psychiatry international

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Anxiety, Depression, and Their Determinants in Adults with Type 2 Diabetes in Khyber Pakhtunkhwa: Exploring Psychological Distress

Sajid Ali [1,2], Sheraz Fazid [1], Basharat Hussain [1], Ihtesham Ul Haq [1], Nasser M. Aldekhail [3] and Zia Ul Haq [1,4,*]

[1] Institute of Public Health and Social Sciences, Khyber Medical University, Peshawar 25100, Pakistan; dr.sajidali1@gmail.com (S.A.); sheraz.iph@kmu.edu.pk (S.F.); bhgillani@gmail.com (B.H.); ihtesham02@gmail.com (I.U.H.)
[2] Rehman College of Dentistry, Peshawar 25000, Pakistan
[3] Department of Pharmacy, College of Pharmacy, Nursing and Medical Sciences, Riyadh Elm University, Riyadh 12734, Saudi Arabia; nasser.aldekhail@riyadh.edu.sa
[4] School of Health and Well-being, University of Glasgow, Glasgow G12 8QQ, UK
* Correspondence: drzia@kmu.edu.pk

Abstract

The global prevalence of type 2 diabetes is alarmingly high, and a considerable proportion of diabetes patients suffer from anxiety and depression. The presence of anxiety and depression worsens the prognosis of diabetes; it increases non-compliance to the treatment and mortality rate. A cross-sectional study of adults ages 20 years or older was conducted in 24 districts of Khyber Pakhtunkhwa (KP). Individuals diagnosed by a certified medical doctor with type 2 diabetes were recruited using multistage stratified cluster sampling. The Agha Khan University Anxiety and Depression Scale (AKUADS) was used for assessment. Chi-square and logistic regression were used to assess the association between depressive disorder and characteristics of the study participants. The results showed that 31.64% of type 2 diabetic patients suffered from anxiety and depression. Prevalence was higher in individuals aged ≤40 years (37.75%), females (40.58%) compared to males (26.48%), individuals without formal education (38.48%), and underweight participants (55%). Anxiety and depression were also prevalent among housewives (38.04%), rural residents (34.76%), and current smokers (43.14%). Multivariate logistic regression indicated significantly higher odds of anxiety and depression among individuals with primary education (OR = 4.73, p-value = 0.03), underweight individuals (OR = 4.46, p-value = 0.001), and those reporting pain (OR = 2.82, p-value < 0.001). The high prevalence of anxiety and depression in the known diabetic population in the KP province of Pakistan requires the development of strategies for screening, awareness related to the contributing factors, and treatment of co-morbid depression at community level.

Keywords: anxiety; depression; depressive disorders; diabetes; prevalence; type 2

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Academic Editor: Domenico De Berardis

Received: 19 June 2025
Revised: 15 August 2025
Accepted: 10 October 2025
Published: 15 October 2025

Citation: Ali, S.; Fazid, S.; Hussain, B.; Ul Haq, I.; Aldekhail, N.M.; Ul Haq, Z. Anxiety, Depression, and Their Determinants in Adults with Type 2 Diabetes in Khyber Pakhtunkhwa: Exploring Psychological Distress. *Psychiatry Int.* **2025**, *6*, 125. https://doi.org/10.3390/psychiatryint6040125

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1. Introduction

Diabetes is a chronic medical condition characterized by elevated blood glucose level and is one of the leading causes of death and disability around the world [1]. Type 2 diabetes mellitus (T2DM) had an estimated global prevalence of 537 million in 2021, projected to reach 643 million by 2030 and 784 million by 2045, according to the International Diabetes Federation (IDF) [2]. The burden of diabetes is alarmingly high, progressively rising,

and a major public health concern worldwide [3]. According to the IDF atlas 2021, the comparative adult prevalence rate of T2DM in Pakistan is estimated to be 30.8%, which is the highest in the world [4].

