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Depression, anxiety and stress among patients with diabetes in primary care: A cross-sectional study

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Abstract

Background: The incidence of diabetes mellitus is ever increasing. Individuals with diabetes mellitus may have concurrent mental health disorders and are shown to have poorer disease outcomes. The objectives of this study were to determine the prevalence of depression, anxiety and stress (DAS) in diabetes patients aged 20 years or more in the primary care setting.

Methods: This was a cross-sectional study involving the use of self-administered questionnaire conducted in eight primary care private and government clinics in Pulau Pinang and Melaka, Malaysia. The validated DASS-21 questionnaire was used as a screening tool for the symptoms of DAS. Prior permission was obtained from the patients and, clearance from ethical committee was obtained before the start of the study. Data analysis was done using SPSS statistical software.

Results: A total of 320 patients with diabetes from eight centres were enrolled via convenience sampling. Sample size was calculated using the Kish's formula. The prevalence of DAS among patients with diabetes from our study was 26.6%, 40% and 19.4%, respectively. Depression was found to be significantly associated with marital status and family history of DAS; anxiety was significantly associated with monthly household income, presence of co-morbidities and family history of DAS; and stress was significantly associated with occupation and family history of DAS.

Conclusions: The prevalence of DAS was higher in patients with diabetes compared with the general community. We recommend to routinely screen all patients with diabetes using the DASS-21 questionnaire because it is easy to perform and inexpensive.

Background

Diabetes is a common chronic disease worldwide. Its prevalence is increasing and expected to be 366 million by the year 2030.[1] According to the Malaysian National Health and Morbidity Survey III (NHMS), the prevalence of diabetes mellitus among individuals aged 18 years or more has increased from 11.6% in 2006 to 15.2% in 2011.[2] It is well recognised that many individuals with chronic illnesses also have co-morbid unrecognised mental health disorders.[3] Detecting depression in a diabetic patient has important significance with regard to mortality, as there was a 54% greater mortality in patients with diabetics and depression than the non-diabetic ones.[4] The International Diabetes Federation has stressed the importance of integrating psychological care in the management of diabetes.[5]

Depression is a common mental disorder, characterised by sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, feelings of tiredness and poor concentration. It can be long-lasting or recurrent, substantially impairing a person's ability to function at work or school, or cope with daily life.[6]

Anxiety is defined as a feeling of worry, nervousness or unease about something with an uncertain outcome; whereas stress is a state of mental or emotional strain or tension resulting from adverse or demanding circumstances.[7]

Various studies have been done to determine the prevalence of depression, anxiety and stress (DAS) in patients with diabetes. Those with depression and diabetes have been shown to have poorer outcomes in the disease management.[8] This not only poses a great burden to the healthcare service and expenditure but also directly affects quality of life of patients.

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In Malaysia, there is a paucity of studies done on the prevalence of DAS among patients with diabetes presenting to the primary care clinics and regarding the various socio-demographic factors associated with it.

This study was carried out with the aim to determine the prevalence of DAS in patients with type 2 diabetes mellitus aged 20 years or more in primary care clinic settings, and to determine any association between DAS and patients' socio-demographic factors.

Methods

Study design

This was a cross-sectional study involving the use of a self-administered questionnaire that was conducted from January to June, 2014.

Study setting

This multi-centred study was conducted in a few selected clinics both in Penang and Melaka states of Malaysia. The centres consisted of both government and private primary care clinics.

Study population

Adult patients aged more than 20 years who were diagnosed with type 2 diabetes mellitus under follow-up of the respective clinics were included in the study.

Patients with cognitive impairment, end-stage renal failure, cancers and any major life-threatening diseases were excluded from the study.

Sampling and sample size

A total of 320 patients or 40 patients from each of the eight centres were obtained by means of convenience sampling. The minimum number of samples needed for the study was calculated using the Kish's formula:

Sample size = z^2 (p (1-p)/c^2)

Where z = 1.96 for 95% confidence interval (CI)
p = prevalence (of depression for diabetes mellitus based on Roshana study13: 20.8%), and
c = desired level of precision.

