International Journal Dental and Medical Sciences Research
Volume 6, Issue 2, Mar - Apr 2024 pp 126-137 www.ijdmsrjournal.com ISSN: 2582-6018

Prevalence of Diabetes Related Distress and depression in people with Type 2 Diabetes and `their associated factors in a rural block of Vellore district.

Deborah Anthirias[1], Venkata Raghava Mohan[2]
First Author-Deborah Anthirias - Study Design, Data Collection, Analysis, Manuscript preparation
Second Author- Venkata Raghava Mohan – Study Design, *appr*oval, and critical revision

Submitted: 10-03-2024 Accepted: 20-03-2024

ABSTRACT

BACKGROUND AND OBJECTIVES: People with type 2 diabetes are more likely to experience depression and diabetes-related distress (DRD), which can impair diabetes control and cause complications. The objectives of this study were to estimate the prevalence of diabetes-related distress (DRD) and depression in patients with type 2 diabetes mellitus in a rural block in Vellore district and to study the factors associated with these two mental health conditions.

METHODS: This community-based cross-sectional study was conducted with 189 randomly selected participants with diabetes in the Kaniyambadi block. Interviews were conducted for all participants using an interviewer-administered semi-structured questionnaire. The Diabetes Distress Scale-17 and Patient Health Questionnaire-9 were used to screen for DRD and depression. Data was entered in Epidata v3.1 and analysed with SPSS v23.0.

RESULTS: The prevalence of DRD and depression was found to be 29.1%and 28.6% respectively. DRD was found to be significantly associated with a history of hypoglycemic episodes, sitting or reclining hours per day, diabetic foot complications, neuropathy, and depression. After adjusting for confounding factors, hypoglycemic episodes (adjusted OR 2.82, 95% CI 1.27–6.29) and depression (adjusted OR 6.75, 95% CI 2.91–15.67) were significantly associated with DRD. Depression was found to be significantly associated with the education of the subject, physical activity level, sitting or reclining hours per day, and diabetic foot complications. After adjusting for confounding factors, educational status (adjusted OR 2.84, 95% CI 1.01–8.06) and blood pressure (adjusted OR 2.21, 95% CI 1.03–4.78) had a significant association with depression.

INTERPRETATION AND CONCLUSIONS: More than one-fourth of the diabetic population has either DRD or depression. Physical activity level, the presence of hypertension, and diabetic foot complications are found to be associated with these mental health disorders. Addressing DRD and depression in the diabetic population is crucial at the primary care level.

KEY WORDS: Diabetes related distress, depression, type 2 diabetes, physical activity, mental health

I. INTRODUCTION

The burden of diabetes on people, families, and nations is increasing globally. According to the IDF Diabetes Atlas (2021), diabetes affects 10.5% of adults aged 20 to 79 years, with nearly half of them having no idea of their condition. (1) The National NCD Monitoring Survey (NNMS) reported the diabetes prevalence in India as 9.3% in the year 2018. Diabetes and untreated mental health problems can both worsen each other's effects. Depression and diabetes-related distress (DRD) are two mental health conditions that affect people with type 2 diabetes, leading to poor diabetes management and diabetic complications. DRD is much more common in those with T2DM.(2)

Diabetes distress makes individuals adopt harmful behaviours, quit monitoring their blood sugar, and even miss doctor's appointments, often after years of effective management. In any 18-month period, 33% to 50% of diabetics experience diabetes distress. Although diabetes distress can resemble depression or anxiety, it cannot be effectively treated with medication. (2) Patients with diabetes who are receiving hospital treatment for diabetes management regularly experienced diabetes-related distress (24%). Diabetes-related distress rises sharply with care level and is minimal at the primary care level. (3) The factors associated with DRD included family dysfunction, insulin therapy, diabetic retinopathy, younger age, longer duration of diabetes, hypoglycaemia and HbA1c level. (4) (5)

People with diabetes are two to three times more likely to suffer from depression than

those without diabetes. Only 25–50% of diabetics with depression receive diagnosis and treatment. (2) Studies have demonstrated that fears about complications, lack of social support, female gender, sexual dysfunction, younger patients, having comorbid thyroid disorders or neuropathy, those treated with insulin, and noncompliant patients were found to be significantly associated with co-morbid depression in diabetes. (6) (7)

A cohort study in the Asian diabetic population receiving regular diabetic health care reported that there were significant individual changes in DRD and depressive symptoms a few years later when followed-up. A lower DRD score predisposed to greater depressive symptoms, and similarly, mild or absent depressive symptoms did not prevent a higher DRD at a later timepoint. (8)

Diabetes-related distress screening and regular health promotion that emphasises the connection between diabetes and psychological issues may be excellent prospective actions to enhance patient outcomes and public health. (5) Adequate psychological attention should be offered to people with T2DM who appear to be in a relatively good psychological state. It is a reasonable strategy in a diabetic care package to include close monitoring for DRD and depressive symptoms with psychological assistance. (8)

Although studies have been undertaken in the Indian subcontinent to measure the prevalence of diabetes-related distress and depression, most of them are hospital-based studies, and very few studies have researched these mental health problems among diabetics in the community.