Mental health illnesses, such as anxiety disorders and depression, concurrently make up a substantial portion of the global disease burden, with an estimated 4.05% (301 million) of the global population suffering from an anxiety disorder [5]. People with diabetes are twice as likely to have anxiety and depression compared to those without diabetes [6]. According to the World Health Organization (WHO), 31% of T2DM globally suffer from some symptoms of depression, while 11% of diabetic patients have a major depressive disorder, which is approximately twice as high as the prevalence of depression in non-diabetics [7,8]. According to the literature, nearly half of people (232 million) with hyperglycemia remain unaware of their disease status [9]. Similarly, in around two-thirds of diabetes patients, anxiety and depression remains undiagnosed and hence untreated, particularly in developing countries, resulting in poor treatment outcomes of T2DM [10]. The population of Pakistan is experiencing rapid growth and is projected to reach 403 million by 2050, almost doubling from its current estimate to 240.5 million, pointing to the potential extent of disease burden in the future [11].

Common co-morbidities associated with type 2 diabetes include hypertension, hyperlipidemia, obesity, coronary heart disease, cerebrovascular disease (stroke), diabetic retinopathy diabetic nephropathy (kidney disease), and mental health conditions. Anxiety and depression are prevalent co-morbidities in adults with type 2 diabetes, offering serious challenges for both patients and healthcare professionals in disease management and general well-being [12]. Type 2 diabetes and mental disorders such as anxiety and depression have a bi-directional relationship, suggesting an increased risk of type 2 diabetes in people with anxiety and depression, as well as those suffering from type 2 diabetes being at high risk of some form of anxiety and depression, and hence affected mental health [13,14]. The high prevalence of anxiety and depression among persons with diabetes is attributed to several factors, such as burden of self-management, inflammation and lifestyle behaviors [15]. Co-morbid anxiety and depression in diabetes are linked to poor glycemic control and adverse health outcomes, including a higher risk of diabetes-related complications, increased physical morbidity, poor quality of life, and a greater likelihood of premature death compared to depression or anxiety alone [16]. Mental health problems in type 2 diabetes are reported to be associated with worse self-care behavior, affecting diet, exercise, medication, and regular blood glucose monitoring [17]. Diabetes, due to its chronic nature, requires lifelong commitment of blood glucose levels monitoring, a rigorous dietary regimen, and taking medication and insulin [18,19]. The chronic nature and burden of self-management in type 2 diabetes promotes mental health problems [20]. Psychological wellbeing through improved self-care and positive behaviors is reported to be linked with better glycemic control, prevention of complications, and lower mortality rates in T2DM [21].Therefore, integrated care for both type 2 diabetes and mental health problems through the collaborative care model has been suggested as an effective method for the management of multi-morbidity [22].

Despite the growing burden of diabetes in Pakistan, there is limited research on the psychosocial aspects of diabetes, including anxiety and depression. We aimed to assess the prevalence of co-morbid anxiety and depression and its associated factors among T2DM patients in the Khyber Pakhtunkhwa province of Pakistan in a province-wide community-based survey, using the Agha Khan University Anxiety and Depression Scale. This study addresses the regional data gap by providing province-wide, community-based evidence on the co-occurrence of anxiety and depression in diabetic patients, compared to the existing literature, which is mainly based on hospital-based studies with small sample sizes. The

findings of this study will contribute to policy making that promotes integrated care for both diabetes and mental healthcare.

2. Methods

The department of public health and social sciences at Khyber Medical University conducted this community-based cross-sectional study from March to September 2016, with operational support from the Population Welfare Department, Khyber Pakhtunkhwa (KP). The target population of the study was the entire adult population (aged 18 years and above) residing in the twenty-four districts of KP [23].

2.1. Sample Size and Study Population

The sample size was estimated based on the results of the Multiple Indicator Cluster Survey 2010 (MICS). We used multi-staged stratified cluster sampling for the sample selection. Selected districts comprised rural and urban areas. Urban areas were divided into enumeration blocks on the low-, middle-, and high-income groups and rural areas were divided into mohallas/villages. These were the primary sampling units (PSUs). Then, further villages/mohallas from the rural areas and enumeration blocks from the urban areas were selected. Each enumeration block/village/mohallas comprised 250–300 households.

