Prevalence and determinants of anxiety and depression symptoms in patients with type 2 diabetes in Lithuania

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
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Source of support: Departmental sources

Background: Depression is associated with a variety of diabetes complications, including diabetic retinopathy, nephropathy, neuropathy, and macrovascular complications. The prevalence of the symptoms of anxiety (32%) and depression (22.4%) in patients with diabetes is considerably higher than in general population samples (10%). The aim of this study was to evaluate the prevalence and determinants of anxiety and depression symptoms in patients with type 2 diabetes (T2DM).

Material/Methods: This survey was conducted during 2007-2010. In total, 1500 patients were invited to participate in the study. The Hospital Anxiety and Depression Scale (HADS) was used to measure depression and anxiety for the evaluation of the depressive state and anxiety. Statistical analysis was carried out using SPSS 17.0.

Results: More than 70% of all respondents who participated in the study had diabetes mellitus complications (72.2%). The prevalence of mild to severe depression score was 28.5% (95% CI 25.7–31.4). The prevalence of anxiety was 42.4% (95% CI 39.3–45.5). Anxiety was more frequent among females (46.8%) than among males (34.7%) (p<0.001). A significant negative trend was observed between prevalence of anxiety and depression, and age and education (p for trend <0.001).

Conclusions: A significant association between depression and diabetic complications was identified (p<0.05). Duration of diabetes was a risk factor significantly associated with higher scores of anxiety among the patients with T2DM.

MeSH Keywords: Diabetes Mellitus, Type 2 – complications • Depression • Anxiety • HAD scale

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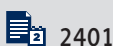
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Background

According to the World Health Organization (WHO), diabetes is likely to be one of the most substantial threats to human health in the 21st century; 346 million people worldwide have diabetes [1]. The number of patients more than doubled during the last 15 years [2]. Type 2 diabetes typically develops in older people. Among people aged 65 years and older, type 2 diabetes is diagnosed 10 times more frequently than in people younger than age 45 years [3]. However, it has been noticed that the average age of patients with type 2 diabetes mellitus is decreasing.

Depression is associated with a variety of diabetes complications (diabetic retinopathy, nephropathy, neuropathy, and macrovascular complications) [4]. After the diagnosis of diabetes mellitus, people must change their everyday lifestyle and adapt to the new conditions of life; also, they experience many negative emotions that cause lower social adaptation, and they experience decreased efficiency and disability. The prevalence of the symptoms of anxiety (32%) and depression (22.4%) in patients with diabetes is considerably higher than in general population samples (10%) [5,6]. Diabetes doubles the likelihood of comorbid depression, which is present in approximately 30% of patients with type 1 or type 2 diabetes [7].

A study by Khuwaja et al. found that the prevalence of depression and anxiety among adults with type 2 diabetes was 44% and 58%, respectively [8]. Both depression and anxiety have been found to have a negative impact on diabetes.

Different studies have been performed and are currently being carried out in a number of countries all over the world to analyze the influence of various factors, including disease, its duration [9], social factors, complications [10], and treatment methods, on the emotional state of diabetic patients. Evidence from several studies suggests that detection and effective treatment of depression can improve diabetic control [11].

The presence of symptoms of depression significantly impairs the health-related quality of life among individuals with type 2 diabetes [12]. Anxiety and depression symptoms often remain unrecognized and, thus, untreated. Screening for and treatment of anxiety and depression may lead to a better medical prognosis and better quality of life. It is important to estimate the prevalence of anxiety and depression symptoms and factors associated with these symptoms in patients with diabetes. There is limited or controversial information regarding factors associated with anxiety and depression in patients with type 2 diabetes.

The aim of this study was to evaluate prevalence and determinants of anxiety and depression symptoms in patients with type 2 diabetes (T2DM).

Material and Methods

The survey was conducted during 2007–2010. Patients were selected for the survey by applying the following inclusion criteria: men and women, 35 years of age or older, with type 2 diabetes mellitus, and without any acute diseases diagnosed during the survey.

