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RESEARCH ARTICLE

PREVALENCE OF DEPRESSION AMONG DIABETIC FOOT ULCER OUTPATIENTS ATTENDING TO DIABETIC CENTER IN PRINCE MANSOUR MILITARY HOSPITAL, TAIF REGION, KSA

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ABSTRACT

Diabetes Mellitus (DM) is one of the most common chronic diseases in nearly all countries, and continues to increase in number and significance. As the prevalence of diabetes increases, the prevalence of long-term diabetes-related complications is also likely to increase especially diabetic foot ulcer. An overall aim of diabetes care is that people should be able to live a good life despite having diabetes. Several somatic diseases, such as diabetes, commonly coexist with anxiety and depression, and these mental disorders are often comorbid. This picture becomes even more complex, as evidence suggests a bidirectional association between depression and diabetes. Aim of the study: Assess the prevalence of comorbid depression among diabetic foot outpatients. The data were collected from 103 diabetic foot patients during follow up at Diabetic Center in Prince Mansour Military Hospital, Taif Region, KSA. Cross sectional study design was used and The Patient Health Questionnaire 9 (PHQ 9) was used to evaluate depression status of patients. Conclusion: Depression is significantly associated with diabetes from incidence to mortality; especially diabetic foot ulcer. It may thus be recommended that all patients with diabetes should be screened for depression. The depression and diabetes are causally related and deserves attention from clinicians to ensure better management and improve diabetic patient quality of life.

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INTRODUCTION

Diabetes mellitus (DM) is a major global public health problem which is increasing dramatically in developing countries. The prevalence of DM worldwide is estimated to be around 200 million people, more than 5% of the adult population globally. Several factors contribute in T2DM pathogenesis, including environmental and lifestyle factors, positive family history, ethnicity, and genetics. Previous studies conducted on the prevalence of DM indicate that DM is becoming increasingly common because of the epidemic of obesity and sedentary lifestyles. (Bener *et al*., 2011; Shaw *et al*., 2010) Diabetes is a chronic illness requiring continual health care and patient self-management education to prevent the development of acute complications and reduce the risk of long term complications. As the prevalence of diabetes increases, the prevalence of long-term diabetes-related complications is also likely to increase. The 'diabetic foot' has been considered the "Cinderella" complication of diabetes care. (Iversen, 2009; American Diabetes Association: Standards of medical care in diabetes - 2009). The feet of people with DM can be affected by neuropathy, peripheral vascular disease, ulcers, infections, gangrene, and foot deformity. Diabetic neuropathy affects up to 60% of individuals with DM and it is one of the most complex and potentially catastrophic of all the diabetic complications. Peripheral polyneuropathy is the most commonly occurring neuropathic complication. Distal numbness or impaired sensation is typically symmetric and bilateral manifestation of peripheral neuropathy. Peripheral vascular disease has been implicated in foot ulceration in diabetes, but it may play a greater role in problems ultimately necessitating lower limb amputation. (National Institute for Health and Clinical Excellence. Diabetic Foot Problems. London: NICE; 2012) All people with diabetes, 15-25% develops a diabetic foot ulcer at some time in their lives Foot ulcerations associated with ischemia will often lead to infection and gangrene in the diabetic population. Impaired blood flow not only increases the likelihood of gangrene in existing foot ulcers, but also prevents their healing. Diabetic foot infections are common and serious problem in persons with diabetes. It usually arises either in a skin as a consequence of peripheral neuropathy or in a wound

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caused by some forms of trauma. Progression of sensory deficits can cause destruction of cartilage of foot joints leading to foot deformity. (Wells, 2011; Lipsky *et al*., 2012) An overall aim of diabetes care is that people should be able to live a good life despite having diabetes. Several somatic diseases, such as diabetes, commonly coexist with anxiety and depression, and these mental disorders are often comorbid. This picture becomes even more complex, as evidence suggests a bidirectional association between depression and diabetes. The comorbidity of major depression is often associated with barriers to seeking treatment and a greater chance of the recurrence of mental disorders. Among people with diabetes, depression and low subjective well-being are suggested to be of concern because these conditions may negatively affect self-management, glycemic control and diabetes related complications. (Lustman and Clouse, 2007; Kinder *et al*., 2002) Therefore, the researcher found it necessary to investigate the prevalence of comorbid depression among diabetic foot ulcer patients.

Aim of the study

Assess the prevalence of comorbid depression among diabetic foot outpatients attending diabetic center Prince Mansour military and community medicine, Taif, Makah region, KSA.

