

Depression, Anxiety and Stress among Diabetic and Non-Diabetic patients with Periodontitis

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Abstract

The aim of this study is to determine the prevalence and severity of depression, anxiety and stress among diabetic patients with periodontitis and to assess the association of emotional disturbances with the severity of periodontitis.

A total of 72 diabetic patients with periodontitis and 87 non diabetic patients with periodontitis who attended Kulliyah of Dentistry periodontics clinic, International Islamic University Malaysia were randomly selected. The patients underwent a full-mouth clinical examination by a periodontics specialist. The prevalence and severity of depressive, anxiety and stress symptoms (DAS) were assessed among those patients by using the self-rating Malay version of the Depression Anxiety and Stress Scale (DASS-21).

Diabetic patients had higher rates of depression 27.7%, anxiety 50% and stress 34.8% compared to the non-diabetic group rate of 11.4%, 25.3% and 6.8% respectively. More diabetic patients showed clinically significant DAS than the non-diabetic group indicating more severe emotional disturbances. The mean scores of DAS among the diabetic group were significantly higher ($p < 0.05$) than non-diabetics. The mean scores of DAS were also higher among patients with advanced periodontitis than mild periodontitis.

Emotional disturbances are occurring in a high rate in diabetic patients with periodontitis which can affect the severity of the periodontitis. Managing diabetic patients need to be more comprehensive by focusing on the psychological as well as the physical wellbeing of the patients leading to more efficient treatment of diabetes and its complications.

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Introduction

Diabetes mellitus (DM) is a global health problem.¹ It is a common disease causing significant mortality and morbidity. It is a serious debilitating disease that has now reached epidemic proportions.² The prevalence in Malaysia has risen much faster than expected, almost doubling in magnitude over the last decade as the Malaysian National Health Morbidity Survey III 2006 revealed that the prevalence of diabetes mellitus was 11.6% in

those above 18 years and 14.9% in those above 30 years.³ In 2011, the prevalence has increased to be 15.2% among Malaysian population.⁴

Periodontitis is a common chronic oral pathology characterized by inflammatory changes of the tissues surrounding the teeth. It is progressive in nature and gradually leads to loss of the alveolar bone around the teeth, and if left untreated, can lead to the loosening and subsequent loss of teeth.⁵

The local destruction of periodontitis is believed to result from a bacterial infection of the gingival sulcus.⁶ caused by microorganisms that adhere to and grow on the tooth's surfaces,⁷ along with an over-aggressive immune response against these microorganisms^{8,9}

There is independent association between periodontitis and the glycemic control of the patient.¹⁰ Moreover, periodontitis has an adverse effect on diabetes glycemic control and worsens complications¹¹ and the risk of

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periodontitis is increased by approximately threefold in diabetic individuals compared with non-diabetic individual.¹²

Recent studies have suggested that certain psychiatric disorders occur with increased frequency among adults with type 2 diabetes mellitus for several reasons¹³ the most important of which, diabetes is considered to be one of the most psychologically and behaviorally demanding of the chronic medical illnesses. Most of the management of diabetes relies on the patient who can lead to increase in the levels of anxiety and depressive symptoms, and lowered self-esteem.¹⁴

The presence of a psychiatric disorder has been associated with poorer glycemic control.¹⁵

Stress is defined as the body's non-specific response to demands placed on it, related to disturbing events in the environment.¹⁶ Duration of diabetes is an indicator of chronic stress and is a risk factor for medical complications and psychological disturbance.¹⁷

Stress may affect the onset of diabetes, can have a harmful effect on glycemic control and can affect quality of life.¹⁸

Depression is a mood disorder that is characterized by a depressed mood or markedly diminished interest in pleasure activity in addition to other symptoms within a duration of at least two weeks, these symptoms include, impaired appetite, disturbed sleep, poor concentration, loss of energy, psychomotor agitation or retardation, feeling of worthlessness or inappropriate guilt, thoughts of death or recurrent suicidal ideation.¹⁹

Anxiety is a condition that is characterized by intense feeling of dread accompanied by somatic symptoms that indicate a hyperactive autonomic nervous system such as tachycardia, sweating, dry mouth, frequent or urgent micturition and diarrhea. Anxiety impairs cognition and may produce distortions of perception.²⁰

Having both a psychiatric and medical illness delays recovery from both. The presence of comorbid psychiatric disorders can lead to decreased adherence to treatment, increased health service costs and poorer outcomes.²¹

The aim of this study is to determine the prevalence and severity of depression, anxiety and stress among diabetic patients with periodontitis and to assess the association of

emotional disturbances with the severity of periodontitis.

Materials and methods

This study was conducted on patients attending the Kulliyah of Dentistry periodontics clinic, International Islamic University Malaysia. A total of 72 diabetic patients with periodontitis and 87 non diabetic patients with periodontitis were randomly selected depending on the inclusion and the exclusion criteria.