Ethical clearanceobtained
This study is conducted on the study subjects after approval of the ethical committee, and a consent form is received from each patient to collect their data for this study.

Conflicts-None
Funding-None
Objectives:
This study is done to measure the prevalence of two significant mental health conditions among diabetic people living in Kaniyambadi block of Vellore in South India, and to study the factors associated with these conditions.

II. MATERIALS AND METHODS

Study design: A cross-sectional community-based study was conducted in a rural part of South India.
Study subjects: All patients with diabetes from the community service area of CHAD hospital were registered in the community health department's Health Information System (HIS).

Inclusion criteria
- at least 30 years of age
- diagnosed with T2DM for a duration of atleast one year

Exclusion criteria
- pregnant women and lactating mothers
- patients with cognitive impairment

This study was done on 189 subjects in the Kaniyambadi block who were randomly recruited from the list of patients with T2DM selected based on inclusion and exclusion criteria from December 2019 to December 2020. The researcher visited the homes of the subjects selected. The subjects were interviewed, and the clinical data were collected and recorded.

Bias: To avoid selection bias, a simple random sampling method was used. To limit measurement bias, standardized interview schedules, a weighing machine, a stadiometer, measuring tape, and a sphygmomanometer were used. The principal investigator was the only interviewer.

Data collection: Interviewer administered semi-structured questionnaires were used. The following instruments were employed to assess participants:

A semi-structured, pilot-tested questionnaire was used to obtain data regarding socio-demographic details. It included questions regarding medical and treatment history and the presence of co-morbidities assessed with the available case records. Social class was categorised based on the BG Prasad socioeconomic scale. (9) General examination findings and anthropometric measurements were recorded. The blood pressure was calculated as the mean of two measured BPs. Diabetic neuropathy screening was done with the help of 10 g monofilament testing for touch sensation, a 128 Hz tuning fork test for vibration sensation, and an ankle reflex with a knee hammer for deep tendon reflex. A decreased or absent sensation on any one of these was classified as diabetic peripheral neuropathy.

Medication adherence was assessed using pill count for OHAs, which has higher accuracy for objective assessment (10). Dietary vegetable and fruit intake, physical activity level, and alcohol and tobacco usage were assessed using the WHO STEPS CORE Questionnaire. (11) Peripheral vascular disease screening was done using the Edinburgh claudication questionnaire (12) and by palpation of peripheral pulses.

Diabetes-related distress (DRD) was assessed with the Diabetes Distress Scale 17 (13). The DDS-17 questionnaire is used to assess burdens related to diabetes experienced during the past month, graded on a Likert scale from 1 (not a problem) to 6 (very serious problem). The DDS-17 yields a composite score as well as four subscale scores, each exploring a different source of diabetes distress. A mean item score of 2.0–2.9 is labelled as "moderate distress," and a mean item score of 3 is considered "high distress." (14) There are four subscales: emotional burden (5 items), regimen-related distress (5 items), interpersonal distress (3 items), and physician-related distress (4 items). Each subscale score reflects the average response among all items on that scale. (15)

Depression was assessed using the Patient Health Questionnaire-9. Based on severity, depression scores were graded as no depression (0–4), mild depression (5–9), moderate depression (10–14), moderately severe depression (15–19), and severe depression (20–27). A PHQ-9 total score ranging from 0 to 27 was obtained, with higher scores indicating the patient's increased self-report of depression severity. The PHQ-9 total score was considered a dichotomous variable, with patients deemed to have depression if total scores were 5. (16)

Sample size: The sample size was calculated using the formula N = Z2pq/d2, where p is the prevalence of diabetes-related distress (42%), taken from the literature (17), q = (100-p), and d is the relative precision of 8 (20% of the prevalence). The required sample size was estimated to be 152. Factoring in a 20% non-response rate, the final sample size was estimated to be 183 people with type 2 diabetes mellitus.

Analysis

The prevalence of diabetes-related distress (DRD) and depression was estimated, associated factors were analyzed, and the results were tabulated.

Statistical analysis of data:

Statistical analysis was done using the statistical package SPSS version 23. The data were expressed as the frequency and proportions for descriptive variables. The mean and standard deviation were obtained for continuous variables. Bivariate analysis was done to check for associations between risk factors and the presence of DRD and depression using the chi-square test. Odds ratios with 95% confidence intervals were estimated. A multivariate logistic regression analysis was performed to study associations after adjusting for potential confounders. The P value of 0.05 was considered statistically significant.

III. RESULTS

A total of 189 diabetic patients were included in this study after fulfilling the inclusion criteria and obtaining informed consent. Table I documents the sociodemographic and clinical characteristics of the participants. The majority of them were women, less than 60 years of age, had less than a high school education, were currently married, were from the lower socio-economic class, were currently unemployed, and were members of nuclear families. A small but significant proportion of the population had experienced hypoglycemic episodes. More than two-thirds of the subjects were compliant with treatment. Only 11% of the subjects had ever consumed alcohol. A major proportion were found to have sufficient physical activity according to WHO recommendations and less than eight hours of sitting or reclining time. Most of the subjects had medical risk factors like abdominal obesity and comorbidities like hypertension.

