

Original Article

Socio-Economic impact on families with Diabetic Foot Ulcers and Amputations

ABSTRACT

Objective: The objective of the study was to examine the socioeconomic risk factors for diabetic foot ulcers & amputations.

Design: A prospective study.

Setting: This study was conducted from January 1st to 30th June 2014 at King Saud Medical City, Riyadh, KSA.

Method: An availability sample of consenting adult diabetic patients was taken. Data related to socioeconomic position, age, gender, type of diabetes, and risk factors for cardiovascular disease, body weight, height, blood pressure status, chronic complications of diabetes, and treatment types was gathered by inquiring the patient. The questionnaire checked about diabetes education received by the patients & their consistency in attending follow up clinics and regular foot examination by the physician. Statistical analysis of these variables was calculated using SPSS version 16.

Result: Exceedingly substantial differences between the 2 study groups regarding the presence of diabetic complications & high sugar & fat diet ($P=0.000$). More than 40% of patients without foot ulcers reported no complications compared by only 8% of patients with ulcers. More than 88% of those with ulcers reported high sugar & fat diet compared with only about half of this percent in those without ulcers. Remarkable difference was also found in patient knowledge about DM ($P=0.003$).

Conclusion: Superior quality of care and treatment is recommended to decrease diabetes-related morbidity and mortality. Patients and primary care physicians should be educated about proper follow up of diabetes mellitus. Socioeconomic factors related to diabetic foot in Saudi patients' needs more controlled studies.

Key Words: Diabetes, Amputations, Foot Ulcer

Introduction

Diabetic foot ulcer is a disabling complication and not infrequent among people with diabetes mellitus. The disability and likely progression to the loss (amputation) of digits and limbs make it a solemn concern¹. Kingdom of Saudi Arabia is one of the top ten countries for prevalence of diabetes and is expected to continue in the coming two decades with prevalence rate of 20.0% in the age group 20–79 years. Half a million of Middle East and North African countries citizens are likely to

have a minor or major diabetes-related amputation over the coming decade. Most of these amputees will not be rehabilitated and may lose their employments or earnings².

In view of the increasing disability, rising health care costs, and decline of the quality of life of diabetic patients that arise from diabetic foot problems, the multifactorial causes for the development of diabetic foot problems have been gaining attention in recent years³. The jeopardy of developing gangrene and of ensuing amputation of the foot is more for people from the lower

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socioeconomic status and for those living in rural areas¹. Other several risk factors for amputation among patients with diabetic foot ulcers have been cited in the literature, including age; sex (male); comorbidities or complications of diabetes such as hypertension, nephropathy, and retinopathy; having a previous history of diabetic foot ulcers; and duration of diabetes⁴. However, the validity of these findings in different cultures and communities remains to be shown. Expounding these factors would lead to appropriate care and aid in preventing amputation.

This study aimed to examine some of the socioeconomic risk factors related to diabetic foot ulcers & amputations.

Materials and Methods

Approval from hospital ethical committee was taken before start of the study. In this cross sectional study a total of 126 diabetic patients were included. The study sample was consisted on 63 diabetic patients with foot ulcers and 63 diabetic patients without foot ulcer. All the patients were briefly described about the purpose of the study and informed written approval was taken from all the participants of the study. An accessibility sample of consenting adult diabetic patients was taken. Diabetic foot ulcers and amputations due to neoplasm or trauma were excluded.

Income & data with reference to educational attainment were used as pointers of socioeconomic position. The net monthly household income was acquired from patients as well as their educational attainment. Other data were gathered by inquiring the patient about age, gender, type of diabetes, and risk factors for cardiovascular disease (e.g., tobacco use, alcohol consumption and physical inactivity), body weight, height, blood pressure status, chronic complications of diabetes (neuropathy, nephropathy and retinopathy), and treatment types. Questions about diabetes education received by the patients & their consistency in attending follow up clinics were inquired. Also, the questionnaire checked if the foot is regularly examined by the physician or not. Statistical analysis of these variables was calculated using SPSS version 16.

Results

A total of 63 diabetic patients with foot ulcers & 63 diabetic patients without foot ulcers could be accessed and interviewed. Female & male patients were approximately of equal numbers in both groups. About half of them were between 51-65 years of age. Concerning those with ulcers, all except 2 of were residing in urban areas. The majority had type 2 diabetes mellitus (93.7%) but almost half of all patients were on insulin injections. About 40% of them were

