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World Health Organization 5 (WHO-5) Well-Being Index and Problem Areas in Diabetes 5 Scale (PAID-5): A Cross-Sectional Study in Screening Tools for Depression and Anxiety Patients with Type 1 and Type 2 Diabetes in Kerala, India

ABSTRACT

Objective: This cross-sectional study aimed to explore the multifaceted interplay of screening tools for the mental health of patients with type 1 (T1D) and type 2 (T2D) diabetes in Kerala, India, with a focus on depression and anxiety.

Materials and methods: Data were collected from 384 patients with diabetes in Kerala, between August and October 2023. The Krejcie and Morgan Method was employed for sample selection, ensuring a confidence level of 99.0% and a margin error of 3.5%. Participants, aged 35 years and above, with T1D or T2D and proficiency in Malayalam, were included. Demographic and clinical factors, World Health Organization 5 Well-Being (WHO-5), and Problem Areas in Diabetes 5 (PAID-5) data were gathered through structured interviews. Statistical analyses included mean, 95% confidence

interval, independent sample test, chi-square test, and receiver operating characteristic (ROC) curve analysis. **Results:** The study revealed a high prevalence of depression (74%) and anxiety (82%) among patients with diabetes in Kerala. T2D participants exhibited significantly higher rates of depression and anxiety. Poor glycemic control, longer disease duration, lower socioeconomic status, comorbid conditions, and a lack of strong social support were identified as significant predictors of psychological distress. ROC analysis demonstrated the predictive capacity of the WHO-5 [area under the curve (AUC) 0.745 and PAID-5 index (AUC 0.822) for depression and anxiety, respectively]. **Conclusions:** Tailored interventions addressing glycemic control, disease management, and psychosocial support are crucial for reducing the burden of depression and anxiety. Health education programs targeting vulnerable subgroups and routine screening for mental health issues in diabetes care are recommended to improve patient outcomes in Kerala. (Clin Diabetol 2024; 13, 3: 164–169)

Keywords: depression and anxiety, patients with diabetes, WHO-5 Well-Being Index, PAID-5 index, physical and mental health

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Introduction

Depression and anxiety are prevalent mental health disorders that often co-occur with chronic medical conditions, such as diabetes. This co-occurrence can significantly impact the overall well-being and management of diabetes. India is currently facing a substantial diabetes epidemic [1]. The country has witnessed dramatic growth in the number of people diagnosed with diabetes, with millions affected by the disease [2]. The factors contributing to this surge include genetic predisposition, urbanization, dietary changes, sedentary lifestyles, and an aging population [3]. Given that diabetes is most prevalent in the Indian state of Kerala, it is imperative to investigate the variables influencing depression and anxiety in people with diabetes [4]. This study aims to explore and understand the multifaceted interplay of screening tools for the mental health of patients with diabetes in Kerala.

In this study, researchers aim to examine the well-being and emotional status of patients with diabetes in Kerala by administering the World Health Organization 5 Well-Being Index (WHO-5), a well-known and verified tool for evaluating a person's subjective well-being and emotional condition [5, 6]. Five straightforward questions are used in the WHO-5 to gauge an individual's general state of well-being and mood during the previous 2 weeks. By doing this, they can learn more about the frequency and intensity of anxiety and depression in this population and pinpoint possible causes of these mental health problems. The research further includes the Problem Areas in Diabetes (PAID-5) questionnaire, which serves several important purposes in the context of diabetes management and healthcare [7]. The PAID-5 questionnaire is a concise and validated tool used to assess the emotional and psychological challenges specific to diabetes management. Through the utilization of tools like the PAID-5 questionnaire, healthcare providers and researchers can pinpoint areas of concern, implement targeted interventions, and ultimately enhance the quality of care for individuals living with diabetes.

The combination of the WHO-5 and PAID-5 index questionnaires is a powerful approach to assessing the emotional well-being of individuals with diabetes. It ensures a more detailed and nuanced understanding of emotional challenges and can inform more targeted interventions and support strategies to improve the overall quality of life for patients with diabetes [8]. This study aims to explore and understand the multifaceted interplay of screening tools for the mental health of patients with diabetes in Kerala. All these factors can contribute to the development of depres-

sion and anxiety in individuals managing the chronic burden of diabetes.