DDS-17 consisted of 17 items, and the value for Cronbach's alpha is 0.852 in this study. Similarly, PHQ-9 consisted of 9 items, and the value for Cronbach's alpha is 0.848 in this study. Both scales had good internal consistency. Nearly 29% of the subjects were found to have moderate to severe distress, and a similar proportion had mild to severe depression. Significantly, more than half of the subjects had emotional distress as measured by one of the subscales.

Figure I shows the gender-wise proportion of those affected with moderate to severe DRD and those with little or no distress. Figure II shows the gender-wise proportion of those with mild to severe depression and those with no depression. Both distress and depression were comparatively higher among females than males.

Table II documents the factors associated with diabetes-related distress. DRD was found to be significantly associated with a positive history of hypoglycemic episodes (OR 2.656, 95% CI 1.37–5.15), prolonged sitting or reclining for more than eight hours per day (OR 2.374, 95% CI 1.18–4.76), the presence of diabetic foot complications (OR 2.717, 95% CI 1.02–7.27), neuropathy (OR 2.126, 95% CI 1.12–4.02), and depression (OR 7.083, 95% CI 3.50–14.32). However, after adjusting for potential confounders, only a positive history of hypoglycemic episodes and the presence of depression had a significant association with DRD.

Table III documents the factors associated with depression. Depression was found to be significantly associated with the lower educational status of the subject (OR 2.875, 95% CI 1.25–6.61), inadequate MET minutes (OR 2.15, 95% CI 1.08–4.28), sitting or reclining for more than 8 hours/day (OR 2.466, 95% CI 1.23–4.96), and the presence of diabetic foot complications (OR 2.80, 95% CI 1.05-7.50). After adjusting for potential confounders, educational status and blood pressure not within the recommended target had a significant association with depression.

IV. DISCUSSION:

This study measured the prevalence and associated factors of DRD and depression among people living with type 2 diabetes in rural south India. The prevalence of DRD was found to be quite high in the community (29.1%) in our study, but not universal as measured in another cross-sectional study done in rural India. (18) Our study showed a positive score in depression for 29% of diabetics in the community, compared to 50.3% of patients scoring positive on PHQ 9 in a study done at a NCD clinic (19). Type 2 diabetes with increased depressive symptoms prevalence varied from 11.6 to 67.5 percent, whereas diabetic distress prevalence ranged from 18.0 to 76.2 percent in a scoping review of 46 studies in the south Asian population (20), fitting into our prevalence. There are not many research studies that look at both DRD and depression. Interestingly, there was no significant association between the socioeconomic status of the patient and DRD or depression demonstrated in the present study. Quite a number of participants in this current study accessed primary health care services that are provided free of charge. Because of this reason, differences in socioeconomic status would not have contributed to significant differences between the subjects belonging to different socioeconomic classes in this study population.

The majority of the study population (68%) were women, in contrast to the majority of men in another community-based study. (21) More than three-fourths of the study participants had at least primary school education, but this is lower than the statistics (92%) as per the 2011 census report. (22) More than half, that is, 55.6%, of the study population did not have any paid occupation, as this proportion included women who were homemakers, retired employees, and unemployed subjects. A huge proportion of 76% were married, and 53% belonged to nuclear families, similar to another community-based study in rural south India. (21) The majority of the study population (64.5%) belonged to the middle socioeconomic class, and 22.2% of the subjects were from the lower socioeconomic group, which is much lower than the 55.3% of families classified as low SES in a nearby semi-urban slum area in Vellore. (23)

In the SITE study (24), the prevalence of coexisting diabetes and hypertension was 20.6%, compared to an alarmingly high 55.6% of diabetics with coexisting hypertension in our study. Experiencing hypoglycaemic episodes during the course of treatment was reported by 30% in our study as compared to 57.4% in another study in south India. (25) Two-thirds of the subjects (66%) were compliant as estimated by pill count, compared to 52% in a previous study done in the same region earlier. (26)

Among the male diabetics who participated in our study, 13% had ever smoked, and 21% had ever consumed alcohol. From the 81.5% of the people who were involved in physical activity, only 74% had sufficient physical activity to meet the required MET minutes per week. (27) Sitting or reclining time of 8 h/day was reported by 24.3% of the subjects in our study as compared to the results from the Singapore multi-ethnic cohort study, where only 13% of the Indians had high total sitting time. (28) Our study estimated a prevalence of 60.3% of diabetics with a BMI above 25 which is much higher compared to the estimated 39.64% in rural Tamil Nadu a decade ago. (29)

Abdominal obesity was prevalent in 85.7% of the study population, compared to 64.05% (30) in a similar rural population. In our study, 37.6% of study subjects had higher BP readings than the recommended target BP for diabetics at the time of interview. The prevalence of diabetic peripheral neuropathy in the study population was 45%, which is similar to the prevalence of peripheral neuropathy (49.45%) in another retrospective study carried out in the podiatry department of an institute in south India (31).