Study setting

Diabetic centerone of the centers related to Prince Mansour military and community medicine, Taif, Makah region, KSA. Specialized Hospital in community medicine located in Taif city, Makah region, Kingdom Saudi Arabia, largest community Military hospital and one of the hospitals sponsor for some of Saudi Boards training setting like community medicine Saudi board, family medicine Saudi board with these programs joined with Taif university and MOH, Taif region

Study Design

Cross-sectional study design was used to conduct the study.

Study Period

The study was conducted from February 8, 2017, to May 13, 2017

Study Population

Diabetic foot outpatients have follow-up appointment during data collection period. (Approximately 103 diabetic foot patients).

Sample Size Determination

Epi Info Program was used to estimate the sample size given that

1- Population size= 309
2- Estimated proportion= 50%
3- Acceptable error= 10%
4- Confidence coefficient=99%
5- Minimum sample size= 103.

So that the individual diabetic foot outpatient was interviewed every Kth day; that is, every 3rd patient was selected from sampling frame developed by giving a number for all 255 patients in the registration book ascendingly. Since the sampling interval was 3, a number between 1 and 4 was selected randomly by loutary and number 1 was drawn first to take as a starting patient for the interview.

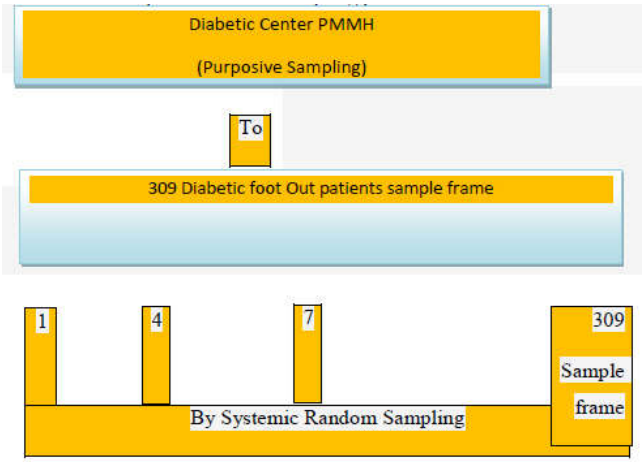

Figure 1. Schematic presentation of sampling procedure

Inclusion Criteria

- Diagnosed as diabetic foot outpatient based on laboratory result (blood sugar level) and clinical finding for at least one year.
- Age ≥ 20 years old
- Being capable of independent communication and giving informed verbal consent.

Exclusion Criteria

- Patients who were currently being treated for depression,
- Age <20 years old.
- Not capable of independent communication.
- Patients who have refused to participate in the study.

Method of Data Collection

Quantitative and qualitative data was collected by using structured interviewer administered questionnaire. Demographic and health related information was collected from each patient and medical records using data abstraction form. Depression status of patients was ascertained at the time of recruitment. The Patient Health Questionnaire 9 (PHQ 9) was used to evaluate depression status of patients. Patients with established clinically assessed diabetic foot were evaluated for depression by administering nine-item Patient Health Questionnaire (PHQ 9) adapted from Pfizer Inc. using local language.

Variable Specification

Dependent Variables

Dependent variable is the response that is measured and it is the presumed effect (Depression).

Independent Variables

Independent variable is the variable that is varied or manipulated by the researcher, and the presumed cause (Diabetic foot outpatients).

Scoring system

(i) No depression: Patient Health Questionnaire 9 score is 0.
(ii) Minimal depression: Patient Health Questionnaire 9 score is 1–4.
(iii) Mild depression: Patient Health Questionnaire 9 score is 5–9.
(iv) Moderate depression: Patient Health Questionnaire 9 score is 10–14.
(v) Moderately severe depression: Patient Health Questionnaire 9 score is 15–19.
(vi) Severe depression: Patient Health Questionnaire 9 score is 20–27.

A pilot study of 10 will be carried who will not be included in the study subjects in order to check and ensure the clarity of the tools, identify obstacles and problems that may be encountered during data collection and the necessary modifications will be done. After data were collected and transferred into specially design formats, so as to be suitable for computer feeding. Data were analyzed using PC with statistical Package for Social Sciences (SPSS) version 22.0. The frequency distribution of dependent and independent variables were worked out and presented in table, figure, and graph.