Data collection tools and measurements

A self-administered multi-language questionnaire consisting of three sections, (i) socio-demographic information (ii) severity of diabetes mellitus and (iii) detection of DAS, was given to the patients during clinic registration.

The socio-demographic data of the patients were recorded, including age, sex, ethnicity, religion, marital status, education level, occupations and household income. Factors that may affect the severity of diabetes mellitus were also recorded, such as smoking status, HbA1c level, duration of diabetes mellitus, presence of co-morbidities, complications and family history of diabetes mellitus.

The section on the detection of DAS was done using validated DASS-21 questionnaire. It is a set of three self-reported scales designed to measure the negative emotional states of DAS. The DASS-21 questionnaire has 21 items, assessing the symptoms of depression, anxiety and stress respectively. The patients were asked to rate their experience on each symptom on a 4-point severity scale ranging from '0' (does not apply to me), to '3' (applies to me most of the time). The DASS-21 questionnaire has been translated into multiple languages including Mandarin and Malay, which has been validated for its use.[9]

Scores of each scale were later summed up and categorised as normal, mild, moderate, severe and extremely severe according to the DASS manual.

Data collection procedure

Patients were screened for study eligibility by trained clinic staff on registration to see the doctor. They were given the patient information sheet, which was made available in multiple languages. Patients who agreed for the study were given the questionnaire to fill up while awaiting their turn to be seen by the doctor.

While inside the consultation room with the doctor, the questionnaire was checked for completion by the doctor. If needed, further details and explanation were given by the doctor. The section concerning the severity of the diabetes mellitus was completed by the doctor.

Data management and analysis

All questionnaires were checked for completeness and entered manually using SPSS statistical software version 20. All the continuous variables were expressed as mean and standard deviation. Frequencies and percentages for categorical variables were calculated. Pearson chi-square test was used to measure the association between the variables in the study. Predictors for outcomes were identified. Significant associations were defined as those with a *p*-value <0.05.

Application for ethical committee

The study had obtained ethical approval from both the Medical Ethics Committee of University Malaya Medical Centre and the Medical Review & Ethics Committee (MREC), Ministry of Health Malaysia.

Results

A total of 320 patients from eight centres involving government and private primary care clinics were successfully recruited for the survey.

Socio-demographic, clinical and other characteristics of the subjects

The demographic characteristics of the study population are shown in Table 1. The mean age of the patients was 57.1 ± 10.84 years. Majority of the respondents were 50–59 years old (35.0%), women (53.1%), Malays (49.4%) and married (77.8%). Almost 90% of the respondents had received some kind of formal education, and 13.1% of them had completed university or college education. Approximately 45% of respondents were employed and 34% of the respondents had monthly household income of more than RM 2000.

Table 1. Frequency distribution of respondents by socio-demographic characteristics and selected variables

Demographic characteristics (*n* = 320)	Mean	SD	*n*	Percentage
Age (years)				
<29	5.71	10.84	6	1.9
30–59			173	54.0
≥80			141	441
Sex				
Male			150	46.9
Female			170	53.1
Ethnicity				
Malay			158	49.4
Chinese			111	34.7
Indian			46	14.4
Others			5	1.6
Religion				
Islam			158	49.4
Buddhist			100	31.3
Christian			28	8.8
Hindu			30	9.4
Others			4	1.3
Martial Status				
Single			34	10.6
Married			249	77.8
Separated			12	3.8
Widow(er)			25	7.8

Table 1. Frequency distribution of respondents by socio-demographic characteristics and selected variables (Continued)