Line listing of the selected enumeration blocks for urban areas and mohallas/villages for rural areas was performed. Sixteen households per rural primary sampling unit (PSU) and twelve households per urban enumeration block (PSU) were selected for data collection, and these were the secondary sampling units (SSUs). From the urban areas, a total of 3756 households were selected, and 11,968 households were selected from the rural areas of these seven districts, making a total sample of 15,724 households. Individual-level data were collected from all eligible members within each selected household. Since multiple individuals could come from the same household, regression models were adjusted for intra-household clustering using robust standard errors.

Trained field workers collected the data and out of the 15,724 surveyed individuals, 768 were identified as type 2 diabetes patients and were included in the analysis for anxiety and depression.

Ethical approval was granted from the Khyber Medical University ethical board (DIR/KMU-EB/SP/000395). Conditions that may affect data collection, i.e., attendant absent at the time of interview and refusal to participate, resulted in exclusion. Face to face interviews were conducted at the participant's home to collect information on demographics (including age, gender, residential area, formal education, marital status, average monthly income, and occupation) using a paper questionnaire in local languages. Weight in kilograms and height in meters was recorded using wooden stadiometers and digital weight scales, respectively, provided by the World Food Program—Pakistan, and an average of the three readings was recorded and used to calculate Body Mass Index.

2.2. Outcome Variables and Assessment Scales

The primary outcome variable was the prevalence of anxiety and depression measured using the validated Agha Khan University Anxiety and Depression Scale (AKUADS). The Aga Khan University Anxiety and Depression Scale (AKUADS) is a screening instrument created in Pakistan to detect signs of anxiety and depression in both community and clinical settings. It was intended to be culturally and linguistically appropriate for the local community. The scale has 25 items, 13 of which are psychological symptoms (e.g., depression, irritation, loss of interest) and 12 of which are somatic.

In our study we used a binary outcome, positive versus negative, for anxiety and depression, which reduces the risk of ceiling effect biasing prevalence estimates.

The AKUADS is a culturally sensitive screening tool developed in Pakistan to assess psychological distress, specifically focusing on the constructs of anxiety and depression. With a sensitivity of 66%, specificity of 79%, positive predictive value of 83%, and negative predictive value of 60% when compared to a psychiatrist's clinical diagnosis, it has shown good psychometric performance. According to reports, the scale's internal consistency is satisfactory (Cronbach's alpha = 0.83). These characteristics demonstrate that AKUADS is a valid and dependable instrument for identifying depression and anxiety in Pakistani clinical and community settings, which makes it suitable for the study population. It was designed to be used in community settings and is suitable for both clinical and non-clinical populations.

The exposure variable was type 2 diabetes and defined as a self-reported diagnosis by a certified medical doctor. Age was categorized into two groups, ≤40 and >40 years. The residential area was classified as urban and rural based on local government criteria. Occupation was recorded as government servant, private servant, self-employed, retired, unemployed, and housewife. Marital status was categorized as unmarried, married, divorced, and widowed. Education was categorized as no formal education, primary level, secondary level, and graduate level. Body mass index (BMI) was categorized as underweight, normal weight, overweight, and obese. Self-reported pain was subjectively reported (not clinically measured) and according to the intensity was classified into no pain–mild pain and moderate–severe pain. Smoking was categorized into never smoker, ex-smoker, and current smoker.

2.3. Statistical Analysis

Differences in the characteristics of participants by depression category were analyzed using the χ^2 test for categorical data. A multivariate logistic regression model was used for the association between anxiety, depression, and its associated factors, i.e., age, gender, residence area, education, occupation, BMI, self-reported pain, and smoking status.

3. Results

This community-based survey revealed that around one third (31.64%) of known diabetes patients suffered from anxiety and depression. We found a significantly higher prevalence of anxiety and depression in individuals aged ≤40 years (37.75%), female participants (40.58%), participants with no formal education (38.48%), people who never married and people who were divorced (31.87% and 50%, respectively), housewives (38.04%), underweight participants (55%), those residing in rural areas (34.76%), those with self-reported pain (40.05%), people with moderate to severe pain intensity (42.18%) and current smokers (43.14%), among type 2 diabetes patients.

Table 1 presents a bivariate analysis of 768 participants with type 2 diabetes, indicating the prevalence of anxiety and depression among participants with various demographical characteristics.

Table 1. Association between depression and demographic characteristics of known diabetes patients (*n* = 768).