The Hospital Anxiety and Depression Scale (HADS) [13] was used to measure depression and anxiety for the evaluation of depressive state and anxiety. It is well-validated instrument and has been used in other chronic disease patient populations. HADS consists of 14 statements: 7 questions of the questionnaire are designed for anxiety symptoms, and the other 7 statements evaluate depression symptoms. This scale allows for a quick and detailed investigation of emotional state. Four possible answers (0-3) are given for the each statement, and the subjects must choose the one that most precisely reflects their condition last week. Possible values for depression and anxiety are from 0 to 21. The results for the depression and anxiety are summed and evaluated separately: a score of 0–7 means there is no depression or anxiety and a score of 8 or over means there is depression or anxiety. A brief patient health questionnaire was used to collect demographic data, duration of the disease (in years), complications, and arterial hypertension.

The study was approved by Lithuanian Bioethics Committee and the survey was conducted in compliance with the requirements of the professional ethics of sociological-medical research. In total, 1500 patients were invited to participate in study. Before presenting the survey form, the subjects were given instructions on filling out the form. After agreeing to participate in the survey, the subjects filled out the provided forms independently.

According to the duration of the disease, the patients were distributed into 4 groups: patients who had diabetes for up to 5 years, patients who had diabetes for 6-10 years, those who had the disease for 11-15 years, and those who had diabetes for 16 years or more.

We evaluated the distribution of the respondents according to the following complications of diabetes: nephropathy, retinopathy, angiopathy, and polyneuropathy of legs. Also, they were asked if they were diagnosed with arterial hypertension, and whether they used medicines for the treatment of hypertension. The prevalence of anxiety and depression symptoms were assessed using HADS cut-off points: 0–7 indicating there is no depression or anxiety and 8 and over indicating there is depression or anxiety. Traditional descriptive and deductive statistical methods were used for the statistical analysis. Descriptive statistics were carried out for demographic and

diabetes-related variables. Pearson's χ^2 test was used for categorical data analysis and the extended Mantel-Haenszel test was used for trend. The anxiety and depression scores were dichotomized prior to regression analysis: 0–7 was defined as a normal score, 8–21 was defined as a mild to severe anxiety or depression score. The odds ratios (OR) for anxiety and depression were estimated using multivariate logistic regression with adjustment for relevant confounders. Socio-demographic variables were specified in block 1 and health status and behavior variables were specified in block 2. Standard method was used for model building.

Any *p*-values lower than 0.05 were considered significant. The SPSS (v. 13.00) statistical package was used in the analysis.

Results

The overall response rate was 68% (1022 patients). Table 1 shows the general characteristics of patients. Of 1022 subjects, 36.4% were males, and 63.6% were females. The most patients were in age groups of 55–64 years (38.1%) and 65–74 years (32.2%) (mean age – 59.3 years (median – 59.0). Mean disease duration was 8.8 years (median - 7.0). More than 70% of all respondents who participated in the study had diabetes mellitus complications (72.2%). Retinopathy (57.5%) and angiopathy (54.6%) were the most common complications of T2DM. Arterial hypertension (AH) was self-reported by 74.4% of patients with T2DM.

The majority of patients (71.5%) had no depression symptoms (normal score ≤7). The prevalence mild to severe depression score was 28.5% (95% CI 25.7–31.4) (Table 2). Depression symptoms were more prevalent in females (32.3%) than in males (21.8%) (p<0.001). The prevalence of anxiety was 42.4% (95% 39.3–45.5). Anxiety was more frequent among females (46.8%) than among males (34.7%) (p<0.001). A significant negative trend was observed between prevalence of anxiety and depression, and age and education (p for trend <0.001). Higher anxiety and depression prevalence were associated with older age and lower educational attainment. Marital status was associated with anxiety and depression prevalence (p<0.001). The prevalence of anxiety and depression symptoms among unmarried people was 55.6% (95%CI 35.3–74.5), while among married people it was 36.9% (95%CI 33.2–40.7) and 25% (95% CI21.8–28.5), respectively. Anxiety and depression were more prevalent among retired (49.5% [95% CI 44.8–54.3] and 33.3% [95% CI 28.9–37.9], respectively) and disabled persons (41.1% [95% CI31.7–51.1] and 40.2% [95% CI 30.8–50.1], respectively) compared with blue-collar and white-collar workers. Therefore, the prevalence of anxiety and depression symptoms were dependent from gender, age, marital status, education, and social status.

Table 1. General characteristics of patients with type 2 diabetes mellitus (n=1022).