Education level				
No formal education			33	10.3
Primary school			90	28.1
Secondary school			155	48.4
University/college			42	13.1
Occupation				
Professional			33	10.3
Non-professional			115	35.9
Unemployed			110	35.4
Retired			62	19.4
Household income (RM)				
<1000			118	36.9
1001–2000			93	29.1
>2001			109	34.1
Smoking				
Smokers			61	19.1
Non-smokers			259	18.9
HbA1c (%)				
≤6.5	7.78	1.697	67	20.9
>6.5			253	79.1
Duration of diabetes (years)				
≤1	5.41	5.02	61	19.1
1–4.99			133	41.6
5.0–9.99			90	28.1
10.0–14.99			19	5.9
15.0–19.99			10	3.1
>20			7	2.2
Co-morbidity				
Yes			365	25.3
No			55	17.2
Compilation				
Yes			81	25.3
No			239	74.7
Family history of DAS				
Yes			16	5..0
No			304	95.0

The mean duration of diabetes mellitus was 5.41 ± 5.02 years and more than one-third (39.3%) of the respondents had been diagnosed with diabetes mellitus for more than 5 years. Approximately 80% of the respondents had HbA1c levels of more than 6.5%. The mean HbA1c level of the whole study population was 7.78% ± 1.7%. More than 80% of the respondents had at least one or more concurrent co-morbidities. One-quarter of the population had a known diabetic complication. Hypertension (68.1%) and dyslipidaemia (65.9%) were the top two co-morbidities in the study population.

Majority of the patients received only oral medication (74.4%) whereas 15% received a combination of both oral medication and insulin.

Only one subject was on insulin alone (0.3%). For follow-up of their conditions, the majority (60.9%) consulted their doctors once every 3 months or more.

Association between depression and socio-demographic variables

Table 2 shows the association between depression and socio-demographic variables of the subjects. On analysis using Pearson chi-square test, depression was found to be significantly associated with marital status and family history of DAS. Subjects who were married were less likely to be depressed (81.7%, $p = 0.031$). Family history of DAS was found to be strongly associated with depression (15.3%; $p<0.01$).

Table 2. Association between depression status and socio-demographic and clinical characteristic

Variable	Depression symptom				
	Yes (n = 85)	Percentage	No (n = 235)	Percentage	p-value
Age (years)					
Mean	56.13		57.45		0.338
Sex					
Male	33	(22.0)	117	(78.0)	0.083
Female	52	(30.6)	118	(69.4)	
Ethnicity					
Malay	34	(21.5)	124	(78.5)	0.183
Chinese	32	(28.8)	79	(71.2)	
Indian	18	(39.1)	28	(60.9)	
Others	1	(20.0)	4	(80.0)	
Religion					
Islam	35	(22.2)	123	(77.8)	0.297
Buddhist	28	(28.0)	72	(72.0)	
Christian	9	(32.1)	19	(67.9)	
Hindu	12	(40.0)	18	(60.0)	
Others	1	(25.0)	3	(75.0)	
Marital status					
Single	15	(44.1)	19	(55.9)	0.031
Married	57	(22.9)	192	(77.1)	
Separated	5	(41.7)	7	(58.3)	
Widow(er)	8	(32.0)	17	(68.0)	
Education level					
No formal education	7	(21.2)	26	(78.8)	0.385
Primary school	19	(21.1)	71	(78.9)	
Secondary school	46	(29.7)	109	(70.3)	
University/college	13	(40.0)	29	(69.0)	
Occupation					
Professional	9	(27.3)	24	(72.7)	0.129
Non-professional	39	(33.9)	76	(66.1)	
Unemployed	25	(22.7)	85	(77.3)	
Retired	12	(19.4)	50	(80.6)	

Table 2. Association between depression status and socio-demographic and clinical characteristic (Continue)