Age (Years)	Anxious and Depressed	Non-Anxious and Non-Depressed	*p*-Value
≤40	77 (37.75)	127 (62.25)	0.04
>40	166 (30.35)	381 (69.65)	
Mean age	48.15 (±12.64)	49.20 (±12.10)	0.27
Gender			
Male	116 (26.48)	322 (73.52)	0.001
Female	127 (40.58)	186 (59.42)	

Table 1. *Cont.*

Age (Years)	Anxious and Depressed	Non-Anxious and Non-Depressed	*p*-Value
Education			
No formal education	157 (38.48)	251 (61.52)	0.002
Primary level	48 (32)	102 (68)	
Secondary level	32 (23.53)	104 (76.47)	
Graduation level	6 (10.53)	51 (89.47)	
Marital Status			
Never married	11 (28.21)	28 (71.79)	0.05
Married	218 (31.87)	466 (68.13)	
Divorced	14 (50)	14 (50)	
Occupation			
Government employed	14 (20.9)	53 (79.1)	0.03
Privately employed	20 (35.71)	36 (64.29)	
Self-employed	45 (25)	135 (75)	
Retired	14 (25.93)	40 (74.07)	
Unemployed	29 (32.95)	59 (67.05)	
Housewife	97 (38.04)	158 (61.96)	
BMI Asian Cut-offs			
Missing	86 (36.44)	150 (63.56)	0.01
Underweight	22 (55)	18 (45)	
Normal weight	66 (29.2)	160 (70.8)	
Overweight	36 (24.83)	109 (75.17)	
Obese	33 (31.73)	71 (68.27)	
Residence			
Urban	56 (26.29)	157 (73.71)	0.08
Rural	187 (34.76)	351 (65.24)	
Self-Reported Pain			
No	50 (18.73)	217 (81.27)	<0.001
Yes	163 (40.05)	244 (59.95)	
Self-Reported Pain Intensity			
Missing	87 (23.97)	276 (76.03)	0.005
Not applicable	0 (0)	11 (100)	
No pain to mild pain	67 (40.36)	99 (59.64)	
Moderate to severe pain	89 (42.18)	122 (57.82)	
Smoking Status			
Missing	75 (44.64)	93 (55.36)	0.002
Never smoker	132 (26.72)	362 (73.28)	
Ex-smoker	14 (36.84)	24 (63.16)	
Current smoker	22 (43.14)	29 (56.86)	

Considering age, participants aged ≤40 years had a higher prevalence (37.75%) of anxiety and depression compared to individuals older than 40 years (30.35%) (*p*-value = 0.04). The mean age of anxious and depressed patients was 48.15 and that of non-anxious and

non-depressed patients was 49.20 (p-value 0.27). Female participants were found to have more anxiety and depression (40.58%) compared to 26.48% of males (p-value = 0.0010). A significantly higher percentage of anxiety and depression (38.48%) was reported in individuals with no formal education. The prevalence of anxiety and depression was found to decline in individuals with progressively higher levels of education: primary level (32%), secondary level (23.53%), and graduation level (10.53%) (p-value = 0.002). These results highlight the potential protective effect of gaining higher education on the psychological wellbeing of type 2 diabetes patients. Education may contribute to improved health literacy, better coping strategies, and access to healthcare.

Individuals who were never married had an anxiety and depression rate of 28.21%, while those who were married and divorced had 31.87% and 50% rates of anxiety and depression, respectively (p-value = 0.05) (Table 1).

Considering occupation, housewives had higher rate of anxiety and depression (38.04%) compared to the other mentioned groups. The anxiety and depression varied significantly by employment status, i.e., privately employed (35.71%), self-employed (25%), retired (25.93%), unemployed (32.95%), and housewives (38.04%) (p-value = 0.02) (Table 1). This indicated a potential association between unemployment and poor mental health status. Individuals not engaged in employment may experience anxiety and depression due to possible lower self-esteem, isolation, and financial stress.

A higher percentage of underweight individuals (55%) reported having anxiety and depression in comparison with participants with normal weight (29.2%), overweight participants (24.83%), and obese participants (31.73%) (p-value = 0.03). A higher percentage (34.76%) of individuals residing in rural areas reported having anxiety and depression compared to those residing in urban areas (26.29%) (p-value = 0.02) (Table 1).

