the persons with type 2 diabetes seeking health care in an urban primary health center of Karnataka (n=110)

Variables	n (%)
Age	
30-49 years	33 (30.0)
50-69 years	62 (56.4)
70 years and above	15 (13.6)
Sex	
Male	37 (33.6)
Female	73 (66.4)
Marital status	
Married	65 (59.1)
Widowed	42 (38.2)
Separated/divorced	03 (2.7)
Level of education	
Illiterate	30 (27.3)
Primary school (1-4 th standard)	14 (12.7)
Secondary school (5-7 th standard)	24 (21.80)
High school (8-10 th standard)	26 (23.6)
PUC	07 (6.4)
Graduate and above	09 (8.2)
Occupation	
Unemployed	43 (39.1)
Unskilled	21 (19.1)
Semiskilled	14 (12.7)
Skilled	30 (27.3)
Professional	2 (1.8)
Socioeconomic status (Kuppuswamy scale 2022)	
Class I	0
Class II	8 (7.3)
Class III	33 (30)
Class IV	44 (40)
Class V	25 (22.7)

Table 2: Lifestyle factors and morbidity profile of the persons with type 2 diabetes seeking health care in an urban primary health center of Karnataka (n=110)

Variables	n (%)
Tobacco use	
Never used	86 (78.2)
Ever user (used previously but stopped for ≥ 1 month)	06 (5.5)
Current user	20 (18.1)
Alcohol Use	
No alcohol use	86 (78.2)
Less than once a month	10 (9.1)
1-3 days a month	06 (5.5)
1-4 days a week	03 (2.7)
Daily use	05 (4.5)
Duration of diabetes	
≤ 12 months	13 (11.8)
13-60 months	43 (39.1)
61-120 months	34 (30.9)
121-180 months	11 (10)
>181 months	09 (8.2)
Family History of diabetes	
Yes	87 (79.1)
No	23 (20.9)
Type of antidiabetic medications	
Oral hypoglycaemic drugs	80 (72.7)
Others (insulin)	01 (0.9)
Taking both medications	20 (18.2)
Not taking medications	09 (8.2)
Taking medicines regularly (90% of the time)	
Yes	91 (82.7)
No	19 (17.3)
Practicing dietary restrictions	
Yes	72 (65.5)
No	38 (34.5)
Engaged in physical activity	
Yes	23 (20.9)
No	87 (79.1)
Presence of complications	
None	40 (36.4)
One complication	56 (50.9)
More than 1 complication	14 (12.7)

≤60 months had 0.486 times (95% CI =0.220-1.072) lesser odds of depression as compared to those who had diabetes for more than 61 months. This association was statistically significant ($P = 0.074$). Those with comorbidities had 1.975 times (95% CI =0.538-7.252) higher odds of depression as compared to those without comorbidities ($P = 0.305$). These findings are presented in Table 3.

Qualitative results [Figure 1]

Human resources (HR)-related facilitators

Willingness to deliver services

The HCPs expressed their willingness to implement screening of depression among the diabetics owing to their passion for the job.

“If we take information on history of the family, income, whatever support we give is more than enough. We are happy to screen the patients.” (HCP, 35 years, female)

Empathetic attitude

The HCPs believed that empathy toward the patients, especially the elderly persons, is imperative and that drives them toward delivering better health care services.

“We can give them the strength to face the problem. They just want one person to listen to their problems. We can be the listening part, just sit and listen to them. This way, we can help them.” (HCP, 45 years, female)

Awareness about mental health problem

The HCPs demonstrated satisfactory knowledge and awareness on the common mental health disorders seen among patients.

“Depression comes when you are not eating properly, you are skipping the meal, this happens when you are in depression you are in some sad moment, you’ll never eat properly. It is directly connected to depression. (HCP, 35-year-old, female)

“If a patient show signs of not taking medicines or if they are unhappy, they open up. They openly say ‘No! I’m feeling angry on myself why am I doing like this.’ So that time we can convince or counsel them along with the patient relatives.” (HCP, 45 years, female)

Good leadership

The HCPs at the UPHC expressed sincere appreciation for the Medical Officer (MO). They acknowledged the empathetic nature of the MO toward their patients. It was evident that the good leadership at the PHC also motivates the HCPs to work more efficiently.