Among the DDS-17 subscales, the highest reported was regimen-related distress at 21.6% in a South Indian study (21), in contrast to our study, where emotional distress was relatively high. More than half of the diabetic subjects (54%) in the community suffered from moderate to severe emotional distress. A lack of family support could be the cause of high emotional distress in our study. Females had a higher prevalence of distress (32.6%) compared to males (21.7%), similar to another study assessing DRD (15) and many other studies. The age of the subjects and number of years since diagnosis of diabetes did not show any increasing trend in the prevalence of DRD in our

study, whereas a higher DDS score was significantly associated with a younger age in another study. (32) DRD was significantly associated with depression in both unadjusted and adjusted analyses. The study design, being cross-sectional, cannot give any tangible insight into the temporal association between DRD and depression.

In a tertiary hospital-based study from North India, the major predictors for high diabetes distress were low education level, diabetic complications, and hypertension (33); whereas in our study, diabetic foot complications were significantly associated with DRD in bivariate analysis, but when adjusting for confounders, no significant association was observed. The acute complication of hypoglycemia was found to be statistically significant in both bivariate analysis and after adjusting for confounding factors in logistic regression analysis. Age and gender were not found to be associated with diabetes-related distress in our study, whereas mixed results were reported from studies done in different regions. Younger age and female gender were significant factors in several studies. Though there is sufficient scientific evidence from various research studies to demonstrate the association between unemployment and distress, our study did not find any such association. Distress was almost similar in those having less than or more than 10 years of education (13%, 13.7%) in one of the studies (21), which is also the case in our study.

The prevalence of depression among the study population is 28.6%. This is similar to the 30% prevalence of depression among diabetics from a study done in East Africa, showing that there is not much difference in the prevalence of depression in diabetes among developing and underdeveloped countries. (34) It is noteworthy that depression was more common among women than men. Females had a higher prevalence of depression (32.6%) compared to males (20%) in our study, though this difference in prevalence was not statistically significant. Similar findings were reported in many other studies. The reason for this gender difference would have been the fact that women play divergent social roles as opposed to their male counterparts, and there are several resultant disadvantages, including dependence and unemployment. In the current study, it can also be observed that the majority of the women were unemployed and homemakers. Similar to the prevalence of DRD, age and number of years since diagnosis of diabetes did not show any increasing trend in the prevalence of depression.

Considering the higher prevalence of DRD and depression among diabetics in the community, studies exploring factors that need to be addressed at the primary care level are required on a larger scale. Hypoglycemia, hypertension, and physical inactivity are found to be associated factors in this study. The effects of factors like glycaemic control, diabetic complications, family support, and regular psychiatrist or psychologist consultation on DRD or depression need to be evaluated in detail.

V. CONCLUSION:

More than one-quarter of the diabetic patients suffered from either depression or diabetes-related distress (DRD), which is of concern given their similar prevalence rates. These mental health issues have been associated with factors such as education level, hypoglycemic episodes, degree of physical activity, presence of diabetic complications, and hypertension. Diabetes patients' quality of life will improve, and the strain on the healthcare system will be lessened, only if these mental health issues are screened and addressed at the primary care and community levels.

BIBLIOGRAPHY:

[1]. International Diabetes Federation [Internet]. [cited 2023 Jul 19]. Facts & figures. Available from: https://idf.org/about-diabetes/facts-figures/

[2]. Centers for Disease Control and Prevention [Internet]. 2023 [cited 2023 Jul 7]. Diabetes and Mental Health. Available from: https://www.cdc.gov/diabetes/managing/mental-health.html

[3]. Kuniss N, Kramer G, Müller UA, Wolf G, Kloos C. Diabetes related distress is high in inpatients with diabetes. Diabetol Metab Syndr. 2021 Apr 9;13(1):40.

[4]. Onyenekwe BM, Young EE, Nwatu CB, Okafor CI, Ugwueze CV. Diabetes Distress and Associated Factors in Patients with Diabetes Mellitus in South East Nigeria. Dubai Diabetes Endocrinol J. 2020 Aug 31;26(1):31–7.

[5]. Bhaskara G, Budhiarta AAG, Gotera W, Saraswati MR, Dwipayana IMP, Semadi IMS, et al. Factors Associated with Diabetes-Related Distress in Type 2 Diabetes Mellitus Patients. Diabetes Metab Syndr Obes Targets Ther. 2022 Jul 15;15:2077–85.

[6]. Abate TW, Gedamu H. Psychosocial and clinical factors associated with depression among individuals with diabetes in Bahir

Dar City Administrative, Northwest Ethiopia. Ann Gen Psychiatry. 2020 Mar 11;19(1):18.

[7]. Abuhegazy H, Mujairi A, Banah F, Agdi Y, Elkeshishi H, Kamel A, et al. Depression and Associated Risk Factors Among Type 2 Diabetic Patients: A Cross Sectional Study on a Convenience Sample from the Diabetic Center, Khamis Mushait; Saudi Arabia. Neuropsychiatr Dis Treat. 2022 Aug 31;18:1975–84.