Similarly, a higher percentage (40.05%) of participants were found to have anxiety and depression linked with self-reported pain, compared to 18.73% of people who were without pain (p-value < 0.001). Those suffering from moderate to severe pain had higher rates (42.18%) of anxiety and depression compared to individuals with no pain or suffering from mild pain (40.36%), with a statistically significant difference (p-value = 0.005). Current smokers had a higher prevalence of anxiety and depression (43.14%) compared to ex-smokers (36.84%), while those who had never smoked had a considerably lower prevalence rate (26.72%) (Table 1).

Table 2 presents the adjusted odds ratios with 95% confidence intervals (CIs) for the association between various sociodemographic and clinical characteristics and the likelihood of anxiety and depression in 768 patients with type 2 diabetes.

Table 2. Multivariate logistic regression to see the association between depression and background characteristics of the known diabetic study participants (n = 768).

Anxiety and Depression	Odds Ratio	[95% Conf. Interval]	p-Value
Age in years	1.01	0.99, 1.03	0.307
Gender			
Male		Reference	
Female	1.61	0.57, 4.54	0.369
Education Status			
No formal education		Reference	
Primary	1.26	0.67, 2.36	0.467
Secondary and above	0.75	0.34, 1.61	0.455

Table 2. *Cont.*

Anxiety and Depression	Odds Ratio	[95% Conf. Interval]	*p*-Value
Marital Status			
Never married		Reference	
Married	0.56	0.20, 1.52	0.255
Divorced	2.92	0.62, 13.81	0.177
Occupation			
Govt employed		Reference	
Private	2.38	0.81, 7.03	0.115
Self-employed	1.08	0.40, 2.88	0.881
Retired	0.86	0.25, 2.99	0.813
Unemployed	1.69	0.59, 4.81	0.325
Housewife	1.22	0.35, 4.26	0.756
Body Mass Index (Asian)			
Underweight	5.13	2.27, 11.62	<0.001
Normal weight		Reference	
Overweight	0.79	0.44, 1.42	0.434
Obese	1.06	0.57, 1.96	0.848
Area of Residence			
Urban		Reference	
Rural	1.13	0.66, 1.92	0.65
Self-Reported Pain			
No		Reference	
Yes	2.74	1.61, 4.67	<0.001

Underweight individuals had significantly higher odds OR: 5.13 (95% CI: 2.27–11.62), $p < 0.001$ making this the most prominent risk factor in the model. Other BMI categories were not significantly associated.

Participants who reported experiencing pain had higher odds OR: OR: 2.74 (95% CI: 1.61–4.67), $p < 0.001$ compared those with no pain. This was statistically significant, indicating pain as a key contributor to psychological distress.

These findings indicate the multifactorial nature of mental health problems in type 2 diabetes patients and suggest psychological interventions, particularly in individuals with chronic pain and underweight BMI.

4. Discussion

This community-based survey revealed that around one third (31.64%) of known diabetes patients suffered from anxiety and depression. We found a significantly higher prevalence of anxiety and depression in individuals aged $\leq$40 years (37.75%), female participants (40.58%), participants with no formal education (38.48%), people who never married and people who were divorced (31.87% and 50%, respectively), housewives (38.04%), underweight participants (55%), those residing in rural areas (34.76%), those with self-reported pain (40.05%), people with moderate to severe pain intensity (42.18%), and current smokers (43.14%), among type 2 diabetes patients. These findings suggest multiple demographic, psychosocial, and lifestyle-related factors with a possible compounding effect on

mental health status in type 2 diabetes. Further exploration of the interrelation between these factors could provide more clarity and help in designing interventions to improve psychological morbidity in these patients.

Shishir Paudel et al. [24] found similar prevalence of anxiety and depression (31.4% and 36.4%, respectively). The data was collected using a face to face interview technique. However, the questionnaire consisted of different sections, including the Patient Health Questionnaire (PHQ-9). Similarly, Rym Ben Othman et al. [25] reported 36.8% depression in T2DM patients by using a different assessment tool, the Hospital Anxiety and Depression Scale, compared to AKUADS used in our study. Regardless of the assessment method used, there remains consistency across different populations and diagnostic tools used. However, comparison of prevalence across different settings necessitates careful interpretation due to tool specific variations.