Table 1: Socio demographic data of diabetic patients

	Patients with foot ulcers Number (%) 63(100)	Patients without foot ulcers Number (%) 63(100)	P
Gender			1.000
Male	28(44.4)	28(44.4)	
Female	35(55.6)	35(55.6)	
Education level			.087
Non educated	44(69.8)	33(52.4)	
Primary school	10(15.9)	9(14.3)	
Secondary school	5(7.9)	10(15.9)	
High education	4(6.3)	11(17.5)	
Age			0.958
≤40	7(11.1)	6(9.5)	
41-50	17(27.0)	19(30.2)	
51-60	22(34.9)	20(31.7)	
>60	17(27)	18(28.6)	
Net household monthly income			0.101
<5000sr	26(41.3)	16(25.4)	
5000-10000sr	23(36.5)	24(38.1)	
>10000sr	14(22.2)	23(36.5)	
Residence			0.159
Urban	61(96.8)	63(100)	
Rural	2 (3.2)	0(0)	
Body mass index			0.665
Normal	6(9.5)	8(12.7)	
Overweight	10(15.9)	7(11.1)	
Obese	47(74.6)	48(76.2)	

smokers, hypertensive & did not have any information about diabetes mellitus. Only 13 of them had lower limb amputations (20.7%) of which the majority of them were performed quite early in the course of the disease (14.3%). Correspondingly, the majority of foot ulcers (65.1%) occurred within the first 5 years of the disease. Likewise, about half of patients had more than one diabetic complication. More than two thirds of patients were non educated (69.8%) and only 4 were of high education. The majority was not acquiescent with dietary constraints (88.9%) & only half of them consumed fresh vegetables. Additionally, about three fourths of them were sedentary (76.2%). One third of patients acknowledged that their feet were not frequently examined by their doctors. Moreover, about one fifth of patients did not follow up their diabetes at all & only one half of the remaining regularly attended diabetic clinic for follow up. Regarding the monthly income; only about 20% of patients had income > 10000 SR & about half of the remaining had income below 5000 SR.

Table II: Diabetes associated factors

	Patients with foot ulcers Number (%) 63(100)	Patients without foot ulcers Number (%) 63(100)	P
Duration between diagnosis of diabetes & amputation			
1-5years	9(14.3)	-	-
6-9years	2(3.2)	-	-
>10years	2(3.2)	-	-
Duration between diagnosis of diabetes & foot ulcers			
1-5years	41(65.1)	-	-
6-9years	19(30.2)	-	-
>10years	3(4.8)	-	-
Type of diabetes			
type 1	4 (6.3)	4 (6.3)	1.000
type 2	59(93.7)	59(93.7)	
Treatment of diabetes			
oral hypoglycemics	30(47.6)	30(47.6)	1.000
insulin injections	33(52.4)	33(52.4)	
Complications of diabetes			
None	5(7.9)	27(42.9)	0.000
nephropathy	9(14.3)	8(12.7)	
retinopathy	18(28.6)	17(27)	
neuropathy	4(6.3)	1(1.6)	
combined	27(42.9)	10(15.9)	
Associated hypertension			
Not hypertensive	37(58.7)	35(55.6)	0.719
Hypertensive	26(41.3)	28(44.4)	

Exceedingly substantial differences between the 2 study groups regarding the presence of diabetic complications & heavy sugar & fat diet (P=0.000). More than 40% of patients without foot ulcers reported no complications compared by only 8% of patients with ulcers. More than

88% of those with ulcers reported high sugar & fat diet compared with only about half of this percent in those without ulcers. Remarkable difference was also found in patient knowledge about DM (P=0.003).

Table 3: Patients' behaviors linked to diabetes

	Patients with foot ulcers Number (%) 63(100)	Patients without foot ulcers Number (%) 63(100)	P
Heavy sugar and fat diet	56(88.9)	27(42.9)	.000
Intake of vegetables	35(55.6)	39(61.9)	.469
Physical activity 0.5h/day/5/week			.056
No	48(76.2)	38(60.3)	
Yes	15(23.8)	25(39.7)	
Smoking			0.463
No	37(58.7)	41(65.1)	
Yes	26(41.3)	22(34.5)	
Knows about DM			0.003
Do not know	26(41.3)	11(17.5)	
Knows	37(58.7)	52(82.5)	
Regular follow up of DM			0.446
No attendance	13(20.6)	10(15.9)	
Regular	24(38.1)	31(49.2)	
Irregular	26(41.3)	22(34.9)	

Table 4: Regular clinical foot examination

Clinical foot examination	Patients with foot ulcers Number (%) 63(100)	Patients without foot ulcers Number (%) 63(100)	P
Not regularly checked	20(31.7)	16(25.4)	0.430
Regularly checked	43(68.3)	47(74.6)	

Discussion

One of the most significant and incapacitating complication of diabetes mellitus is the diabetic foot ulcer. Globally, one lower limb is lost every 30 seconds because of diabetic foot ulcers. Given the diabetic foot ulcers' high prevalence, heavy burden, and severe impact on patients' life quality, it is advisable that sufficient attention be paid to prevention of this particular complication of DM ⁵. Poverty, poor education, low-occupational status as well as a poor-labor market situation have repeatedly been shown to constitute health risks ⁶. The fact that diabetes is a widespread disease with an increasing incidence in Kingdom of Saudi Arabia means that the rate of its complications

such as diabetic foot ulcers & amputations can be expected to ascend in the future.