Household income (RM)					
<1000	32	(27.1)	86	(72.9)	0.334
1001–2000	29	(31.2)	64	(68.8)	
>2001	24	(22.0)	85	(78.0)	
Smoking					
Smokers	15	(24.6)	46	(75.4)	0.698
Non smokers	70	(27.0)	189	(73.0)	
HbA1c (%)					
Mean	7.7		7.8		0.624
Duration of diabetes (months)					
Mean	59.55		66.88		0.338
Duration of follow-up					
2 weeks	3	(42.9)	4	(57.1)	0.890
1 month	24	(25.0)	72	(75.0)	
2 months	6	(27.3)	16	(72.7)	
3 months	22	(27.5)	58	(72.5)	
5 months	30	(19.1)	85	(80.9)	
Diabetic treatment					
Lifestyle modification	11	(32.4)	23	(67.6)	0.568
Oral medication	59	(24.8)	179	(75.2)	
Oral and insulin	15	(31.9)	32	(68.1)	
Insulin only	0	(0)	1	(100.0)	
Co-morbidity					
Yes	69	(26.0)	196	(74.0)	0.641
No	16	(29.1)	39	(70.9)	
Complication					
Yes	25	(30.9)	56	(69.1)	0.31
No	60	(25.1)	179	(74.9)	
Family history of DAS					
Yes	13	(81.3)	3	(18.8)	<0.001
No	72	(23.7)	232	(76.3)	

Association between anxiety and socio-demographic variables

Table 3 shows the association between anxiety and socio-demographic variables of the subjects. Monthly household income (MHI), presence of co-morbidities and family history of DAS were found to be significantly associated with anxiety. Subjects with higher MHI (>RM 2001) appeared to have less anxiety (39.6%; p = 0.033). Of those with concomitant co-morbidities, 88.3% of the respondents also scored positive for anxiety (p = 0.034). Family history of DAS was found to be strongly associated with anxiety at (10.2%; p<0.001).

Table 3. Association between anxiety status and socio-demographic and clinical characteristic

Variable	Anxiety symptom				
	Yes (*n* = 128)	Percentage	No (*n* = 192)	Percentage	*p*-value
Age (years)					
Mean	57.27		59.68		0.812
Sex					
Male	52	(34.7)	98	(65.3)	0.067
Female	76	(44.7)	94	(55.3)	
Ethnicity					
Malay	68	(43.0)	90	(57.0)	0.429
Chinese	39	(35.1)	72	(64.9)	
Indian	20	(43.5)	26	(56.5)	
Others	1	(20.0)	4	(80.0)	
Religion					
Islam	67	(42.4)	91	(57.6)	0.469
Buddhist	35	(35.0)	65	(65.0)	
Christian	9	(32.1)	19	(67.9)	
Hindu	15	(50.0)	15	(50.0)	
Others	2	(50.0)	2	(50.0)	
Marital status					
Single	15	(61.8)	19	(38.2)	0.031
Married	94	(37.8)	155	(62.2)	
Separated	4	(33.3)	8	(66.7)	
Widow(er)	9	(36.0)	16	(64.0)	
Education level					
No formal education	17	(51.5)	16	(48.5)	0.404
Primary school	34	(37.8)	56	(62.2)	
Secondary school	58	(37.4)	97	(62.6)	
University/college	19	(45.2)	23	(54.8)	
Occupation					
Professional	10	(30.3)	23	(69.7)	0.446
Non-professional	47	(40.9)	68	(59.1)	
Unemployed	42	(38.2)	68	(61.8)	
Retired	29	(46.8)	33	(53.2)	
Household income (RM)					
<1000	55	(46.6)	63	(53.4)	0.033
1001–2000	40	(43.0)	53	(57.0)	
>2001	33	(30.3)	76	(69.7)	
Smoking					
Smokers	27	(44.3)	34	(55.7)	0.45
Non-smokers	101	(39.0)	158	(61.0)	
HbA1c (%)					
Mean	7.75		7.79		0.843
Duration of diabetes (months)					
Mean	62.67		66.44		0.584

Table 3. Association between anxiety status and socio-demographic and clinical characteristic (Continued)