Inclusion criteria: Male and female patient who are above 18 years of age and have been diagnosed with type 2 Diabetes Mellitus for at least one year duration and also diagnosed with periodontitis and who have not taken any antibiotic treatment for the past one month. Smokers and patients with other systemic illnesses were excluded.

Ethical approval and consent

Ethical approval number (IREC 250) was obtained from the IIUM Research Ethics Committee prior to commencing the study. All patients were informed verbally and were given the patient information sheet to explain about the purpose of the study. A written informed consent was obtained from the patient after explaining the details of clinical procedures prior to participation. The patients were asked to fill the patient's data form that was provided. The data includes gender, age, race, level of education, income per month.

Oral Clinical examination

Random blood glucose test was done on all patients prior to oral examination. The patients then underwent a full-mouth clinical examination by a periodontics specialist at six sites per tooth (third molars excluded), using a manual periodontal probe. The periodontal parameters included probing depth (PD), Clinical attachment loss (CAL) and bleeding on probing (BOP)

The emotional disturbances were assessed by using the Depression Anxiety, Stress Scale (DASS-21) which is a short version, self-rated questionnaire that is designed to assess the severity of the symptoms of depression, anxiety and stress; it consists of statements referring to the past week. Each item is scored on a 4-point scale (0 = Did not apply to me at all, 1= Applied to me to some degree, or some of the time, 2=Applied to me to a considerable degree, or a good part of time, and

3 = Applied to me very much or most of the time).²² We used the Malay version of DASS-21 which has been translated and validated by Musa et al.²³

Subjects were asked to use 4-point severity/frequency scales to rate the extent to which they have experienced each state over the past week. Scores for depression, anxiety and stress are calculated by summing the scores for the relevant items. Each subscale was categorized into normal, mild, moderate, severe and extremely severe. In this study, we further classified those who have severe and extremely severe symptoms as 'clinically significant' and those with mild and moderate as 'subclinical'.

Statistical Analysis

All the data obtained from the study were processed and analyzed by means of statistical package for social science version 22.0 (SPSS ver.22.0). The analysis for the sociodemographic data were presented in numbers and percentages, the mean scores were used to determine the presence of emotional disturbances. Mann-Whitney U test and Kruskal-Wallis test were used to determine the association between the important sociodemographic characteristics with the emotional disturbances. A p value of less than 0.05 was considered as statistically significant.

Results

A total of 72 diabetic patients with periodontitis and 87 non diabetic patients with periodontitis participated in this study. The male patients were higher in the diabetic group 63.9% than the non-diabetic group 41.4%. Most of the patients from both the diabetic and non-diabetic group were Malay 75% and 69% respectively. The majority of the diabetic patients were from the middle age group 63.9%.

In assessing the prevalence and severity of depression, anxiety and stress (DAS) in diabetic and non-diabetic patients, It was found that the diabetic patients had higher rates of depression 27.7%, anxiety 50% and stress 34.8% compared to the non-diabetic group rate of 11.4%, 25.3% and 6.8% respectively. Also, more diabetic patients showed clinically significant depression, anxiety and stress than the non-diabetic group indicating more severe emotional disturbances. (Table 1)

	Diabetic with periodontitis			Non diabetic with periodontitis		
	Depression n (%)	Anxiety n (%)	Stress n (%)	Depression n (%)	Anxiety n (%)	Stress n (%)
Subclinical	15(20.8)	30(41.7)	22(30.6)	9(10.3)	18(20.7)	5(5.7)
Clinically significant	5(6.9)	6(8.3)	3(4.2)	1(1.1)	4(4.6)	1(1.1)
Total No. of affected Patients	20(27.7)	36(50)	25(34.8)	10(11.4)	22(25.3)	6(6.8)

Table 1. The rate and severity of DAS among Diabetic and non-diabetic patients with periodontitis

Comparing the mean scores of depression, anxiety and stress among the diabetic and non-diabetic revealed significantly higher mean scores ($p < 0.05$) of depression, anxiety and stress in the diabetic group indicating more severe disturbance in the diabetic group.

The mean scores of DAS were also higher among patients with advanced periodontitis than mild periodontitis although not statistically significant $p > 0.05$. (Table 2)

	Total No.	Mean depression level	P value	Mean anxiety level	P value	Mean stress level	P value
Diabetic with periodontitis	72 (45.3)	5.86	0.009	7.55	0.010	9.23	0.015
Non-diabetic with periodontitis	87 (54.7)	3.21		4.98		6.41	
Diabetic with mild periodontitis	4	2.50	0.35	5.50	0.55	6.3	0.43
Diabetic with advanced periodontitis	62	6.12		7.6		9.6	
Non diabetic with mild periodontitis	6	5.55	0.46	7.33	0.58	9.33	0.52
Non diabetic with advanced periodontitis	44	2.63		4.13		5.63	

Table 2. Comparing the mean scores of depression, anxiety and stress between diabetic and non-diabetic patients.