Characteristics		N. (%)
Gender	Male	372 (36.4)
	Female	650 (63.6)
Age (years)	35–44	16 (1.6)
	45–54	287 (28.1)
	55–64	390 (38.1)
	65–74	329 (32.2)
	mean – 59.3 years; median – 59.0	
Duration of diabetes in years	up to 5 years	**366 (35.8)**
	6–10 years	**346 (33.9)**
	11–15 years	184 (18.0)
	≥16 years	126 (12.3)
Duration of diabetes in years: mean – 8.8; median – 7.0 (min. – 2, max. – 25)		
Had diabetes complications		**738 (72.2)**
of them:	nephropathy	343 (33.6)
	retinopathy	588 (57.5)
	angiopathy	558 (54.6)
	polyneuropathy of legs	329 (32.2)
Patients with arterial hypertension		**760 (74.4)**

The prevalence of depression symptoms was higher (p=0.007) among obese (31.0%, 95% CI 27.18–34.97) than among overweight respondents (23.3% [95%CI 19.45–27.59]). However, the prevalence of anxiety in these groups of patients was similar (40.3% and 43.0%, p=0.384). Prevalence of anxiety and depression symptoms was associated with duration of diabetes, diabetes complications, and self-reported arterial hypertension. The prevalence of anxiety and depression symptoms increases with increasing duration of the disease (p<0.001). Our study results confirmed that chronic complications of diabetes mellitus affected the emotional state of patients. The prevalence of anxiety and depression symptoms was higher among patients with complications (45.7% [95% CI 42.03–49.34] and 33.5% [95% CI 30.1–37.0]) and self-reported arterial hypertension (45.7% [95% CI 42.1–49.3] and 31.7% [95% CI 28.4–35.2]). Anxiety and depression symptoms were more prevalent among insulin users (47.9% [95% CI43.2–52.6] and 39.1% [95% CI 34.6–43.8], respectively). The prevalence of anxiety and depression symptoms was lower among respondents who had changed their diet (37.2% [95% CI 34.1–40.4]

Table 2. The prevalence of depression and anxiety among type 2 diabetes mellitus patients by socio-demographic characteristics.

Variables	n	Depression		p value	Anxiety		p value
		n (%)	95% CI		n (%)	95% CI	
Overall	1022	291 (28.5)	25.7–31.4		433 (42.4)	39.3–45.5	
Gender							
Male	372	81 (21.8)	17.7–26.3	<0.001	129 (34.7)	29.9–39.8	<0.001
Female	650	210 (32.3)	28.7–36.1		304 (46.8)	42.9–50.7	
Age (years)							
35–44	16	0	0.0–17.1		0	0.0–17.1	
45–54	287	47 (16.4)	12.3–21.2	<0.001*	68 (23.7)	19.0–28.9	<0.001*
55–64	390	110 (28.2)	23.8–32.9		166 (42.6)	37.7–47.5	
≥65	329	134 (40.7)	35.4–46.3		199 (60.5)	54.9–65.8	
Marital status							
Single	27	15 (55.6)	35.3–74.5		15 (55.6)	35.3–74.5	
Married	659	165 (25.0)	21.8–28.5	0.001	243 (36.9)	33.2–40.7	<0.001
Divorced	148	50 (33.8)	26.2–42.0		81 (54.7)	46.4–62.9	
Widow (-er)	188	61 (32.4)	25.8–39.6		94 (50.0)	42.6–57.4	
Education							
Elementary	117	68 (58.1)	48.64–67.11		64 (54.7)	45.23–63.92	
Incomplete secondary	139	45 (32.3)	24.69–40.83		70 (50.4)	41.76–58.94	
Secondary	274	78 (28.5)	23.20–34.21	<0.001*	113 (41.2)	35.35–47.32	<0.001*
Further education	302	62 (20.5)	16.13–25.53		112 (37.1)	31.62–42.81	
Higher	190	38 (20.0)	14.56–26.40		74 (38.9)	31.97–46.27	
Social status							
Blue-collar workers	254	49 (19.3)	14.63–24.69		75 (29.5)	23.99–35.55	
White-collars workers	223	53 (23.8)	13.34–29.91	<0.001	97 (43.5)	36.89–50.28	<0.001
Retiree	438	146 (33.3)	28.93–37.96		217 (49.5)	44.76–54.33	
Disabled	107	43 (40.2)	30.82–50.11		44 (41.1)	31.70–51.05	

95% CI – 95% confidence interval; * extended Mantel-Haenszel test for trend.

and 24.7% [95% CI 21.9–27.6], respectively). Increased physical activity after T2DM diagnosis was statistically significantly (p=0.004) associated with lower prevalence of anxiety symptoms (36.1% [95% CI 31.1–41.3]). We found no statistically significant association between smoking and prevalence of anxiety and depression symptoms by bivariate analysis (Table 3).