Duration of follow-up					
2 weeks	2	(28.6)	5	(71.4)	0.436
1 month	39	(40.6)	57	(59.4)	
2 months	12	(54.5)	10	(45.5)	
3 months	27	(33.8)	53	(66.3)	
5 months	48	(41.7)	67	(58.3)	
Diabetic treatment					
Lifestyle modification	13	(38.2)	21	(61.8)	0.636
Oral medication	93	(39.1)	145	(60.9)	
Oral and insulin	22	(46.8)	25	(53.2)	
Insulin only	0	(0)	1	(100.0)	
Co-morbidity					
Yes	113	(42.6)	152	(57.4)	0.034
No	15	(27.3)	40	(72.7)	
Complication					
Yes	36	(44.4)	45	(55.6)	0.345
No	92	(38.5)	147	(61.5)	
Family history of DAS					
Yes	13	(81.3)	3	(18.8)	0.001
No	115	(37.8)	189	(62.2)	

Table 4. Association between anxiety status and socio-demographic characteristic and other selected variable

Variable	Stress symptom				
	Yes (n = 62)	Percentage	No (n = 258)	Percentage	p-value
Age (years)					
Mean	55.53		57.47		0.206
Sex					
Male	25	(16.7)	125	(83.3)	0.25
Female	37	(21.8)	133	(78.2)	
Ethnicity					
Malay	28	(17.7)	130	(82.3)	0.072
Chinese	19	(17.1)	92	(82.9)	
Indian	15	(32.6)	31	(67.4)	
Others	0	(0)	5	(100.0)	
Religion					
Muslim	28	(17.7)	130	(82.3)	0.206
Buddhist	42	(17.0)	207	(83.0)	
Christian	7	(25.0)	21	(75.0)	
Hindu	10	(33.3)	20	(66.7)	
Others	0	(0)	4	(100.0)	

Table 4. Association between anxiety status and socio-demographic characteristic and other selected variable (Continued)

Marital status					
Single	12	(35.3)	22	(64.7)	0.08
Married	42	(16.9)	207	(83.1)	
Separated	3	(25.0)	9	(75.0)	
Widow(er)	5	(20.0)	20	(80.0)	
Education level					
No formal education	7	(21.2)	26	(78.8)	0.495
Primary school	18	(20.0)	72	(80.0)	
Secondary school	28	(18.1)	127	(81.9)	
University/college	9	(21.4)	33	(78.6)	
Occupation					
Professional	4	(12.1)	29	(87.9)	0.026
Non-professional	32	(27.8)	83	(72.2)	
Unemployed	19	(17.3)	91	(82.7)	
Retired	7	(11.3)	55	(88.7)	
Household income (RM)					
<1000	27	(22.9)	91	(77.1)	0.053
1001–2000	22	(23.7)	71	(76.3)	
>2001	13	(11.9)	96	(88.1)	
Smoking					
Smokers	15	(24.6)	46	(75.4)	0.252
Non-smokers	70	(27.0)	189	(73.0)	
HbA1c (%)					
Mean	7.7		7.8		0.757
Duration of diabetes (months)					
Mean	59.6		66.22		0.438
Duration of follow-up					
2 weeks	3	(42.9)	4	(57.1)	0.430
1 month	21	(21.9)	75	(78.1)	
2 months	3	(13.6)	19	(86.4)	
3 months	13	(16.3)	67	(83.8)	
5 months	22	(19.1)	93	(80.9)	
Diabetic treatment					
Lifestyle modification	10	(29.4)	24	(70.6)	0.058
Oral medication	38	(16.0)	200	(84.0)	
Oral and insulin	14	(29.8)	33	(70.2)	
Insulin only	0	(0)	1	(100.0)	
Co-morbidity					
Yes	52	(19.6)	213	(80.4)	0.806
No	10	(18.2)	45	(81.8)	
Complication					
Yes	18	(22.2)	63	(77.8)	0.453
No	44	(18.4)	195	(81.6)	

Table 4. Association between anxiety status and socio-demographic characteristic and other selected variable (Continued)

Family history of DAS					
Yes	14	(87.5)	2	(12.5)	0.001
No	48	(15.8)	256	(84.2)	

Table 5. Summary of the associations between DAS and the demographic variables and selected variables