[8]. Chew BH, Vos RC, Stellato RK, Rutten GEHM. Diabetes-Related Distress and Depressive Symptoms Are Not Merely Negative over a 3-Year Period in Malaysian Adults with Type 2 Diabetes Mellitus Receiving Regular Primary Diabetes Care. Front Psychol [Internet]. 2017 [cited 2023 Jul 18];8. Available from: https://www.frontiersin.org/articles/10.3389/fpsyg.2017.01834

[9]. Majhi MM, Bhatnagar N. Updated B.G Prasad's classification for the year 2021: consideration for new base year 2016. J Fam Med Prim Care. 2021 Nov;10(11):4318–9.

[10]. Shiomi M, Kurobuchi M, Tanaka Y, Takada T, Otori K. Pill Counting in the Determination of Factors Affecting Medication Adherence in Patients with Type 2 Diabetes: A Retrospective Observational Study. Diabetes Ther. 2021 Jul;12(7):1993–2005.

[11]. STEPwise approach to NCD risk factor surveillance (STEPS) [Internet]. [cited 2023 Jul 21]. Available from: https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps

[12]. Edinburgh Claudication Questionnaire – MedicalCRITERIA.com [Internet]. [cited 2023 Jul 21]. Available from: https://medicalcriteria.com/web/edinburgh-claudication-questionnaire/

[13]. Polonsky WH, Fisher L, Earles J, Dudl RJ, Lees J, Mullan J, et al. Assessing psychosocial distress in diabetes: development of the diabetes distress scale. Diabetes Care. 2005 Mar;28(3):626–31.

[14]. Fisher L, Hessler DM, Polonsky WH, Mullan J. When Is Diabetes Distress Clinically Meaningful? Diabetes Care. 2012 Feb;35(2):259–64.

[15]. Hemavathi P, Satyavani K, Smina TP, Vijay V. Assessment of diabetes related distress among subjects with type 2 diabetes in South India. Int J Psychol Couns. 2019 Jan 31;11(1):1–5.

[16]. PHQ-9 Depression Scale | University of Washington AIMS Center [Internet]. [cited 2023 Jul 21]. Available from: https://aims.uw.edu/resource-library/phq-9-depression-scale

[17]. Kumar N, Unnikrishnan B, Thapar R, Mithra P, Kulkarni V, Holla R, et al. Distress and Its Effect on Adherence to Antidiabetic Medications Among Type 2 Diabetes Patients in Coastal South India. J Nat Sci Biol Med. 2017;8(2):216–20.

[18]. Gupta SK, Rastogi A, Kaur M, Lakshmi PVM. Diabetes-related distress and its impact on self-care of diabetes among people with type 2 diabetes mellitus living in a resource-limited setting: A community-based cross-sectional study. Diabetes Res Clin Pract. 2022 Sep;191:110070.

[19]. 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 Dec 1;14(6):709–13.

[20]. Kalra G, Gill S, Tang TS. Depression and Diabetes Distress in South Asian Adults Living in Low- and Middle-Income Countries: A Scoping Review. Can J Diabetes. 2020 Aug 1;44(6):521-529.e1.

[21]. Allbright K. Simon, Saritha Susan Vargese, Elsheba Mathew. Diabetes related distress in adults with type 2 diabetes mellitus: a community based study.

[22]. Statista [Internet]. [cited 2023 Jul 21]. India - population by level of education and gender 2011. Available from: https://www.statista.com/statistics/617899/popualtion-level-of-education-india/

[23]. Kattula D, Venugopal S, Velusamy V, Sarkar R, Jiang V, S MG, et al. Measuring Poverty in Southern India: A Comparison of Socio-Economic Scales Evaluated against Childhood Stunting. PloS One. 2016;11(8):e0160706.

[24]. Joshi SR, Saboo B, Vadivale M, Dani SI, Mithal A, Kaul U, et al. Prevalence of diagnosed and undiagnosed diabetes and hypertension in India--results from the Screening India's Twin Epidemic (SITE) study. Diabetes Technol Ther. 2012 Jan;14(1):8–15.