“Our Medical Officer is super. Since she is a well-versed in diabetes care, all serious patients go to her. She takes care of everything. From counselling to treatment” (HCP, 55 years, female)

Health system-related facilitators

Availability of key interventions like yoga and mindfulness exercises

The HCPs expressed that more patients need to be made aware of the key interventions like yoga or mindful exercises that are available at the UPHC. They also emphasized on the importance of more holistic approach toward the preventive and curative measures in depression among persons with diabetes.

“Already programs are going on a daily basis, especially for the aged. There is a yoga trainer, associated with the PHC but very few people know. Then mindful exercises help too” (HCP, 35 years, female)

Table 3: Factors associated with depression among the persons with type 2 diabetes seeking health care in an urban primary health center of Karnataka (n=110)

Variables	Depression Screening		OR* (95% CI)**	AOR*** (95% CI)**	P***
	Positive	Negative			
Age in years					
30-49 years (n=23)	13 (56.5)	10 (43.5)	1.106 (0.438,2.793)	1.008 (0.959, 1.059)	0.765
50 years and above (n=87)	47 (54.0)	40 (46.0)			
Gender					
Male (n=37)	17 (45.94)	20 (54.06)	0.593 (0.267,1.316)	0.474 (0.126, 1.782)	0.269
Female (n=73)	43 (58.9)	30 (41.1)			
Marital status					
Married (n=65)	34 (52.3)	31 (47.7)	0.801 (0.373,1.724)	1.134 (0.396, 3.251)	0.815
Widowed/divorced/separated (n=45)	26 (57.8)	19 (42.2)			
Education					
0-7 th standard (n=68)	42 (61.76)	26 (38.24)	0.464 (0.212,1.016)	0.474 (0.158, 1.417)	0.181
8 th standard and above (n=42)	18 (42.86)	24 (57.14)			
Occupation of the participant					
Unemployed (n=43)	26 (60.5)	17 (39.5)	0.674 (0.310,1.465)	1.532 (0.472, 4.966)	0.478
Employed (n=67)	34 (50.7)	33 (49.3)			
Socioeconomic status					
Upper class (n=8)	03 (37.5)	05 (62.5)	0.474 (0.107,2.089)	0.377 (0.056, 2.541)	0.316
Lower class (n=102)	57 (55.9)	45 (44.1)			
Duration of diabetes					
0-60 months (n=56)	25 (44.6)	31 (55.4)	0.438 (0.203,0.943)	0.486 (0.220, 1.072)	0.074
>61 months (n=54)	35 (64.8)	19 (35.2)			
Stigma associated with diabetes					
Yes (n=66)	40 (60.6)	26 (39.4)	1.846 (0.853,3.995)	2.487 (0.938, 6.594)	0.067
No (n=44)	20 (45.5)	24 (54.5)			
Taking medicines regularly					
Yes (n=101)	54 (53.5)	47 (46.5)	0.574 (0.136,2.425)	0.403 (0.066, 2.458)	0.325
No (n=9)	06 (66.7)	03 (33.3)			
Presence of comorbidities					
Yes (n=78)	49 (62.8)	29 (37.2)	3.226 (1.362,7.638)	1.975 (0.538, 7.252)	0.305
No (n=32)	11 (34.4)	21 (65.6)			
Presence of complications					
Present (n=70)	45 (64.3)	25 (35.7)	3.000 (1.341, 6.713)	2.115 (0.633, 7.071)	0.224
Absent (n=40)	15 (37.5)	25 (62.5)			
Alcohol					
Yes (n=24)	13 (54.2)	11 (45.8)	0.981 (0.395,2.432)	1.320 (0.260, 6.696)	0.738
No (n=86)	47 (54.7)	39 (45.3)			
Tobacco					
Never user (n=84)	48 (57.1)	36 (42.9)	1.556 (0.643,3.765)	1.271 (0.314, 5.137)	0.737
User (n=26)	12 (46.2)	14 (53.8)			

*OR - Crude Odds Ratio computed by Univariate Logistic Regression. **CI - Confidence Interval. ***Adjusted Odds Ratio and P value computed by Binary Logistic Regression

Community screening

The HCPs understood the importance of screening and believed that it is imperative to screen for depression in patients with chronic diseases like T2DM. They emphasized the need of early and streamlined screening of NCDs, opining that timely detection could reduce potential complications in the long run.