Variable	Pearson chi-square (*p*-value)		
	Depression	Anxiety	Stress
Age (years)	3.198	8.253	6.245
	(0.784)	(0.220)	(0.396)
Sex	3.013	3.346	1.326
	(0.083)	(0.067)	(0.250)
Ethnicity	6.188	2.767	6.997
	(0.183)	(0.429)	(0.072)
Religion	4.911	3.559	5.908
	(0.297)	(0.469)	(0.206)
Marital status	8.874	7.264	6.767
	(0.031)	(0.054)	(0.080)
Education level	3.041	2.919	0.378
	(0.385)	(0.404)	(0.495)
Occupation	5.674	2.666	9.275
	(0.129)	(0.446)	(0.026)*
Household income (RM)	8.079	6.909	6.931
	(0.044)*	(0.075)	(0.074)
Smoking	0.150	0.571	1.312
	(0.698)	(0.450)	(0.252)
HbA1c (%)	2.620	0.381	0.125
	(0.106)	(0.537)	(0.723)
Duration of diabetes (months)	4.315	6.824	12.248
	(0.505)	(0.234)	(0.032)*
Duration of follow-up	0.890	0.436	0.438
	(1.128)	(3.783)	(3.823)
Diabetes treatment	0.568	0.636	0.430
	(2.020)	(1.703)	(7.465)
Co-morbidity	0.218	4.483	0.061
	(0.641)	(0.034)*	(0.806)
Complication	1.029	0.893	0.563
	(0.310)	(0.345)	(0.453)
Family history of DAS	25.822	11.941	50.038
	(<0.001)*	(0.001)*	(<0.001)*

Significant at 5% significant level

Association of stress with socio-demographic variables

Table 4 shows the association of stress with socio-demographic data of the subjects. Stress was found to be significantly associated with occupation and family history of DAS. Non-professional group had higher stress level at (51.6%; *p* = 0.026). Family history of DAS was again found to be strongly associated with stress at (22.6%; *p* <0.001). A summary of the associations of DAS with the demographic variables and the selected ones is presented in Table

Discussion

The prevalence of DAS in our study was 26.6%, 40% and 19.4%, respectively. These were higher compared with a similar study in Klang Valley, Malaysia by Gurpreet et al. using DASS-21 assessment tool where the prevalence of DAS was 11.5%, 30.5% and 12% respectively.[10]

The differences in the prevalence rates of our study and Gurpreet et al. may be attributed to the demographic differences of our populations. In particular, our study was limited by a smaller number of sample size, a lower proportion of married subjects, a lower mean household income, a higher rate of unemployment and a higher rate of co-morbidity. Our study mirrored another large study in Qatar involving 12 primary healthcare centres using similar DASS-21 assessment tool,[11] where the prevalence of DAS was 13.6%, 35.3% and 23.4% respectively.

The prevalence of depression in our study was more than two times higher than the prevalence of depression in the general population (10%).[12] This was in keeping with a meta-analysis study by Anderson et al. with a prevalence of 11% in general population and 31% in diabetes patients.[13] The depressive symptomss rate we found was also comparable to a study[14] done in Bahrain (33%), although in that study, the Beck Depression Inventory (BDI) scale was used as the study instrument.

However, a study conducted by Roshana et al.[15] on 260 respondents from the Diabetic Centre, Hospital USM (HUSM), found the prevalence of depression to be 12.3%. The education level of the participants and the presence of complications were identified as significant risk factors. The difference between the findings of this study and those of ours may be due to the different study instrument used by HUSM. In that study, the HADS (Hospital Anxiety and Depression Scale) was used. The study done by Roshana et al.[17] involved all respondents from the tertiary care centre as compared with our study involving respondents from the primary care. Their mean HbA1c was higher (8.5 ± 1.8% vs 7.78 ± 1.7%). This indicated higher prevalence of diabetic complications in their study population.