[25]. Samya V, Shriraam V, Jasmine A, Akila GV, Anitha Rani M, Durai V, et al. Prevalence of Hypoglycemia Among Patients With Type 2 Diabetes Mellitus in a Rural Health Center in South India. J Prim Care Community Health. 2019;10:2150132719880638.
[26]. Muliyil DE, Vellaiputhiyavan K, Alex R, Mohan VR. Compliance to treatment among type 2 diabetics receiving care at peripheral mobile clinics in a rural block of Vellore District, Southern India. J Fam Med Prim Care. 2017;6(2):330–5.
[27]. Physical activity [Internet]. [cited 2023 Jul 21]. Available from: https://www.who.int/news-room/fact-sheets/detail/physical-activity
[28]. Uijtdewilligen L, Yin JDC, van der Ploeg HP, Müller-Riemenschneider F. Correlates of occupational, leisure and total sitting time in working adults: results from the Singapore multi-ethnic cohort. Int J Behav Nutr Phys Act. 2017 Dec 13;14(1):169.
[29]. Gupta SK, Singh Z, Purty AJ, Kar M, Vedapriya D, Mahajan P, et al. Diabetes Prevalence and its Risk Factors in Rural Area of Tamil Nadu. Indian J Community Med Off Publ Indian Assoc Prev Soc Med. 2010 Jul;35(3):396–9.
[30]. Prevalence and associated factors of obesity among adults in Tamil Nadu State, South India | International Journal of Current Research [Internet]. [cited 2023 Jul 21]. Available from: https://www.journalcra.com/article/prevalence-and-associated-factors-obesity-among-adults-tamil-nadu-state-south-india
[31]. Epidemiology of diabetic foot complications in a podiatry cl... : Indian Journal of Health Sciences and Biomedical Research kleu [Internet]. [cited 2023 Jul 21]. Available from: https://journals.lww.com/kleu/Fulltext/2015/08010/Epidemiology_of_diabetic_foot_complications_in_a.9.aspx
[32]. Wardian J, Sun F. Factors associated with diabetes-related distress: implications for diabetes self-management. Soc Work Health Care. 2014;53(4):364–81.
[33]. Gahlan D, Rajput R, Gehlawat P, Gupta R. Prevalence and determinants of diabetes distress in patients of diabetes mellitus in a tertiary care centre. Diabetes Metab Syndr. 2018 May;12(3):333–6.
[34]. Khan ZD, Lutale J, Moledina SM. Prevalence of Depression and Associated Factors among Diabetic Patients in an Outpatient Diabetes Clinic. Psychiatry J. 2019;2019:2083196.
[35]. Aminu AS, Chandrasekaran V, Nair S. Depression among patients with diabetes: A community-based study in South India. J Med Sci. 2017 Nov 1;37(6):237.

Tables and figures

Table I: Sociodemographic and clinical characteristics of the sample (n-189):

Characteristic	**Descriptive statistics**
Age in years - **Mean (SD)**	58.74(11.9)
Number of years since diagnosis of diabetes – **Median (IQR)**	7 (5-10)
	Frequency n (%)
Gender	
Male	60 (31.7)
Female	129 (68.3)
Age	
≥60 years	92 (48.68)
<60 years	97 (51.32)
Number of years of education	
Upto middle school	136 (72)
High school and above	53 (28)
Marital status	
currently married	144 (76.2)
Single/widowed	45 (23.8)
Social class	
lower	132 (69.8)

upper	57 (30.2)
Employment status	
Unemployed (retired & homemakers)	105 (55.6)
Currently working	67 (35.4)
Family type	
Nuclear	100 (52.9)
Extended or joint	89 (47.1)
Hypoglycaemic episodes	
Yes	57 (30.2)
No	132 (69.8)
compliance	
compliant	128 (67.7)
Not compliant	61 (32.3)
Alcohol consumption	
ever	21 (11.1)
never	168 (88.9)
MET (Metabolic Equivalent of Task) minutes	
Sufficient (>600METS-min)	140 (74.1)
Insufficient (<600 METS-min)	49 (25.9)
Sitting / reclining minutes	
≥8 hours	46 (24.3)
<8 hours	143 (75.7)
Clinical characteristics	
Higher than target blood pressure	71 (37.6)
Overweight and obese (BMI >25 kg/m^2)	113 (59.8)
Abdominal obesity present (Waist circumference, male>90 cm, female>80cm)	162 (85.7)
Diabetic foot complications	18 (9.5)
Neuropathy	85 (45.0)
Peripheral vascular disease	6 (3.2)
Diabetes related distress (DRD-17 mean score)	
Little/no distress(<2)	134 (70.9)
Moderate(2-2.9)	41(21.7)
High(>3)	14(7.4)
Domain wise prevalence of DRD	
Emotional distress	102 (54)
Physician related	29 (15.3)
Regimen related	48 (25.4)
Inter-personal	39 (20.6)
Depression (PHQ-9 score)	
No depression(0-4)	135 (71.5)
Mild(5-9)	41(21.7)
Moderate(10-14)	8(4.2)
Moderately severe(15-19)	4(2.1)
Severe(20-27)	1 (0.5)

International Journal Dental and Medical Sciences Research
Volume 6, Issue 2, Mar - Apr 2024 pp 126-137 www.ijdmsrjournal.com ISSN: 2582-6018