Results of the multivariable analysis for factors associated with anxiety and depression symptoms are given in Table 4 and Table 5. Age (older age), education (incomplete secondary, secondary *vs.* elementary), social status (white-collar workers *vs.* blue-collar workers), duration of diabetes, and complications were risk factors significantly associated with higher anxiety scores. Self-reported arterial hypertension, increased physical activity after T2DM diagnosis, and smoking were not significantly associated with anxiety.

Protective factors significantly associated with lower depression scores were: marital status, education, retiree (*vs.* blue-collar workers), and changed nutrition habits after T2DM diagnosis. Age (older age) and duration of diabetes were associated with

higher depression symptoms. Gender, complications, insulin using, self-reported arterial hypertension, increased physical activity after DM diagnosis, and smoking were not significantly associated with higher depression scores.

Discussion

Diabetes – particularly its complications – not only causes impairment of the physical health, but at the same time promotes occurrence of psycho-emotional and social problems [14]. After the diagnosis of diabetes mellitus, people must change their everyday lifestyle and adapt to the new conditions the life. They experience many negative emotions that cause lower social adaptation, and they face disability and decreased efficiency. Co-morbid major depression is a significant problem among patients with T2DM and/or coronary heart disease and this negatively impacts quality of life [15].

Most epidemiological studies indicate that diabetes is associated with an increased risk of depression [16]. In our

Table 3. The prevalence of depression and anxiety among type 2 diabetes mellitus patients by health status and behavior characteristics.

Variables	n	Depression		p value	Anxiety		p value
		n (%)	95% CI		n (%)	95% CI	
Duration of diabetes in years							
Up to 5	366	58 (15.8)	12.3–20.0	<0.001*	97 (26.5)	22.1–31.3	<0.001*
6–10	346	92 (26.6)	22.01–31.6		172 (49.7)	44.3–55.1	
11–15	184	79 (42.9)	35.7–50.4		90 (48.9)	41.5–56.4	
≥16	126	62 (49.2	40.2–58.3		74 (58.7)	49.6–67.4	
Complications							
Yes	738	247 (33.5)	30.1–37.0	<0.001	337 (45.7)	42.03–49.34	<0.001
No	284	44 (15.5)	11.5–20.2		56 (19.7)	15.25–24.83	
Self reported arterial hypertension							
Yes	760	241 (31.7)	28.4–35.2	<0.001	347 (45.7)	42.1–49.3	<0.001
No	262	50 (19.1)	14.5–24.9		86 (32.8)	27.2–38.9	
Insuline use							
Yes	432	169 (39.1)	34.6–43.8	<0.001	207 (47.9)	43.2–52.6	0.002
No	590	122 (20.7)	17.6–24.1		226 (38.3)	34.4–42.3	
Changed nutrition habits after DM diagnosis							
Yes	894	221 (24.7)	21.9–27.6	<0.001	333 (37.2)	34.1–40.4	<0.001
No	128	70 (54.7)	45.7–63.2		100 (78.1)	69.9–85.3	
Increased physical activity after DM diagnosis							
Yes	346	86 (24.9)	20.4–29.5	0.067	125 (36.1)	31.1–41.3	0.004
No	676	205 (30.3)	26.9–33.8		308 (45.6)	41.8–49.3	
Smoker							
Yes	451	115 (25.5)	21.5–29.6	0.061	186 (41.2)	36.4–45.8	0.517
No	571	176 (30.8)	27.1–34.7		247 (43.3)	43.8–52.1	

95% CI – 95% confidence interval; * extended Mantel-Haenszel test for trend.

study, depression was detected in 28.5% of the subjects: 32.3% for females, and 21.8% of males. Anxiety was found in 42.4% of the subjects. Anxiety – like depression – was more common (p<0.001) in females (46.8%) than in males (34.7%). Tellez-Zenteno and Cardiel reported a 39% prevalence of depression, and the risk for depression in females was more than twice as high (OR 2.95, CI 1.50–5.82, p=0.006) as in males [17].