“If its streamlined, it will be really helpful for the public. Now the era that is going towards diabetes and mental issues. Yes, it's much needed.” (HCP, 45 years, female)

Another HCP emphasized on the importance of screening of every individual aged ≥ 30 years at the primary care setting.

“Any walk-in patient above 30 years in the U-PHC should be screened for BP and sugar. Every Wednesday, we are conducting NCD clinic also.” (HCP, 27 years, female)

Majority of the HCPs felt that screening for depression will also lead to better prognosis in the course of the treatment. They commented on the correlation between

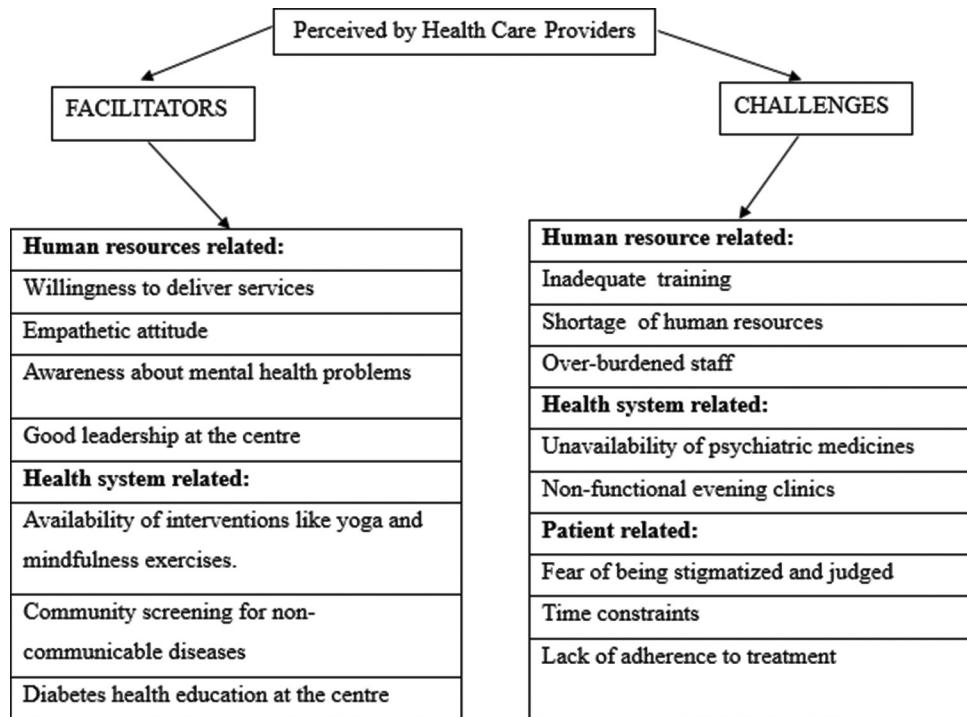


Figure 1: Nonhierarchical thematic diagram showing facilitators and challenges for implementation of depression screening for diabetics in the selected primary care setting

depression and blood sugar levels and further reiterated the importance of early screening.

“Depression indirectly acts on their blood sugar levels. If we know before only, it will be easier for us to counsel them regarding compliance and to come for follow, it definitely helps.” (HCP, 45 years, female)

Diabetic education

The HCPs were well-informed regarding the importance of health education and promotion in the context of diabetes. They were aware of the effective channels through which diabetic education would be best delivered.

“We can do it in bulk. Make videos where diabetic education is given whether it’s a new or old patient. Mouth to mouth is the biggest largest IEC. So, if we do education for 10 people, we can cover 1000 people actually, indirectly. (HCP, 45 years, female)

“Kind of animated where they can understand very easily irrespective of the language and literacy level. Awareness and diabetic education are the key which we can implement. (HCP, 45 years, female)

HR-related challenges

Inadequate training in assessment of mental health problems

Majority of the HCPs felt that the training and exposure to specialized NCD care were often limited. They felt that periodic training and workshops concentrating

on screening, early diagnosis, and treatment of noncommunicable diseases would be beneficial to them while managing such patients.