Figure I: Gender wise proportions of DRD

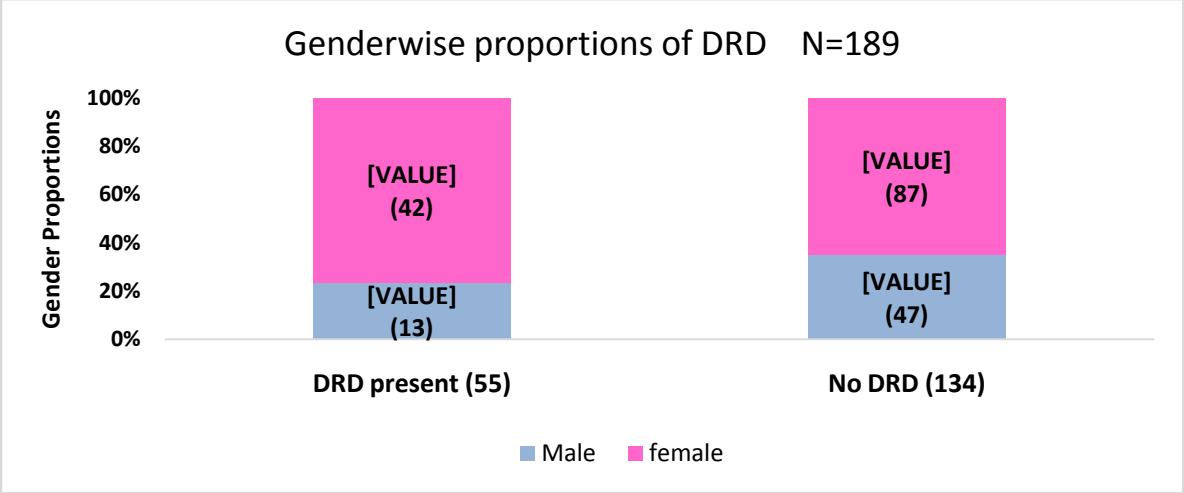

Figure II: Gender wise proportions of depression

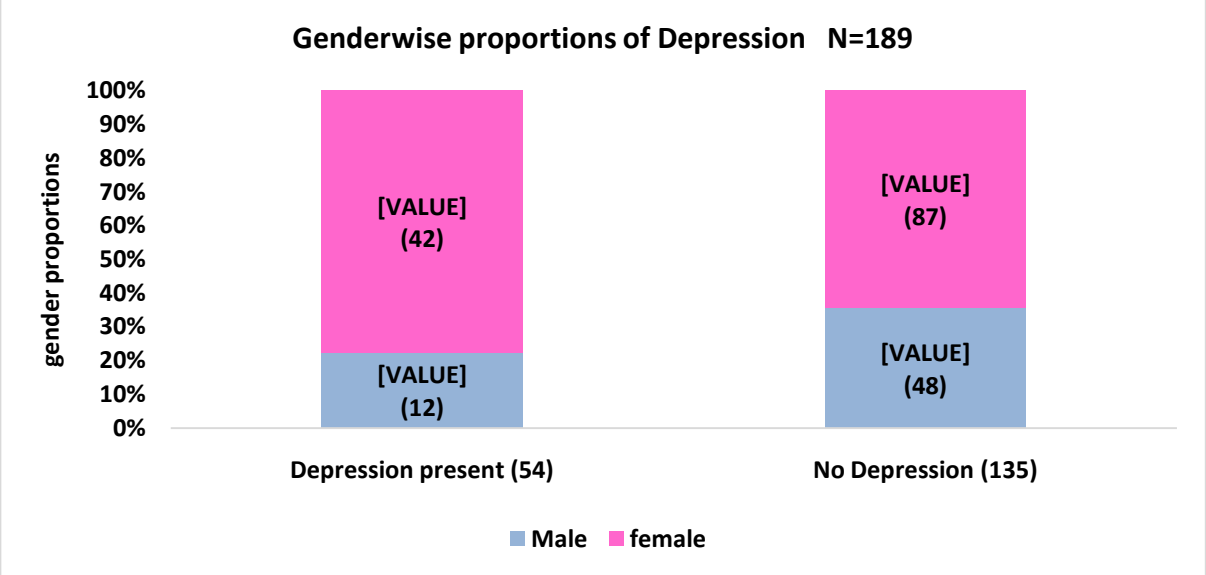

Table II:Factors associated with DRD

Variable	DRD		Bivariate		Multivariate	
	Present N (%)	Absent N (%)	Odds Ratio (95% CI)	Chi square p value	Adjusted OR (95% CI)	Chi square p value
Gender						
Male	13(21.7)	47(78.3)	0.57 (0.28-1.17)	0.125	0.69 (0.23-2.08)	0.519
Female	42(32.6)	87(67.4)				
Age						
≥60 years	24(26.1)	68(73.9)	0.75	0.374	0.70	0.414