Our study shows that insulin use did not affect the states of depression and anxiety, but it could lead to a longer duration of the disease and increase complications. In addition, insulin-treated patients had more advanced disease and poor patient performance status.

According to the literature, complications of T2DM negatively affect patient health, and health impairment due to T2DM complications increases the risk of depression [4,18]. According to Ell et al., depressive state was diagnosed in 30.2% of the subjects. Depressive states were significantly related to the complications of diabetes, the presence of other chronic diseases, anxiety, and poorer quality of life [19,20]. In our study

we found that the prevalence of anxiety was 42.4% (95% CI 39.3–45.5). Anxiety was more frequent among females (46.8%) than among males (34.7%) (p<0.001).

Previous studies showed that different chronic complications influence the depressive state: neuropathy [21], cardiovascular diseases [22], retinopathy [23], and nephropathy [11] have a direct impact on the depressive state of diabetic patients. Studies showed that depression and anxiety rate depended on the duration of the disease. According to a study performed in Norway (the HAD Scale was used), the probability that patients with type 2 diabetes would develop depression was the same as in the general population. The diabetes itself as a disease does not have any impact on the depressive state (ORo – 1.08; 95%, CI 0.70–1.65; p=0.740) – the strongest influence is exerted by complications and concomitant chronic diseases (ORo – 1.38; 95%, CI 1.10–1.74; p<0.005) [24].

Our study shows a significant negative trend between prevalence of anxiety and depression, and age and education (p for trend <0.001). Higher anxiety and depression prevalence were associated with older age and lower educational attainment.

Table 4. Determinants of anxiety in patients with type 2 diabetes mellitus.

Variables	ORc	ORa	CI (95%)	P value
Socio-demographic characteristics				
Gender				
Male	0.65	0.63	0.43–0.92	0.016
Female	1.00	1.00	–	
Age (years)				<0.001
45-54	1.00	1.00	–	–
55-64	2.39	2.12	1.40–3.19	<0.001
≥65	4.93	7.52	4.32–13.10	<0.001
Marital status				<0.001
Single	1.00	1.00	–	–
Married	0.49	0.34	0.14–0.83	0.018
Divorced	0.97	0.75	0.28–2.02	0.567
Widow (-er)	0.80	0.32	0.12–0.83	0.019
Education				0.189
Elementary	1.00	1.00	–	–
Incomplete secondary	0.84	2.07	1.09–3.92	0.026
Secondary	0.59	1.97	1.06–3.67	0.032
Further education	0.49	1.88	0.98–3.62	0.058
Higher	0.59	1.62	0.83–3.14	0.157
Social status				<0.001
Blue-collar workers	1.00	1.00	–	–
White-collars workers	2.04	2.39	1.41–4.05	0.001
Retiree	2.32	0.78	0.45–1.35	0.375
Disabled	1.65	0.94	0.52–1.71	0.850
Health status and behavior characteristics				
Duration of diabetes in years				<0.001
Up to 5	1.00	1.00	–	–
6–10	2.63	2.85	1.94–4.20	<0.001
11–15	2.52	2.24	1.38–3.65	0.001
≥16	3.74	2.92	1.64–5.22	<0.001
Complications				
Yes	3.95	2.32	1.51–3.56	<0.001
No	1.00	1.00	–	
Self-reported arterial hypertension				
Yes	1.56	0.91	0.62–1.34	0.637
No	1.00	1.00	–	
Insuline use				
Yes	1.44	0.61	0.42–0.87	0.007
No	1.00	1.00	–	
Changed nutrition habits after DM diagnosis				
Yes	0.17	0.22	0.13–0.38	<0.001
No	1.00	1.00	–	
Increased physical activity after DM diagnosis				
Yes	0.69	0.81	0.56–1.17	0.267
No	1.00	1.00	–	–
Smoker				
Yes	0.92	1.04	0.74–1.46	0.817
No	1.00	1.00	–	–

ORc – crude odds ratio; ORa – adjusted odds ratio; CI (95%) – 95% confidence interval; Model χ^2=259.10, df=23, p<0.0005. Cox and Snell R^2=0.227, Nagelkerke R^2=0.305.

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Table 5. Determinants of depression symptoms in patients with type 2 diabetes mellitus.