“They gave a 2 hours training for NCDs at the time of joining. But even we don’t know how to handle the patient. Time to time if we are updated about what is going on, it will be helpful to us. (HCP, 35 years, female).

Shortage of human resources

The HCPs provided an insight on the dearth on human resources at the primary care level which may be a leading challenge in implementation of the screening tool at the PHC level. They noted that the availability of more trained HCPs, especially those specialized in mental health, would help cater to those suffering from depression in a more focused manner.

“We don’t know if they are under depression, they are in some pain. How they will get hurt we don’t know that. In the middle of the work, we don’t have time to get through them.” (HCP, 35 years, female)

Health system-related challenges

Unavailability of psychiatric medicines

The HCPs during the course of the interviews also indicated the need for future action once the screening has been implemented. They further commented on the necessity /importance of certain psychiatric drugs being made available at PHCs to manage those who require immediate attention.

"We need to treat them with certain medications, some kind of activities, certain things can be done, it is beyond this level. After screening what next? We need anti-depressants and ask them to come for follow up to know if there is any change or something. We have a good psychiatrist among us in BBMP." (HCP, 45 years, female).

Nonfunctional evening clinics

Before the COVID-19 pandemic, the running of evening clinics was useful in tending to more patients. The HCPs commented on how the current nonfunctioning of evening clinics has significantly affected the patients who availed such services after their work hours. They noticed that the reduced flow of patients was mainly attributable to the cessation of evening clinics. They also recommended training of staff for evening clinics.

"We had evening clinic from 6-8pm, now it's not available. Evening clinic is stopped. Now less patients will come." (HCP, 27 years, female)

"Most of them are working people. They also need services to be provided late evenings. This is when maximum people belonging to the working age group may approach. We can train our staff, people can walk in, get free medications and free lab services." (HCP, 45 years, female).

Patient-related challenges

Fear of being stigmatized and judged

The HCPs reported that some of the patients would refuse to come to the PHC with the fear of being stigmatized. The persons with T2DM seeking health care were still reluctant to talk about their mental health problems. They elaborated on how administering care is difficult in the later stages, since many patients hesitate to seek care in the earlier stages due to stigma and fear of being judged.

"They have inferiority complex that people will judge. Most of them will not come in the early stage of depression. They will suffer, physically and mentally. They will not have the capacity to control and come when diabetes or depression is more. Then, all we can give is counselling." (HCP, 35 years, female)

Time constraints

The HCPs had observed how the patients were not always receptive to undergo counselling citing time constraints and lack of patience. Patients mostly came to the PHC to take medicines.

"The patients also don't have time, they come and wrap the medicine for next month and walk out. If they can give time and spend some time over here, then yes, we can do." (HCP, 45 years, female)

Lack of adherence to treatment

Often the patients would stop taking medicines abruptly without consulting the doctors, despite their blood sugar

levels being extremely high at the time of seeking care at PHCs. This was due to the fear of complications like kidney failure.

"If the sugar levels are controlled, they stop taking the medicines. People think if they take more tablets, it can lead to kidney failure. By the time they come to the PHC, their sugar levels are already high like 400-450." (HCP, 37 years, female)

The findings of the qualitative component are summarized in Figure 1.

Discussion

NCDs are one of the most significant public health challenges of the 21st century. These chronic conditions, such as diabetes, not only harm physical health but also impede the socioeconomic development of countries. The World Health Organization (WHO) projects that the total number of annual deaths from NCDs will increase to 55 million by the year 2030.^[4] India has the high burden of diabetes, with an estimated 69.1 million people living with diabetes, the second highest in the world, after China.^[13]

The present study comprised of two components: a quantitative component to estimate the prevalence of depression among T2DM patients who were seeking treatment at a UPHC and a qualitative component to gain deeper insights on the facilitators and the challenges in implementing depression screening for persons with T2DM at the UPHC from the perspective of the HCPs.