<60 years	31(32.0)	66(68.0)	(0.4-1.41)		(0.30-1.64)	
Education						
Upto middle school	40(29.4)	96(70.6)	1.05 (0.52-2.13)	0.880	0.55 (0.21-1.53)	0.258
High school and above	15(28.3)	38(71.7)				
Socio-economic status						
Lower	39(29.5)	93(70.5)	1.07 (0.54-2.139)	0.838	1.04 (0.44-2.47)	0.918
Upper	16(28.1)	41(71.9)				
History of hypoglycaemic episodes						
Yes	25(43.9)	32(56.1)	2.65 (1.37-5.15)	**0.003**	**2.82 (1.27-6.29)**	**0.011**
No	30(22.7)	102(77.3)				
Compliance to treatment						
Non-compliant	21 (34.4)	40 (65.6)	1.45 (0.75- 2.80)	0.266	1.93 (0.85-4.38)	0.116
Compliant	34 (26.6)	94 (73.4)				
Alcohol consumption						
Ever	6(28.6)	15(71.4)	0.97 (0.35-2.65)	0.955	0.57 (0.12-2.76)	0.492
Never	49(29.2)	119(70)				
MET minutes						
Inadequate	18 (36.7)	31 (63.3)	1.61 (0.80-3.23)	0.172	0.79 (0.26-2.28)	0.664
Adequate	37(26.4)	103 (73.6)				
Sitting or reclining minutes/day						
>8 hours	20(43.5)	26(56.5)	2.37 (1.18-4.76)	**0.014**	2.23 (0.74-6.82)	0.156
≤ 8 hours	35(24.5)	108(75.5)				
BMI(WHO)						
Obese & overweight	36(31.9)	77(68.1)	1.40 (0.73-2.69)	0.309	0.78 (0.32-1.88)	0.582
Normal & underweight	19(25.0)	57(75.0)				
Blood pressure (target <140/90)						
High	23(32.4)	48(67.6)	1.28 (0.68-2.45)	0.439	0.83 (0.35-1.99)	0.690
Within target	32(27.1)	86(72.9)				
Diabetic foot complications						
Yes	9(50.0)	9(50.0)	2.71 (1.02-7.27)	**0.040**	1.52 (0.39-6.02)	0.547
No	46(26.9)	125(73.1)				

Abdominal obesity						
Present	51(31.5)	111(68.5)	2.64 (0.87-8.04)	0.078	2.04 (0.50-8.29)	2.045
Absent	4(14.8)	23(85.2)				
Neuropathy						
Present	32 (37.6)	53 (62.4)	2.12 (1.12-4.02)	**0.019**	2.21 (0.87-5.21)	0.098
Absent	23 (22.1)	81 (77.9)				
Depression						
Depression	32(59.3)	22(40.7)	7.08 (3.50-14.32)	< 0.001	**6.75 (2.91-15.67)**	< **0.001**
No depression	23(17.0)	112(83.0)				

Table III: Factors associated with depression

Category	**Depression**		**Bivariate**		**Multivariate**	
	Present N(%)	Absent N(%)	**Odds Ratio (95% CI)**	**Chi square p value**	**Adjusted OR (95% CI)**	**Chi square p value**
Gender						
Male	12(20.0)	48(80.0)	0.51 (0.25-1.08)	0.075	0.42 (0.14-1.31)	0.134
Female	42(32.6)	87(67.4)				
Education						
Upto middle school	46(33.8)	90(66.2)	2.87 (1.25-6.61)	**0.010**	**2.84 (1.01-8.06)**	**0.048**
High school and above	8(15.1)	45(84.9)				
Marital status						
Single/ widowed	16 (35.6)	29 (64.4)	1.53 (0.75-3.14)	0.235	1.06 (0.45-2.50)	0.887
Married	38 (26.4)	106 (73.6)				
Socio-economic status						
Lower	42(31.8)	90(68.2)	1.75 (0.83-3.64)	0.133	1.66 (0.72-3.86)	0.231
Upper	12(21.1)	45(78.9)				
History of hypoglycaemia						
Yes	20(35.1)	37(64.9)	1.55 (0.80-3.04)	0.193	1.59 (0.76-3.43)	0.228
No	34(25.8)	98(74.2)				
Alcohol consumption						
Ever	7(33.3)	14(66.7)	1.28	0.608	3.54	0.087

Never	47(28.0)	121(72.0)	(0.48-3.38)		(0.83-15.10)	
MET minutes						
Inadequate	20 (40.8)	29 (59.2)	2.15 (1.08- 4.28)	**0.027**	1.35 (0.52-3.55)	0.538
Adequate	34 (24.3)	106 (75.7)				
Sitting or reclining hours/day						
>8 hours	20(43.5)	26(56.5)	2.46 (1.23-4.96)	**0.010**	2.03 (0.71-5.81)	0.185
≤ 8 hours	34(23.8)	109(76.2)				
Peripheral vascular disease						
Present	3 (50.0)	3 (50.0)	2.58 (0.50-13.24)	0.355	2.28 (0.39-13.21)	0.356
Absent	51 (27.9)	132 (72.1)				
BMI (WHO classification)						
Obese & overweight	36(31.9)	77(68.1)	1.50 (0.78-2.92)	0.223	0.90 (0.39-2.09)	0.822
Normal & underweight	18(23.7)	58(76.3)				
Blood pressure (target<140/90)						
High	26(36.6)	45(63.4)	1.85 (0.98-3.53)	0.057	**2.21 (1.03-4.78)**	**0.043**
Within target	28(23.7)	90(76.3)				
Diabetic foot complications						
Yes	9(50.0)	9(50.0)	2.80 (1.05-7.50)	**0.034**	2.00 (0.62-6.51)	0.247
No	45(26.3)	126(73.7)				
Abdominal obesity						
Present	50(30.9)	112(69.1)	2.56 (0.84-7.81)	0.087	2.19 (0.63-7.69)	0.217
Absent	4(14.8)	23(85.2)				
Neuropathy						
Present	30 (35.3)	55 (64.7)	1.81 (0.96 -3.43)	0.064	1.05 (0.46-2.41)	0.898
Absent	24 (23.2)	80 (76.8)				