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Risk of foot complications in diabetes mellitus; how much do the diabetes mellitus patients in Enugu know?

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Abstract:

BACKGROUND: Diabetes Mellitus is a disease that has multisystem effects and complications are known to develop in several organs after some years. Diabetic foot problems are largely preventable and both care givers and the diabetic patient must place high priority on prevention through education. Health providers in developing countries are inadequate, overworked and do not have enough time to spend on health education of their patients.

AIM: This study was carried out to evaluate the level of awareness of diabetes mellitus patients of complications of the disease seen in the foot in order to plan and execute effective health education programme to reduce complications.

MATERIALS AND METHODS: This prospective study was carried out in the medical outpatient clinic of ESUT teaching Hospital Enugu from January to July 2015 using pretested structured questionnaire.

RESULTS: 283 patients were sampled but only 260 supplied data for analysis. In the study, 150(57.7%) were females and 110(42.3%) were males. Age of the participants ranged from 32years to 88years, with mean age 0f 60.2years. Majority of the participants 258(99.2%) had been educated on common foot complications seen in diabetes mellitus. Only 70(27%) of the respondents could recognise loss of sensation in the foot as a sign of foot complication.

CONCLUSION: Diabetic foot complication is still high in our diabetics and represents failure of preventive measures, requiring change of modality. Better education of diabetics must be emphasised in addition to any other attempt to curtail the problem.

Keywords:

Diabetic foot, diabetes mellitus, Enugu Nigeria, patient education

Introduction

Diabetes mellitus (DM) is a common metabolic disease worldwide and the most common endocrine disease in Nigeria, with a prevalence rate of 2.2% (Anyanwu, 1994; Alebiosu *et al*., 2000), and is characterized by relative or absolute lack of insulin with resultant high blood glucose level (hyperglycemia) either fasting or postprandial. Estimates indicate that about 171 million people in the world in 2000 had DM and this is expected to increase to 366 million by 2030 (Chauchard *et al*., 2001; Armstrong and Lavery, 1996). There is reduced life expectancy and significant morbidity due to diabetes-related microvascular complications, increased risk of macrovascular complications (ischemic heart disease, stroke, and peripheral vascular disease), and diminished quality of life in all diabetics (Inlow *et al*., 2001).

One of the most common complications seen in DM in the lower limb is diabetic foot ulcer, and it is a major source of morbidity and a leading cause of hospitalization in diabetics (Al-Ghazaly *et al*., 2015). Generally, the term "diabetic foot" refers to a variety of pathological conditions that may affect the feet of people with diabetes (Ekere *et al*., 2003).

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Diabetic foot disease is a major surgical problem which appears to be increasing in Nigeria (Anyanwu, 1994; Nwadiaro 2000). In Ghana, in one series, as well as in Nnewi and Enugu, both in Nigeria, diabetic foot disease was the leading cause of lower limb amputation, while in Ilorin, Nigeria, diabetic foot was the second most common indication for amputation (Naaeder, 1993; Okenwa and Edeh, 2012).

Patient education, foot prophylaxis, tight diabetic control, and improved medical funding will reduce morbidity and mortality (Boulton, 2001). Vascular diseases and neuropathy in the legs accentuate the risk for diabetes-related foot ulcers that might grow into large sizes, become infected, and can be difficult to treat and may occasionally require amputation (Armstrong and Lavery, 1996; Okenwa and Edeh, 2012).

Lavery *et al*. (2003) in their study on incidence of foot pathology among Mexican Americans and non-Hispanic Whites found an incidence of 5.9 foot amputations per 1000 people having DM per year. The level of foot amputations in diabetics has prompted advocacy by Joslin (1934) for intensive health education of diabetics on cleanliness and foot care to minimize occurrence of diabetic gangrene. Studies by Akel and Hamadeh (1999) and Morbach and Paul Hartmann (2003) have shown that diabetics who had their lower limb amputated lacked knowledge about preventive and early treatment measures in case of diabetic foot complication. It is therefore important that diabetics are educated on the pathology they have to enhance their quality of life. Knowing the level of information or knowledge they have will go a long way in planning how to carry out an effective health education program.