In this study, majority screened positive for depression with a third screening positive for mild depression. This is consistent with the findings of a study conducted by Das *et al.*^[14] in Bengal, which reported a depression prevalence of 46.15% among T2DM patients. Barnacle *et al.*^[15] conducted a study similar to this one, examining depression screening patterns among a primary care population with T2DM, and reported a higher prevalence of 64.82%. Various other studies found prevalence of depression in T2DM ranging from 13.6% to 67.5%.^[16,17] The study conducted in the United States of America (USA) by Chaoyang *et al.* reported a lower prevalence of depression among diabetics, at 8.3%, while a study based on the analysis of medical records conducted in the United Kingdom found a much higher prevalence of 83% among diabetic patients.^[18] A study conducted in China by Liu *et al.*^[19] found that the prevalence of depression was higher in women (OR =1.36, 95% CI 1.19–1.54). A previous study by Alzahrani *et al.*^[20] which was conducted among 450 persons with T2DM reported that the prevalence of depression to be 56.9% among men and 43.1% among women. In contrast, the present study reported higher depression in women. However, the findings of this

study go hand in hand with Rajput *et al.*^[19] who found a higher prevalence among women when compared to men (71.7% vs. 23.8%).

In this study, more than half of the participants belonging to the lower socioeconomic class screened positive for depression, whereas the prevalence among participants belonging to the upper class the prevalence of depression was 37.5%. These results are similar to a study conducted by Kant *et al.*,^[21] which reported that patients from low socioeconomic status had a higher prevalence of depression compared to those with high socioeconomic status, with prevalence rates of 23.9% vs. 8.8%.

Duration of diabetes was significantly associated with depression. Similar finding was reported by Alzahran *et al.*^[20] who found that predictors of depression were age, sex, comorbidities, and duration of T2DM. A study conducted in Oman by Alsumry *et al.*^[22] found that the prevalence of depression was 37.6% and was highest among patients who had diabetes for more than 10 years (27.5%). In addition, a significant relationship was also established between depression and presence of complications. In the present study, the association between the presence of comorbidities and depression was found to be statistically significant. These findings are comparable with another study conducted in Bangalore by Ravishankar *et al.*^[23] who found that among 500 patients suffering from T2DM, about 11.6% of the patients had comorbid depression with more prevalence in females when compared with males. Another significant finding in the present study was the association between the presence of complications and depression among diabetics. These findings are also comparable to another study conducted in Saudi Arabia by Al Qusaibi *et al.*^[24] where depression was prevalent in 54% of patients with T2DM, with the most common associated risk factor being having at least one diabetes-related complication ($P = 0.001$). Liu *et al.*^[19] also reported that T2DM patients with complications (OR = 1.90, 95% CI 1.53–2.36) had higher odds of getting depression.

The interviews conducted with key informants aided in identifying the key facilitators and challenges involved in implementing depression screening among T2DM patients receiving treatment in primary health care settings. There was widespread consensus among the health care providers that depression screening was important. However, the successful implementation of depression screening was hindered by various challenges, including inadequate training of healthcare providers in identifying mental health problems, limited availability of psychiatric treatment, negative attitudes of patients toward mental health issues and their treatment, fear of stigma, and time constraints from both health care providers and patients. Similar challenges were

also highlighted in a study by Colligan *et al.*,^[25] where the major barriers included stigma, lack of resources for treatment referrals, and insufficient time during medical appointments. In a Canadian study titled “*Patient Experiences of Depression and Anxiety with Chronic Disease: A Systematic Review and Qualitative Meta-Synthesis*” by De Jean *et al.*,^[26] found that there is a frequent overlap between the physical symptoms of the chronic diseases such as fatigue that can make it difficult for the patients and the clinicians to recognize depression as a separate disease and not simply a manifestation of the chronic disease, in this case, being T2DM.

The results of this study align with those of a qualitative research conducted by Pols *et al.*,^[27] which highlighted that stigma and limited knowledge of depression and mental health care problems among patients are also additional obstacles in executing a screening test.

With respect to the facilitators, the HCPs were found to be highly motivated and exhibited a willingness to implement the screening at the PHC, they had an empathetic attitude toward the patients, and the level of knowledge related to mental health assessments and treatments was satisfactory. In addition, conducting community screening and providing diabetic education at the primary health care setting were also identified as major enablers for the implementation of the screening programme. However, there are only a few qualitative studies that have been conducted regarding the implementation of depression screening at a primary setting. Raghuveer *et al.*^[28] conducted a study in Mangaluru, Karnataka, which identified that the health care providers’ willingness to provide services was a crucial factor in facilitating the implementation of opportunistic screening. However, this study was conducted in the context of diabetes and hypertension screening among persons aged ≥ 30 years in primary health care settings.