Materials and methods

In this cross-sectional study, data were collected from 384 patients with diabetes, who also suffered from depression and anxiety, in Kerala, India, between August and October 2023. Participants with T1D and T2D have chronic conditions characterized by high blood sugar, marked by elevated hemoglobin A1C, and glucose tolerance test levels. The samples of 384 cases were selected using the Krejcie and Morgan method, with a confidence level of 99.0% and a margin error of 3.5%. To be eligible for this study, the respondents should have either T1D or T2D, be over 35 years of age, and be able to read, speak, and write in Malayalam. Ethical approval to conduct the present study was granted by the Ethics Committee of the Department of Psychology at Suresh Gyan Vihar University, Jaipur, India, with an approval letter bearing the reference number (IEC/DPSY/2023/DRKR/2-002). All patients were fully informed about the purpose of the study and the confidentiality of the data. Before data collection, each subject provided written informed consent. The questionnaire included demographic/clinical factors, WHO-5, and PAID-5.

Quantitative data such as age, body mass index (BMI), sex, family type, marital status, employment, history of depression, hypertension, alcohol consumption, smoking habits, and comorbidity were expressed as the mean and 95% confidence intervals. After the data were tested for normality of distribution, the statistical test was allotted. The independent sample test and chi-square test were used to compare the groups of T1D and T2D patients.

The receiver operating characteristic (ROC) curve is a valuable tool for assessing the diagnostic performance of psychological assessment instruments in identifying conditions such as depression and anxiety. In this study, we used the WHO-5 and the PAID-5 index to evaluate their ability to discriminate between individuals with and without depression and anxiety. ROC curve analysis was employed to determine the diagnostic accuracy of these indices. Plotting the test's sensitivity (power) against the relative false-positive rate (1-specificity) as the model's cutoff level is changed is a widely used technique to measure a test's predictive capacity [9]. Using Egger's approach and the algorithm recommended by Delong et al., we compared the areas under the ROC curves [10]. For this analysis, statistical significance was determined as $p < 0.05$. Data were analyzed using the dedicated software program SPSS 26.0 (IBM Corporation).

Exclusion criteria

Exclusion criteria were implemented in the WHO-5 and PAID-5 index cross-sectional study conducted in Kerala, India, to refine the participant pool and ensure the study's specificity. Individuals below the age of 35 years were excluded to concentrate on the impact of diabetes within the later stages of adulthood. Proficiency in Malayalam, the primary language of the region, was essential for accurate communication during data collection. Unwillingness to provide informed consent resulted in exclusion, upholding ethical standards and ensuring voluntary participation. Exclusion criteria that

were also considered as medical conditions affecting cognitive function were severe psychiatric disorders beyond depression and anxiety, incomplete or inaccurate survey responses, and pregnancy in females, which could introduce confounding factors.

Results

The comparison of demographic and clinical parameters between participants with T1D and T2D revealed several noteworthy findings (Tab. 1). Firstly, there were no significant differences observed in age or BMI between the 2 groups, indicating that age and

Table 1. Demographic and Clinical Parameters in Participants with T1D and T2D

Mean ± SD or n (%)

Variables	T1D	T2D	p-value
Age	50.7 ± 11.3	48.9 ± 11.0	0.555
BMI	26.6 ± 5.0	26.7 ± 4.6	0.304
Sex			0.923
Male	56 (50.9)	138 (50.4)	
Female	54 (49.1)	136 (49.6)	
Family type			0.874
Joint	38 (34.5)	97 (35.4)	
Nuclear	72 (65.5)	177 (64.6)	
Marital status			0.644
Married	102 (92.7)	250 (91.2)	
Unmarried	6 (5.5)	14 (5.1)	
Separated/divorced	2 (1.8)	10 (3.6)	
Employment			0.405
Employed	83 (75.5)	218 (79.6)	
Unemployed	18 (16.4)	43 (15.7)	
Retired	9 (8.2)	13 (4.7)	
Duration of diabetes	12.8 ± 2.8	12.4 ± 2.8	0.711
Family history of depression	84 (76.4)	204 (74.5)	0.006**
Hypertension	79 (71.8)	176 (64.2)	0.015*
Alcohol	36 (32.7)	106 (38.7)	0.024*
Smoking	36 (32.7)	91 (33.2)	0.027*
Regular blood glucose checks	110 (100.0)	274 (100.0)	—
Diabetes complications			0.000**
Eye disease	66 (60.0)	150 (54.7)	
Kidney disease	60 (54.5)	159 (58.0)	
Heart disease	77 (70.0)	200 (73.0)	
Stroke	15 (13.6)	44 (16.1)	
Paresthesia	97 (88.2)	240 (87.6)	
Diabetes medications			0.728
Pills	46 (41.8)	115 (42.0)	
Insulin	12 (10.9)	23 (8.4)	
Both	52 (47.3)	136 (49.6)	