Data Quality Issues

To assure quality of the data, properly designed data collection tool was prepared and pretested and training was given to data collectors. Additionally, on each data collection day, the collected data was reviewed and checked for its completeness by principal investigator and appropriate design and sampling procedure was applied. Moreover, the exclusion criteria were considered.

Ethical Considerations

The study was conducted after approval of the proposal by Al Taif University ethical committee. The researcher introduced himself to every subject patient including in the study, explained the purpose of the study and obtaining verbal consent from each respondent by assuring confidentiality throughout the data collection period.

RESULTS

Table (1):- Distribution of demographic data in study group (n=103)

Regarding patients' sex, this table shows that less than three quarters of patients (71.8 %) were male. In relation to patients' age, this table reveals that the less than half of patients(42.7%) were aged from 41-60 years followed by more than one third of patients (39.8%) aged from 61-80 years of age.Concerning place of residence and marital status , it was found that that less than three quarters of patients (71.8 %) were lives in Taief and married. Concerning the patient's educational level, more than two fifth of patients (42.7%) was less than secondary school and more than one third (35.9%) was non formal schooling. In relation to patients' occupation, more than half of patients (53.4) were non military.The majority of patients (75.7%) were diagnosed for more than ten years and more than half of them have income with less than 5000 pound monthly.

Table 1. Distribution of demographic data in study group (n=103)

Demographic data	N	%
Gender		
Male	74	71.8
Female	29	28.2
Age		
20-40	4	3.9
41-60	44	42.7
61-80	41	39.8
More than 80	14	13.6
Residence		
cairo	74	71.8
Outside cairo	29	28.2
Marital status		
Married	74	71.8
Single	5	4.9
Divorced	5	4.9
Widow	19	18.4
Education level		
Non formal Schooling	37	35.9
Less than secondary	44	42.7
Secondary	15	14.6
University	5	4.9
Beyond university	2	1.9
Occupation		
Military	48	46.6
Non military	55	53.4
Date of diagnosis		
1-5	8	7.8
6-10	17	16.5
≤10 years	78	75.7
Income		
≥5000	55	53.4
5001-10000	35	34.0
10001-15000	10	9.7
≥15000	3	2.9

Table (2) revealed that more than one third of patients (38.8%) were free form depression followed by on third of patients (33%) have mild depression and less than one fifth (16.5%) have moderate depression. In relation to work affection, this table showed that the work wasn't affected in approximately less than half of patients (45.6%) while mildly affected in more than one third of patients (40.8%).

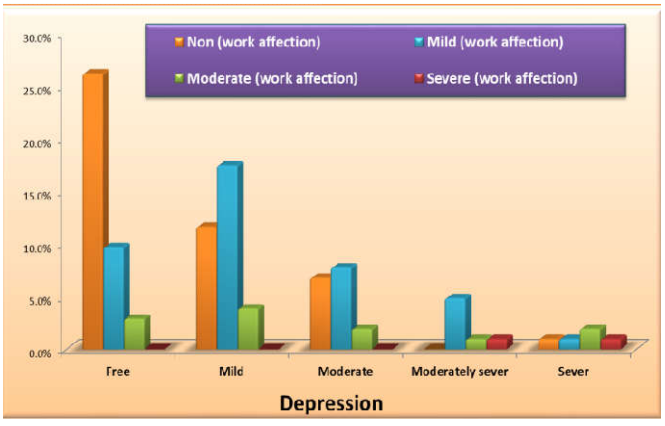

Figure 2. The correlation between Depression and work affection

Table 2. Degrees of the different types of depression prevalent and work affection among Diabetic foot patients

Level of depression and work affection	N	%
Depression		
Free	40	38.8
Mild	34	33.0
Moderate	17	16.5
Moderately sever	7	6.8
Sever	5	4.9
Work affection		
Non	47	45.6
Mild	42	40.8
Moderate	12	11.7
Severe	2	1.9

Table 3. The correlation between Depression and work affection in study group (n=103)

From this table it can be noticed that, there was a statistical significant correlation between level of depression and work affection. (P=<0.01*)

			Depression					Total
			Free	Mild	Moderate	Moderately sever	Sever	
work affection	Non	N	27	12	7	0	1	47
		%	26.2%	11.7%	6.8%	0.0%	1.0%	45.6%
	Mild	N	10	18	8	5	1	42
		%	9.7%	17.5%	7.8%	4.9%	1.0%	40.8%
	Moderate	N	3	4	2	1	2	12
		%	2.9%	3.9%	1.9%	1.0%	1.9%	11.7%
	Severe	N	0	0	0	1	1	2
		%	0.0%	0.0%	0.0%	1.0%	1.0%	1.9%
Total		N	40	34	17	7	5	103
		%	38.8%	33.0%	16.5%	6.8%	4.9%	100.0%
Spearman's correlation		r				0.376		
		P-value				<0.01*		