However, Rajesh Rajput et al. [26] reported depression (26.3%) and anxiety (11.2%) among T2DM patients. The reported lower rates could be due to the exclusion criteria used in the study, not including patients with history of chronic illnesses other than diabetes or those who were terminally ill or required hospitalization. In a similar study, Niloofar et al. [27] reported 72% of the T2DM patients as having depression, suggesting a significant association between the two conditions. In this study, a total number of 100 type 2 diabetics with microvascular complications were assessed for depression. The higher percentage of depression reported in this study may have resulted due to the microvascular complications in T2DM, thus resulting in participants having complications due to diabetes.

This discrepancy indicates that factors like study design and participant selection criteria impact the prevalence rates.

Shengxin Liu et al. [28] reported an association between early-onset type 2 diabetes and psychiatric disorders including anxiety and stress. It reported that individuals diagnosed with early-onset diabetes are at high risk of any diagnosis, followed by unipolar depression, bipolar disorder, and anxiety and stress related disorders. Upon univariate analysis, we found a borderline association between age and depression and anxiety among type 2 diabetes, but on multivariate regression the association did not remain. We have also reported a higher rate of anxiety and depression among individuals aged $\leq$40 years, which could be due to genetic factor, as mentioned in the above study. Similarly, Batholomew Chireh et al. [29] reported decreased prevalence of self-reported depression and anxiety with increasing age. Young individuals, due to psychological vulnerability and possible emotional exhaustion, may continue to struggle with the lifelong burden of type 2 diabetes management. Social expectations and possible career disruptions due to illness may aggravate mental health problems in this age group.

Numerous studies, including Tania Dehesh et al. [30], have reported that women had higher rates of depression compared to men, which is in line with our findings upon multivariate regression (OR 1.44 (0.52–3.96 95% CI)). This could be due to the emotional vulnerability of women due to gender-specific differences such as childbirth and the menstrual cycle [31]. The burden of self-management of type 2 diabetes combined with caregiving responsibilities and sociocultural pressures may contribute to higher depression rates in women.

The positive impact of higher education on lower anxiety and depression rates is reported by several studies [32] due to the possible influence of education on income as well as increased knowledge and self-care, providing a protective effect against both anxiety and depression [33]. Enhanced awareness about psychological problems and timely help-seeking behavior in individuals with higher education may contribute to lower anxiety and depression rates. Our findings shows negative dose–response correlation

between educational attainment and the incidence of anxiety and depression in adults with diabetes, suggesting that increased educational levels are linked to reduced rates of anxiety and depression (Table 1). Upon multivariate regression, participants with primary-level education had a higher but statistically non-significant odds ratio (OR 1.26), while secondary and higher levels showed lower odds (OR 0.75), indicating the protective effect of education.

Marital status plays an important role in the mental health of type 2 diabetes patients. Divorced and widowed individuals experience higher levels of anxiety and depression, as reported by Alen et al. [34], due to higher levels of stress and social isolation. On the contrary, we did not find any significant association after the multivariate regression. According to our study, divorced people had higher odds (OR 2.92) of anxiety and depression upon multivariate regression, compared to those who never married, but this was not statistically significant.

Housewives seem to experience higher levels of anxiety and depression due to economic dependency, burden of household chores, and possible lack of social interactions, which is in line with our findings and suggested by the literature [35]. The absence of emotional support and important social connections can affect mental health, particularly in individuals managing challenges of living with a chronic disease. According to our findings, housewives had higher odds (OR 1.22) upon multivariate regression compared to those with government employment, but the association was not statistically significant.

Obesity is common in diabetes and is reported to be linked with increased physical and mental concerns. Obesity being a potential social stigma, as well as obesity-related pain, lack of mobility, and the psychological burden of managing both diabetes and obesity contribute to higher anxiety and depression levels [36]. While we observed notable anxiety and depression among obese individuals (31.73%), lower BMI categories showed a statistically significant association. On the contrary, we found that individuals with lower BMI (underweight) had statistically significant higher odds of anxiety and depression upon multivariate regression (OR 5.13, $p < 0.001$) compared to the normal BMI individuals. The underweight BMI, potentially due to raised glycemic levels or possible complications, may suggest disease severity and possible association with poor mental health status.