*is significant at the 0.05 level; **is significant at the 0.01 level

BMI — body mass index; SD — standard deviation; T1D — type 1 diabetes; T2D — type 2 diabetes

Table 2. ROC Curve Analysis for WHO-5 Well-Being Index and PAID-5 Index of Depression and Anxiety

Variables	AUC	SE	p-value	95% CI		Sensitivity	Specificity
				Lower bound	Upper bound		
WHO-5 Well-Being Index	0.745	0.051	0.000*	0.644	0.845	0.640	0.740
PAID-5 Index	0.822	0.044	0.000*	0.736	0.907	0.740	0.820

*is significant at the 0.01 level

AUC — area under the curve; PAID-5 — Problem Areas in Diabetes 5 scale; ROC — receiver operating characteristic; SE — standard error; WHO-5 — World Health Organization 5 Well-Being Index

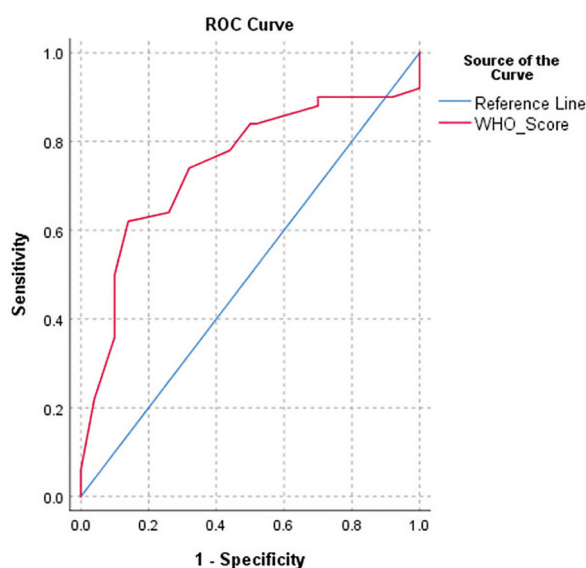


Figure 1. Receiver Operating Characteristic Curve of Depression and World Health Organization 5 Well-Being Index (WHO-5) in Patients with Diabetes

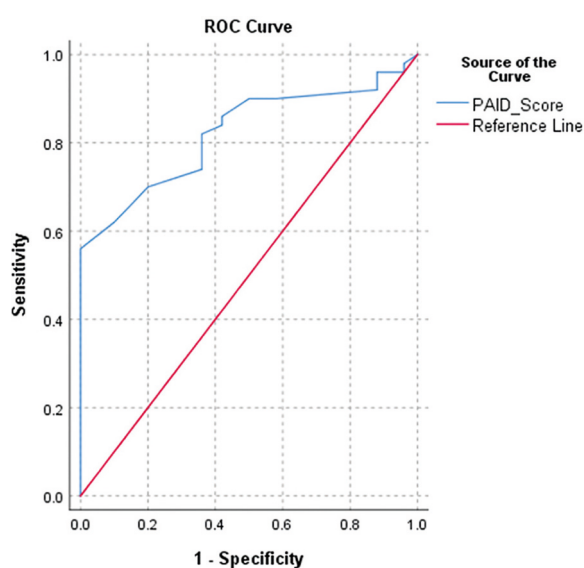


Figure 2. Receiver Operating Characteristic Curve of Anxiety and Problem Areas in Diabetes (PAID-5) Index Score in Patients with Diabetes

BMI are not distinguishing factors between T1D and T2D in this study population. Similarly, there were no significant disparities in sex distribution, family type, marital status, or employment status between individuals with T1D and T2D. The duration of diabetes revealed no significant difference between the 2 groups, as indicated by the p-value of 0.711. Both groups exhibited similar mean durations of diabetes, with T1D showing an average duration of 12.8 years (± 2.8) and T2D with 12.4 years (± 2.8). However, it is notable that participants with T1D showed a higher prevalence of family history of depression compared to those with T2D, suggesting a potential link between T1D and familial predisposition to depression. Moreover, while both groups exhibited high adherence to regular blood sugar checks, there were differences in the prevalence of certain comorbidities and lifestyle factors. Notably, individuals with T1D showed higher rates of hypertension, while those with T2D had higher rates of alcohol

consumption and smoking. Additionally, participants with T1D demonstrated a higher prevalence of various diabetes complications such as eye disease, kidney disease, heart disease, stroke, and numbness disease compared to those with T2D, suggesting potentially different disease trajectories and complications associated with each diabetes type. However, there were no significant differences in the diabetes medications received between the 2 groups.