Table (3) and figure (1) show that is a significant positive correlation between the depression and work affection where r=0.376 and P-value<0.001

Table 4. The relationship between Depression and Demographic data in study group (n=103): This table clarifies that there was no statistical significant correlation between sociodemographic characteristics and presence of depression

		Depression				Chi-square	
		Negative		Positive			
		N	%	N	%	X^2	P-value
Gender	Male	29	72.5%	45	71.4%	0.014	0.906
	Female	11	27.5%	18	28.6%		
Age	20-40	1	2.5%	3	4.8%	0.215	0.643
	41-60	16	40.0%	28	44.4%		
	61-80	18	45.0%	23	36.5%		
	More than 80	5	12.5%	9	14.3%		
Residence	Taief	30	75.0%	44	69.8%	0.325	0.569
	Outside Taief	10	25.0%	19	30.2%		
Marital status	Married	29	72.5%	45	71.4%	5.493	0.139
	Single	0	0.0%	5	7.9%		
	Divorced	2	5.0%	3	4.8%		
	Widow	9	22.5%	10	15.9%		
Education level	Non formal Schooling	11	27.5%	26	41.3%	7.570	0.109
	Less than secondary	23	57.5%	21	33.3%		
	Secondary	5	12.5%	10	15.9%		
	University	1	2.5%	4	6.3%		
	Beyond university	0	0.0%	2	3.2%		
Occupation	Military	20	50.0%	28	44.4%	0.303	0.582
	Non military	20	50.0%	35	55.6%		
Date of diagnosis	1-5	4	10.0%	4	6.3%	0.539	0.764
	6-10	7	17.5%	10	15.9%		
	≤10 years	29	72.5%	49	77.8%		
Income	≥5000	21	52.5%	34	54.0%	5.652	0.130
	5001-10000	17	42.5%	18	28.6%		
	10001-15000	1	2.5%	9	14.3%		
	≥15000	1	2.5%	2	3.2%		

Table 5. The relationship between work affection and Demographic data in study group (n=103)

This table clarifies that there was no statistical significant correlation between sociodemographic characteristics and work affection.

		Work affection				Chi-square	
		Negative		Positive			
		N	%	N	%	X^2	P-value
Gender	Male	38	80.9%	36	64.3%	3.545	0.060
	Female	9	19.1%	20	35.7%		
Age	20-40	3	6.4%	1	1.8%	4.991	0.025
	41-60	25	53.2%	19	33.9%		
	61-80	14	29.8%	27	48.2%		
	More than 80	5	10.6%	9	16.1%		
Residence	Taief	35	74.5%	39	69.6%	0.295	0.587
	Outside Taief	12	25.5%	17	30.4%		
Marital status	Married	37	78.7%	37	66.1%	2.673	0.445
	Single	2	4.3%	3	5.4%		
	Divorced	1	2.1%	4	7.1%		
	Widow	7	14.9%	12	21.4%		
Education level	Non formal Schooling	12	25.5%	25	44.6%	4.238	0.375
	Less than secondary	23	48.9%	21	37.5%		
	Secondary	8	17.0%	7	12.5%		
	University	3	6.4%	2	3.6%		
	Beyond university	1	2.1%	1	1.8%		
Occupation	Military	22	46.8%	26	46.4%	0.001	0.969
	Non military	25	53.2%	30	53.6%		
Date of diagnosis	1-5	5	10.6%	3	5.4%	1.630	0.443
	6-10	9	19.1%	8	14.3%		
	≤10 years	33	70.2%	45	80.4%		
Income	≥5000	24	51.1%	31	55.4%	0.877	0.831
	5001-10000	17	36.2%	18	32.1%		
	10001-15000	4	8.5%	6	10.7%		
	≥15000	2	4.3%	1	1.8%		