Table 3 shows the relationship of different factors with the mean scores of DAS among diabetic patients. Females showed higher mean scores for DAS than males, the middle age group had higher mean scores for DAS than the other age groups.

High education level patients were suffering from higher emotional disturbances in the form of DAS than low education level. Married patients also showed higher scores than unmarried. Patients staying in urban area had higher scores than those living in rural areas.

Regarding the effect of the duration of illness on the emotional disturbances, patients with duration of illness of less than 5 years showed higher mean scores of DAS than those with longer duration.

	Total N (%)	Mean depression level	P value	Mean anxiety level	P value	Mean stress level	P value
Gender							
Male	46(63.9)	5.6	0.73	7.0	0.40	8.5	0.34
Female	26(36.1)	6.3		8.4		10.5	
Race							
Malay	54(75)	5.8	0.95	7.7	0.69	9.6	0.56
Non-Malay	18(25)	5.9		7.0		8.3	
Age							
Young	7(9.7)	3.7	0.72	6.7	0.37	6.1	0.19
Middle	46(63.9)	6.2		7.6		10.5	
Elderly	19(26.4)	5.9		4.4		7.2	
Education							
Low level	47	5.3	0.40	6.7	0.15	8.5	0.33
High level	25	6.8		9.1		10.5	
Marital status							
Married	68(94.4)	5.9	0.71	7.7	0.44	9.5	0.26
Unmarried	4(5.6)	4.5		5.0		4.8	
Place of stay							
Urban	54	6.4	0.15	7.8	0.45	10	0.08
Rural	18	4.1		6.6		6.7	
Duration of illness							
≤5 years	36	5.3	0.94	8.2	0.16	10.6	0.08
>5 years	33	5.2		6.0		7.2	
Status of Diabetes							
Controlled (RBS≤8.5)	40	6.2	0.18	7.8	0.33	9	1
Uncontrolled (>8.5)	29	4.0		6.3		9	

Table 3. Determinant of Depression, Anxiety and stress among diabetic patients.

Discussion

Having a chronic disease such as DM renders the patient vulnerable to increased levels of emotional disturbances such as depression, anxiety and stress this is due to the fact that the patient has to change their lifestyle, eating habits and adhere to lifelong medications plus having to deal with many complications that are associated with DM such as periodontitis. There is strong association between DM and the prevalence and severity of periodontitis²⁴ and previous studies have shown that diabetic patients are at higher risk of developing emotional disturbances²⁵ This was shown in this study where diabetic patients with periodontitis showed higher prevalence of depression, anxiety and stress symptoms compared to non-diabetic patients. Also the diabetic patients group showed significantly higher mean scores of DAS than the non-diabetic group.

Research has shown than depression can lead to increase in the production of inflammatory mediators such as IL-6²⁶ which is one of the main inflammatory mediators in the pathogenesis of periodontitis²⁷ which means that continuous depressive symptoms can lead to prolongation or worsening of the course of the periodontitis. This is evident by the findings in this study where patients with advanced periodontitis showed higher mean scores of depression, anxiety and stress.

The chances of becoming depressed increase as diabetes complications worsen. Depression leads to poorer physical and mental functioning, so a person is less likely to follow a required diet or medication plan. Treating depression with psychotherapy, medication, or a combination of these treatments can improve a patient's well-being and ability to manage diabetes.²⁸

Diabetic patients are also prone to higher levels of stress and anxiety which can also affect their periodontal disease as stress plays an important factor in the etiology and maintenance of inflammatory conditions like the periodontal diseases²⁹

Although diabetic patients are more prone to develop emotional disturbances, there are other factors like sociodemographic profile of the patient that can affect the severity of these emotional disturbances. In the current study, diabetic females showed higher mean scores of DAS than males although it was statistically not significant this may be explained by the fact that females generally show higher levels of emotional disturbances than males³⁰. Patients with higher education and those living in urban areas showed higher mean scores of DAS which may be due to their higher exposure to health education and more awareness about the complications of DM.

Another factor that contributes to the severity of periodontitis is the glycemic control of the diabetic patient¹⁰ and since the presence of depression has been associated with defective glycemic control³¹ it is expected that diabetic patients with depressive symptoms have more advanced and destructive periodontitis and so is important to detect and manage depression early.

Conclusions

Emotional disturbances are occurring in a high rate in diabetic patients with periodontitis which can affect the severity of the periodontitis. Managing diabetic patients need to be more comprehensive by focusing on the psychological as well as the physical wellbeing of the patients to be able to efficiently manage diabetes and treat its complications.

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Declaration of Interest

The authors declare no conflict of interest.

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