When the WHO-5 was used as a predictor of depression in diabetes patients, ROC curve analysis showed an AUC of 0.745 ($p < 0.001$) (Tab. 2 and Fig. 1). Depression was predicted with 64.0% sensitivity and 74.0% specificity when the WHO-5 score was greater than 2.4. Similarly to ROC analysis, we discovered that the ideal cutoff value of 2.0 for the PAID-5 index had 74.0% sensitivity and 82.0% specificity (AUC 0.822, $p < 0.001$) for anxiety prediction in diabetes patients (Fig. 2).

Discussion

This PAID-5 and WHO-5 study examined the variables related to anxiety and depression in Indian patients with diabetes living in Kerala. We discovered that 74% of the participants screened positive for depression and 82% matched the criteria for anxiety when it came to the factors affecting depression and anxiety. The study's findings about anxiety and depression were in line with those found in earlier research, which estimated their incidence to be between 18% and 30% [11]. Furthermore, patients with T2D had significantly higher WHO-5 and PAID-5 ratings for depression and anxiety than did patients with T1D. According to earlier research, diabetes may be associated with higher levels of anxiety and depression [12, 13]. Additionally, across all populations, people with T1D are found to experience higher rates of depression and anxiety than those with T2D. Patients diagnosed with T2D may develop lifelong insulin dependency, hypoglycemia episodes connected to insulin, diabetes management-related family disputes, and comorbidities, all of which suggest a higher likelihood of early development of diabetes signs.

The study discovered that among Kerala's patients with diabetes, anxiety and depression were highly prevalent. The WHO-5 scores were significantly lower in those with depression, indicating reduced psychological well-being. The PAID-5 scores were higher among those with anxiety, demonstrating a strong association with diabetes-related distress. Several factors emerged as significant predictors: First, among patients with diabetes, poor glycemic control was substantially linked to anxiety and depression. Higher HbA1c levels were linked to increased psychological distress. Second, patients living with diabetes for a longer period were more likely to experience anxiety and depression, probably as a result of the difficulties in managing the condition in the long term. Third, lower socioeconomic status, limited access to healthcare, and educational disparities were correlated with higher depression and anxiety rates. Fourth, patients with diabetes were more likely to experience anxiety and despair if they also had comorbid conditions such as neuropathy, heart disease, stroke, kidney disease, or eye illness. Finally, a lack of strong social support systems was associated with higher psychological distress.

These findings underscore the importance of addressing both physical and mental health aspects of diabetes care. Improving glycemic control, enhancing disease management strategies, and providing psychosocial support are essential steps in reducing the burden of depression and anxiety in this population [14, 15].

The study also highlights the need for tailored interventions to target vulnerable subgroups, such as those with low socioeconomic status or longer disease duration. Health education and awareness programs should be designed to address these disparities and encourage patients to seek early psychological support when needed [16].

Furthermore, healthcare professionals in Kerala should recognize the strong connection between diabetes-related distress and mental health, integrating routine screening for depression and anxiety into diabetes care. Collaborative care models that involve mental health professionals may also be beneficial for improving patient outcomes.

Conclusions

The study, using the WHO-5 and PAID-5, sheds light on the screening results for depression and anxiety among Indian patients in Kerala with diabetes. It highlights the urgency of addressing psychological well-being as an integral part of diabetes management. Kerala's diabetes population could have improved quality of life if healthcare providers apply comprehensive care plans and interventions that address the highlighted issues.

Article information

Data availability

The datasets generated during and analyzed during the current study are available from the corresponding author upon reasonable request.

Authors' contributions

The authors, Juliet George and Kalpana Randhawa, contributed collaboratively to the conception, design, data collection, and analysis of the study. Additionally, both authors played integral roles in drafting and revising the manuscript, ensuring the accuracy and integrity of the intellectual content.

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Conflict of interest

The authors declare no conflict of interest.

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