DISCUSSION

Diabetes Mellitus (DM) is one of the most common chronic diseases in nearly all countries, and continues to increase in number and significance. DM is a chronic multisystem disease related to abnormal insulin production, impaired insulin utilization, or both. Diabetes currently affects more than 194 million people worldwide and it is expected to reach 333 million by year 2025, with the maximum burdens falling upon developing countries (Arafa and El Din, 2010). According to the World Health Organization (WHO) and to the International Working Group on the Diabetic Foot, diabetic foot is defined as the foot of diabetic patients with ulceration, infection and/or destruction of the deep tissues, associated with neurological abnormalities and various degrees of peripheral vascular disease in the lower limb. (American Diabetes Association: Diagnosis and Classification of Diabetes Mellitus, 2011; Apelqvist *et al*., 2008; Liapis *et al*., 2007) The majority of scenarios leading to amputation begin when patients with absent peripheral sensation sustain a pivotal event initiating the causal chain to an amputation. This event is frequently footwear-related, followed by ulceration and faulty wound healing. Three great pathologies come together in the diabetic foot, neuropathy, ischemia and infection, leading to an inexorable situation that defeats every health system in the world. (Singh, 2006)

The findings of the present study revealed that concerning sex, the findings showed that two thirds of patients were male. This finding is in opposite with Ekpenyong *et al*, (2012) who asserted that the worldwide diabetes prevalence is almost similar in both men and women. (Ekpenyong *et al*., 2012) Regarding age, the majority of patients was between 41-80 years old and diagnosed for more than ten years ago. This result is in accordance with Kirkman *et al*, (2012) who confirmed that older adults with diabetes are at substantial risk for both acute and chronic microvascular complications of the disease. (Kirkman *et al*., 2012) As regards the marital status, less than three quarters of patients were married. Marriage might explain the patients' adherence to follow up visits as marriage provide care giver, social & psychological support and also a source of instrumental support for tasks like household work especially for those with limited mobility. This result is in harmony with results of other researches which confirmed that marital status has a strong protective and remedial effect. (Quinones *et al*., 2014) Regarding the educational level and income, the majority of patients have less than secondary school and non-formal schooling with low monthly income. These results are congruent with Mullie *et al*, (2011) who mentioned that low socioeconomic position as measured by the indicators educational level, and income was associated with a lower knowledge of vascular risk factors and diabetic foot care. (Mullie and Clarys, 2011) Regarding the incidence of depression among diabetic foot patient, the study revealed that approximately half of patients were suffered from mild to moderate depression. This results is congruent with Abdulrahman *et al* (2017). Who recorded high prevalence of anxiety and depression among adults with type 2 diabetes mellitus. And emphasize on the role of clinicians to identify and treat anxiety and depression as part of multidisciplinary diabetes care. (Abdulrahman *et al*., 2017) Furthermore, Ahmedabad (2013) reported that depression is commonly found as a comorbid condition in chronic medical illnesses in general, and diabetes mellitus in particular and concluded that depression increases the risk of diabetes rather than vice-versa. (Ahmedabad, 2013) Also, Habtewold *et al*, (2015) Abu hadid (2014), demonstrated that depression is a common comorbid health problem in type 2 diabetic outpatients with a prevalence rate of 13%. (Habtewold *et al*., 2015) Moreover, Afra *et al*. (2016) reported that the depression in patient with chronic wounds was higher than patient without the wounds. Also,

depression in patients with underlying disease and older age rises. (Afra *et al*., 2016) In this context, Williams *et al* (2010) concluded that major depression measured and assessed by patient health questionnaire (PHQ-9) is associated with a two-fold higher risk of incident diabetic foot ulcers. (Williams *et al*., 2010) The results of the present study demonstrate that there was no significant correlation between sociodemographic data and level of depression or work affection. These results were in opposite with the study Raval *et al*. (2010) who showed a high prevalence of depression in patients with T2DM and explained that the risk factors for depression were age, central obesity, diabetic complications particularly neuropathy and diabetic foot disease and increased pill burden. (Raval *et al*., 2010) Also, Husin (2017) was in opposite and showed that the prevalence of depression and anxiety for diabetic patients, both with and without foot ulcer was similar. Male and lower education status was significantly associated with DFU and concluded that by identifying the prevalence and the risk factors involved, early detection and treatment for depression and anxiety may improve health outcomes, including sexual functions. However further studies are required to ascertain the directional nature of this relationship. (Husin *et al*., 2017)

Conclusion and Recommendations

Depression is significantly associated with diabetes from incidence to mortality; especially diabetic foot ulcer. It may thus be recommended that all patients with diabetes should be screened for depression. The depression and diabetes are causally related and deserves attention from clinicians to ensure better management and improve diabetic patient quality of life.

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