Yekta et al compared the demographic & clinical characteristics influencing health related quality of life in diabetic patients with & without foot ulcers⁴. They found smoking considerably more frequent in those with foot ulcers. Forty percent of patients in this study were smokers. Smoking persons with diabetes have more proximal amputations but no significant difference was found between the 2 groups in the current study^{4,6}. Also, Yekta et al reported that 84% of those with ulcers had least one complication of DM⁴. In agreement with the present study, complications (whatever the number) were found in 92% versus 57% in non ulcer group ($P=.000$, table 2). The results of this study revealed that half of all patients had combined diabetes complications, more than one quarter of them had isolated retinopathy & 40% had hypertension. All of amputated patients in this study had also foot ulcers. These results agree with what was stated by Barshes et al that approximately 84% of non-traumatic major amputations amongst people with diabetes are preceded by a diabetic foot ulcer⁷. Risk factors for limb loss in diabetes include end-stage renal disease & visual impairment. They also added inappropriately fitted shoes, autonomic neuropathy, and depressive symptoms as added risk factors⁷. Jbour et al stated that the incidence of hypertension was 52%, retinopathy 45% and microalbuminuria 33%⁸. The prevalence of all amputations was 5%. Frequency of amputation correlates with duration of diabetes, poor glycemic control, smoking, neurological impairment, peripheral vascular disease and microalbuminuria. Different figures from this study are probably due methodological differences & larger sample size.

Exceedingly significant difference was also found between the 2 study groups as 82.5% of patients without foot ulcers reported adequate knowledge about DM, compared by only 58.7% of those without ulcers ($P=0.000$). This is in accordance with Yan et al who stated that absence of diabetic foot education & dearth of knowledge of foot lesion warning signals were independent predictors of long patient delay leading to increased risk of amputation⁹. Low socioeconomic position can be indicated by low monthly income & low educational level. In this study, about two thirds of patients were uneducated. Regarding the monthly income the majority of patients were either of low or moderate income. However, no significance difference

was found between the 2 study groups regarding these points. Al- Maskari & El-Sadig conducted a study in Emirates & found that the majority of the surveyed population (63%) was illiterate¹⁰. They counted the level of education as one of the main risk factors for peripheral neuropathy and peripheral vascular disease and thus potentially for foot complications¹⁰. Likewise, a Saudi study showed that diabetic foot was significantly associated with education¹¹. Sriyani et al found that low education, low income, were amongst predictors of increased risk of foot ulcers¹². These controversies can be explained by methodological differences in patients' selection, as the researcher selected patient according to accessibility to them.

The majority of patients in this study (88.9%) were consuming heavy fat ($P=.000$) & sugar diet with only about half of them eating fresh vegetables. This can be associated with poor glycemic control & atherosclerosis; both are known risks for diabetic foot. However, glycemic control nor serum lipids were not studied in this research. Also only a minority (23.8%) perform adequate exercise program. These results agrees generally with Nelson et al who reported that the majority of patients with type 2 diabetes mellitus did not involve in recommended levels of physical activity & did not follow dietary guidelines for fat & fruits & vegetables consumption¹³.

In the present study, about one third of patients with foot ulcers were regular in follow up & stated that foot examination by their physicians were not a routine part of their follow up. Patients without foot ulcers were more regular in follow up & reported higher rate of foot examination; though these differences were non significant. Barshes et al also reported that primary care providers perform complete foot examinations only infrequently and may lack the time or training to educate at-risk people with diabetes⁷. While effective treatment and formulation of prevention guidelines require a thorough understanding of characteristics of diabetic foot ulcer patients and their ulcers, there are reports that not only patients but also physicians information about these characteristics is inadequate and even the process leading to ulceration and amputation is still not well understood by many healthcare professionals. As a result, educating medical and nursing personnel, applying screening and prevention guidelines, and

allocating more resources are of great significance in treatment of diabetic foot ulcer patients⁵.

Conclusion

Many diabetics are hypertensive, have chronic complications of diabetes mellitus & non compliant with diabetic diet or exercise programs. Enhanced quality of care and treatment to target is recommended to decrease diabetes-related morbidity and mortality. Patient education should be afforded its due attention. Primary care physicians should be educated about proper follow up of diabetes mellitus. Socioeconomic factors related to diabetic foot in Saudi patients needs more controlled studies.

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