This study is among the limited researches that specifically concentrate on the implementation of depression screening for a vulnerable population such as individuals with T2DM in primary care settings. Through a mixed-methods approach, we were able to investigate various aspects. In addition, this study offers valuable insights into the perspectives of health care providers, both in their personal and professional capacities as part of the health system, which can be useful in developing future interventions. The qualitative findings have programmatic implications in terms of mandatorily incorporating mental health screening for persons with T2DM across all health care settings.

Limitation and recommendation

As a cross-sectional study, it is not possible to determine directionality or causality of the variables

studied. The study was conducted in a single center. Therefore, there is limited generalizability. Since the study participants were selected based on convenience sampling, a possible selection bias cannot be excluded. There could be an element of recall bias as this was a self-reported assessment. Confounder-adjusted estimates were difficult to compute due to the low sample size. However, this study is unique as it focuses specifically on the implementation of depression screening, with potential usefulness in developing future interventions.

Conclusion

The study reveals that the prevalence of depression among the persons with T2DM who were seeking health care at the UPHC was found to be 54.5%. Several factors associated with depression among the participants were assessed. The qualitative research found the key facilitators and challenges involved in screening for depression in T2DM particularly in primary care settings. The important facilitators in implementation of screening program were the willingness of the staff to implement the screening, empathetic attitude among the HCPs, and also sufficient awareness of the staff about mental health disorders like depression. The key challenges identified were inadequate training of the HCPs in assessment of mental health problems or psychological counselling, lack of adherence to treatment, and fear of being stigmatized among persons with T2DM.

Acknowledgment

The authors would like to acknowledge the Medical Officer Health, Shanthinagar Zone, Department of Health, Bruhat Bengaluru Mahanagara Palike (BBMP), for permission to carry out this study. The authors express their gratitude to the all the participants of this research for sparing their invaluable time. Special thanks to the Medical Officer and health care staff working in the study site for their cooperation. The authors are indebted to the Department of Epidemiology, Centre for Public Health, National Institute of Mental Health and Neuro Sciences, Bengaluru, for the constant encouragement and unstinted support during the course of this research.