Participants from rural areas had higher prevalence of anxiety and depression compared to participants from urban areas (34.76% vs. 26.29%), but the adjusted odds ratio showed no significant difference. This could be due to the lack of healthcare services leading to untreated mental health concerns in rural areas, as reported by other studies [37].

Pain was the most prominent and statistically significant contributing factor to anxiety and depression, with an adjusted OR of 2.74 ($p < 0.001$) on multivariate regression. This provides supporting evidence that chronic physical symptoms contribute to mental health problems in diabetes patients.

The prevalence of anxiety and depression in T2DM patents varies widely due to several reasons, including different methods and screening tools used for the assessment of anxiety and depression, clinical or outpatient screening, ethnicity of the participants, gender composition, and age groups of the patients. Assessment of anxiety and depression is difficult in diabetes, as it can manifest in various forms and at different stages of the disease, and can be due to different reasons, including the chronic nature of the disease, the burden of self-management, and being a side effect of the medications. However, T2DM patients are for several reasons clearly at high risk for anxiety and depression, which can influence self-care management and outcomes of diabetes. Therefore, timely detection and intervention to address co-morbid depression in T2DM is required.

4.1. Strengths

This population-based survey was conducted in all twenty-four districts of the KP province—the largest health survey conducted to date in the province of Khyber Pakhtunkhwa. A validated tool was used for assessing anxiety and depression in the population in Pakistan. The data collection tool was in Urdu, the national language of Pakistan.

4.2. Limitations

The limitations of the study included reliance on self-reporting of known type 2 diabetes in the adult population of Khyber Pakhtunkhwa province rather than using a diagnostic test, which could have resulted in higher prevalence of type 2 diabetes.

This study did not include other co-morbidities which could potentially contribute to mental health problems, including anxiety and depression, among type 2 diabetes participants. Therefore, further studies should be performed to explore the influence of other co-morbidities associated with type 2 diabetes.

This study was unable to include a four-way comparison due to data restrictions, which is acknowledged as a critical constraint and advised for future research consideration.

5. Conclusions

The study suggests that anxiety and depression is highly prevalent in persons with type 2 diabetes in Khyber Pakhtunkhwa, Pakistan. Diabetes management is adversely impacted by co-morbid anxiety and depression, which can result in complications and poor outcomes. The need to create solutions for improved anxiety and depression management in patients with type 2 diabetes is made evident by factors including younger age, female gender, low education levels, divorced/housewife status, underweight BMI, rural area residence, and smoking habit.

6. Recommendations

Incorporating sex-specific approaches in diabetes management, particularly regarding cardiovascular risk, lifestyle choices, and psychological support, is important. Women with type 2 diabetes show greater relative risk of CVD and mortality than men; therefore, healthcare providers should implement gender-tailored care, with aggressive cardiovascular screening, routine mental health assessment, and lifestyle interventions addressing women's unique barriers.

Author Contributions: Conceptualization, S.A., S.F., B.H., I.U.H., N.M.A. and Z.U.H.; methodology, S.A., S.F., B.H., I.U.H., N.M.A. and Z.U.H.; software, S.A., S.F., B.H., I.U.H., N.M.A. and Z.U.H.; validation, S.A., S.F., B.H., I.U.H., N.M.A. and Z.U.H.; formal analysis, S.A., S.F., B.H., I.U.H. and Z.U.H.; data curation, S.A., S.F., I.U.H. and Z.U.H.; writing—original draft preparation, S.A., S.F., B.H., I.U.H., N.M.A. and Z.U.H.; writing—review and editing, S.A. and I.U.H.; visualization, I.U.H.; supervision, Z.U.H. and S.F. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Khyber Medical University ethical board (Approval Code: DIR/KMU-EB/PD/000233; Approval date: 2 February 2016).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author due to ethical approval requirements.

Conflicts of Interest: The authors declare no conflicts of interest.

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