We found the prevalence of DAS among type 2 diabetes patients at the private general practice clinics and the government community clinics were similar. The prevalence of DAS in the private general practice clinics compared with the government community clinics was as follows: 26.4% vs 23.8% for depression, 36.8% vs 41.6% for anxiety and 19.8% vs 17.3% for stress. This finding is important, as there are limited studies involving diabetes patients from the private sector in the medical literature.

Our study revealed that marital status and the family history of DAS were predictors of depression. These findings were consistent with those from the studies by Martin et al. and Agbir et al.[16,17] Gurpreet et al.[10] also showed a family history of psychiatric illness was the strongest predictor of DAS among patients with diabetes. We found that the respondents who were married were less likely to be depressed compared with those who were either single, separated or widowed.

Although various social factors such as age, gender, ethnicity, level of education, occupation, HbA1c level, duration of diabetes and presence of complications were cited to be associated with depression, our study failed to prove such an association. A study done by Raval et al.[18] in India proved that high prevalence of depression in patients with type 2 diabetes mellitus was associated with diabetic complications particularly neuropathy and diabetic foot disease. This study was conducted on patients at a tertiary care centre, whereas our study was conducted at the primary care setting, where the prevalence of complications was likely to be much lower.

We found the prevalence of anxiety to be almost double that of depression and stress. Our findings concurred with those from other studies[19,20] that anxiety is common in medical illness, supporting the association between psychiatric illness and chronic medical conditions such as diabetes.

A similar study done in Karachi showed that the prevalence of anxiety in adult patients with type 2 diabetes was 57.9%.[21] This study also noted that having co-morbidities such as hypertension or ischaemic heart disease was significantly associated. The metabolic component found to be associated with anxiety was raised blood triglycerides levels.[21] A descriptive, cross-sectional study[22] done in a Malaysian public hospital also showed that ischaemic heart disease was significantly associated with anxiety.

Our study also found that occupation appears to be a strong predictor for stress symptoms. Patients who were working as non-professional seems appear more likely to be stressed compared with those who were working as professionals, unemployed or retired. Those who work as non-professionals may be probably stressed regarding their job stability and work life balance. They may be too busy to understand their illness and to manage their condition.

Although several factors have been identified to be associated with DAS among patients with diabetes in our study, in general, different studies have shown a vast array of factors different from our study contributing to DAS. The differences were due to the different studies being set in different cultures, demography, disease process, duration of disease and financial situations.

Our study indicated that a family history of DAS was strongly associated with positive DAS scores. This shows that taking family history of psychiatric illness is important in identifying a vulnerable group for screening and management of psychiatric illness. The high prevalence of DAS and the limited number of predictors imply that all patients with diabetes should be screened for DAS. The Canadian Diabetes Association suggested to routinely screen for depression and anxiety among patients with diabetes.[23] Katon et al. and Lichtman et al. acknowledged depression as a co-morbidity of chronic diseases, such as diabetes mellitus and coronary heart disease, and which may often lead to worse clinical outcome.[24,25] Korsen suggested screening for depression in patients with chronic diseases.[26]

In view of the high prevalence of DAS in patients with diabetes mellitus and a family history of DAS being a strong predictor, we recommend that patients with diabetes mellitus be routinely screened for symptoms of DAS.

For better representation and associations, we also recommend that future studies should be done involving a larger number of samples from multiple centres and patient selection should be done in a more systematic manner.

Conclusion

Our study showed that the prevalence of DAS is high in patients with type 2 diabetes mellitus: 26.6% (depressing), 40% (anxiety) and 19.4% (stress), The strongest association was found to be a positive family history of DAS. Yet, only 5% of the study population was found to have a family history. Hence, our recommendation is to screen all type 2 diabetes patients using DASS-21 routinely because it is simple, easy to perform and inexpensive.

How does this paper make a difference? depression, anxiety and stress

- Common psychiatric disorders such as exist in chronic diseases, especially diabetes mellitus

- This paper highlights the prevalence of these disorders in patients with diabetes mellitus

- It emphasises the need to screen for these psychiatric disorders while managing patients with diabetes mellitus

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