Institutional ethics committee approval details

The study was approved by the Institutional Ethics Committee, NIMHANS Ethics Committee vide letter no NO NIMH/DO/IEC (BS and NS DIV)/2022.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- Piovani D, Nikolopoulos GK, Bonovas S. Non-communicable diseases: The invisible epidemic. *J Clin Med* 2022;11:5939.
- Ramesh S, Kosalram K. The burden of non-communicable diseases: A scoping review focus on the context of India. *J Educ Health Promot* 2023;12:41.
- World Health Organization. Global status report on non-communicable diseases 2014. Geneva, Switzerland: World Health Organization; 2014. [Last accessed on 2023 May 08].
- 'Burden of Diabetes Mellitus - PAHO/WHO | Pan American Health Organization'. Available from: <https://www.paho.org/en/enlace/burden-diabetes-mellitus>. [Last accessed on 2022 Nov 07].
- Stumvoll M, Goldstein BJ, van Haeften TW. Type 2 diabetes: Principles of pathogenesis and therapy. *Lancet* 2005;365:1333-46.
- Magliano DJ, Boyko EJ; IDF Diabetes Atlas 10th Edition Scientific Committee. *IDF DIABETES ATLAS* [Internet]. 10th edition. Brussels: International Diabetes Federation; 2021.
- National Programme for prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS). Available from: <https://nhm.gov.in/index1.php?lang=1&level=2&sublinkid=1048&lid=604>. [Last accessed 2023 May 24].
- Golden SH, Lazo M, Carnethon M, Bertoni AG, Schreiner PJ, Diez Roux AV, *et al*. Examining a bidirectional association between depressive symptoms and diabetes. *JAMA* 2008;299:2751-9.
- Rajput R, Gehlawat P, Gehlan D, Gupta R, Rajput M. Prevalence and predictors of depression and anxiety in patients of diabetes mellitus in a tertiary care center. *Indian J Endocrinol Metab* 2016;20:746-51.
- Patra S, Patro BK, Mangaraj M, Sahoo SS. Screening for depression in diabetes in an Indian primary care setting: Is depression related to perceived quality of life? *Prim Care Diabetes* 2020;14:709-13.
- 'Mahajan - 2003 - Textbook of Preventive and Social Medicine. pdf. [Last accessed on 2022 Nov 14]. Available from: [efaidnbmnnnibpcajpcglclefindmkaj/https://www.ruseducation.in/books/Mahajan4th.pdf](https://www.ruseducation.in/books/Mahajan4th.pdf).
- Kroenke K, Spitzer RL, Williams JB. The PHQ-9: Validity of a brief depression severity measure. *J Gen Intern Med* 2001;16:606-13.
- Pradeepa R, Mohan V. Epidemiology of type 2 diabetes in India. *Indian J Ophthalmol* 2021;69:2932-8.
- Das R, Singh O, 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.
- Barnacle M, Strand MA, Werremeyer A, Maack B, Petry N. Depression screening in diabetes care to improve outcomes: Are we meeting the challenge? *Diabetes Educ* 2016;42:646-51.
- Eren I, Erdi O, Ozcankaya R. Tip II diabetik hastalarda kan şekeri kontrolü ile psikiyatrik bozuklukların ilişkisi [Relationship between blood glucose control and psychiatric disorders in type II diabetic patients]. *Türk Psikiyatri Derg* 2003;14:184-91. Turkish. PMID: 14569469.
- Bener A, Al-Hamaq AOAA, Dafeeah EE. High prevalence of depression, anxiety and stress symptoms among diabetes mellitus patients. *Open Psychiatry J* 2011;5:5-12.
- Chaoyang Li, Earl S. Ford, Tara W. Strine, Ali H. Mokdad; Prevalence of Depression Among U.S. Adults With Diabetes: Findings from the 2006 Behavioral Risk Factor Surveillance System. *Diabetes Care* 1 January 2008; 31 (1): 105–107. <https://doi.org/10.2337/dc07-1154>.
- Liu X, Li Y, Guan L, He X, Zhang H, Zhang J, *et al*. A Systematic review and meta-analysis of the prevalence and risk factors of depression in type 2 diabetes patients in China. *Front Med (Lausanne)* 2022;9:759499.

20. 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;13:48.
21. Kant R, Yadav P, Barnwal S, Dhiman V, Abraham B, Gawande K. Prevalence and predictors of depression in type 2 diabetes mellitus. *J Educ Health Promot* 2021;10:352.
22. Alsumry SH, Al Ghelani T, Jaju S. Depression in Urban Omani adults with type 2 diabetes: A cross-sectional study. *Sultan Qaboos Univ Med J* 2022;22:45-50.
23. Ravishankar SN, Madhuva HS, Vishal, Reddy T, Prabha V, Dinesh SR. A study of depression in diabetes mellitus: Analysis from rural hospital, India. *Arch Med* 2014;6:1-6.
24. Al Qusaibi B, Mosli H, Kattan W, Fadel H, Alariefy A, Almalki B, *et al.* Depression among patients with type 2 diabetes mellitus at King Abdulaziz University Hospital (KAUH): A Cross-sectional study. *Cureus* 2022;14:e25990.
25. Colligan EM, Cross-Barnet C, Lloyd JT, McNeely J. Barriers and facilitators to depression screening in older adults: A qualitative study. *Aging Ment Health* 2020;24:341-8.
26. DeJean D, Giacomini M, Vanstone M, Brundisini F. Patient experiences of depression and anxiety with chronic disease: A systematic review and qualitative meta-synthesis. *Ont Health Technol Assess Ser* 2013;13:1-33.
27. Pols AD, Schipper K, Overkamp D, van Marwijk HWJ, van Tulder MW, Adriaanse MC. Patients' and practice nurses' perceptions of depression in patients with type 2 diabetes and/or coronary heart disease screened for subthreshold depression. *BMC Fam Pract* 2018;19:202.
28. Raghuveer P, Anand T, Tripathy JP, Nirgude AS, Reddy MM, Nandy S, *et al.* Opportunistic screening for diabetes mellitus and hypertension in primary care settings in Karnataka, India: A few steps forward but still some way to go. *F1000Res* 2020;9:335.