Variables	ORc	ORa	CI (95%)	P value
Socio-demographic characteristics				
Gender				
Male	0.62	0.68	0.46–1.02	0.063
Female	1.00	1.00	–	
Age (years)				<0.001
45–54	1.00	1.00	–	0.038
55–64	2.01	1.59	1.03–2.47	<0.001
≥65	3.51	3.50	1.97–6.19	
Marital status				<0.001
Single	1.00	1.00	–	–
Married	0.28	0.237	0.09–0.60	0.002
Divorced	0.41	0.225	0.08–0.61	0.003
Widow (-er)	0.38	0.122	0.05–0.33	<0.001
Education				0.008
Elementary	1.00	1.00	–	–
Incomplete secondary	0.35	0.51	0.28–0.92	0.026
Secondary	0.29	0.39	0.21–0.71	0.002
Further education	0.18	0.34	0.18–0.65	0.001
Higher	0.20	0.31	0.16–0.61	0.001
Social status				0.001
Blue-collar workers	1.00	1.00	–	–
White-collars workers	1.41	1.37	0.79–2.39	0.266
Retiree	2.07	0.52	0.29–0.94	0.030
Disabled	2.78	1.62	0.90–2.90	0.109
Health status and behavior characteristics				
Duration of diabetes in years				0.001
Up to 5	1.00	1.00	–	–
6–10	1.851	1.591	1.04–2.44	0.033
11–15	3.814	2.610	1.58–4.30	<0.001
≥16	4.911	2.403	1.35–4.27	0.003
Complications				
Yes	2.56	1.19	0.75–1.89	0.463
No	1.00	1.00		
Self-reported arterial hypertension				
Yes	1.82	1.29	0.86–1.93	0.226
No	1.00	1.00		
Insuline use				
Yes	2.41	1.29	0.89–1.8	0.178
No	1.00	1.00	–	
Changed nutrition habits after DM diagnosis				0.022
Yes	0.28	0.56	0.34–0.92	
No	1.00	1.00	–	–
Increased physical activity after DM diagnosis				
Yes	0.78	0.90	0.61–1.35	0.618
No	1.00	1.00	–	–
Smoker				
Yes	0.77	1.11	0.77–1.58	0.583
No	1.00	1.00	–	

ORc – crude odds ratio; ORa – adjusted odds ratio; CI (95%)– 95% confidence interval; Model χ^2=163.79, df=23, p<0.0005. Cox and Snell R^2=0.150, Nagelkerke R^2=0.215.

Marital status was associated with anxiety and depression prevalence (p<0.001).

A significant association between depression and diabetic complications has been identified. According to a meta-analysis by De Groot et al., the effect sizes for each complication were: 0.17 for retinopathy, 0.20 for macrovascular complications, 0.25 for nephropathy, 0.28 for neuropathy, and 0.32 for sexual dysfunction. The overall effect size was small to moderate (r=0.25), and was comparable between the 2 types of diabetes [25].

The data of our study confirmed that chronic complications of diabetes mellitus affected the emotional state of patients. The prevalence of anxiety and depression symptoms was higher among patients with complications (45.7% [95% CI42.03–49.34] and 33.5% [95% CI 30.1–37.0]) and self-reported arterial hypertension (45.7% [95% CI 42.1–49.3] and 31.7% [95% CI 28.4–35.2]).

A Canadian study found that smoking and depression are strongly associated in patients with type 2 diabetes, and this association appears to be strongest for moderate/heavy smokers [26]. However, we did not find a statistically significant association between smoking and prevalence of anxiety and depression symptoms by bivariate analysis.

Duration of the disease was relevant to lower rating of all fields of quality of the life except for evaluation of role limitations due to emotional problems, emotional state, and mental health [27]. In our study the results of the multivariable analysis for factors associated with anxiety and depression symptoms shows that diabetes duration was a risk factor significantly associated with higher scores of anxiety among patients with T2DM.

Our results confirmed the study results of Malaysian research findings that individuals with diabetes of less than 2-year duration were 1.6 times more likely to have depressive symptoms than individuals with diabetes of longer duration. Females and Asian Indians were 1.4 times more likely to have depressive symptoms compared to males and Malay diabetic individuals [28].

Conclusions

The prevalence of depression and anxiety among type 2 diabetes mellitus patients was statistically significantly higher in females than in males (p<0.001). A significant association between depression and diabetic complications was identified (p<0.05). Diabetes duration was a risk factor significantly associated with higher scores of anxiety among the patients with T2DM.

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