Materials and Methods

This prospective study was carried out in the medical outpatient clinic of ESUT Teaching Hospital, Enugu, between January 2, 2015, and July 2, 2015. The clinic is a referral center and receives patients from the general outpatient clinic, other specialist clinics, and surrounding general hospitals and private clinics. Patients from Enugu metropolis and nearby villages access medical services in this center. The medical outpatient clinic has consultant physicians (endocrinologists), senior and junior resident doctors, trained nurses, and dieticians who interact with the patients. The study was questionnaire based and the questionnaire was designed to ascertain age, sex, duration of illness, place where diagnosis was made, and common complications associated with the illness among other parameters.

Consenting DM patients attending the clinic had a pretested and validated questionnaire administered to them by a trained research fellow. The researcher had earlier been trained to explain the questions asked to the patients to avoid ambiguity. The questionnaire was structured to elicit the level of knowledge of the patients regarding foot complications of DM. Data generated were analyzed using SPSS v.16 manufactured by SPSS Inc. Chicago USA. The frequency distribution of the variables was done and cross tabulated to evaluate the variables.

Patients who already had foot complications such as ulcers were excluded.

Results

A total of 283 patients consented to participate in the study, however only 260 were able to give data for analysis. The youngest participant was 32 years and the oldest 88 years, with mean age being 60.2 years and standard deviation 13.1 years. Of the 260 participants, 150 (57.7%) were females and 110 (42.3%) were males.

Majority of the respondents, i.e., 189 (72%), were married, while 62 (23.8%) were widowed, and 5 (1.9%) were single. Only 4 (1.5%) were separated.

Table 1 shows that the duration of illness was from 0 to 34 years. Majority of the patients, i.e., 99 (38%) had been diabetic for 4 years or less, followed by those who had been diabetic for 5–9 years 72 (27.7%). Only 5 (1.8%) respondents had been diabetic for >25 years. Median duration of illness was 2 years.

The diagnosis of DM was made at different levels of health care. 111 (42.7%) was in a tertiary health institution, 31 (11.9%) in a secondary health center, 23 (8.8%) in primary health center, 57 (21.9%) in private hospital/clinics, and 38 (14.6%) in private laboratories.

A total of 258 (99%) of respondents had previous health education on foot complications of DM, while only 2 (0.8%) had no previous education on foot complications of DM.

Table 1: Duration of diabetes mellitus

Sex	Duration of diabetes mellitus (years)							Total (%)
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	
Males	37	32	22	6	9	1	3	110 (42.3)
Females	62	40	30	14	3	1	0	150 (57.7)
Total (%)	99 (38)	72 (27.7)	52 (20.0)	20 (7.8)	12 (4.6)	2 (0.8)	3 (1.1)	260 (100)

Table 2: Place of diagnosis

Sex	Family physician	Private laboratory	Primary health center	General hospital	Territory hospital	Total (%)
Male (%)	27 (10.4)	16 (6.2)	12 (4.6)	11 (4.2)	4.4 (16.9)	110 (42.3)
Female (%)	30 (11.5)	22 (8.5)	11 (4.2)	20 (7.7)	67 (25.7)	150 (57.7)
Total (%)	57 (21.9)	38 (14.7)	23 (8.8)	31 (11.9)	111 (42.7)	260 (100)

Table 3: Education on foot complications

Sex	Education on foot complication		Total (%)
	Yes (%)	No (%)	
Male	208 (41.5)	2 (0.8)	110 (42.3)
Female	150 (57.7)	0 (0.0)	150 (57.7)
Total	158 (99.2)	2 (0.8)	260 (100)

A total of 216 (83.4%) of those who participated in this study recognized diabetic foot ulcer as a complication, 70 (27%) recognized loss of sensation, and 64 (24.7%) appreciated foot gangrene as complications of DM.

Concerning foot care practices, 254 (98%) are aware that regular foot examination is important. 220 (85%) examine their feet daily. However, only 67 (26%) reported minor cut in the toe to their physician immediately.

Tables 1-4 depict, among other things, point of diagnosis of DM, source of knowledge of common foot complications, and depth of knowledge of foot complication.

Discussion

Our study found that 99% of the study population had health education on foot complications. This finding differed significantly from the results by Ekore *et al*. (2011) in Ibadan, Nigeria, and Chandelia *et al*. (2008) in India where 92% and 44.7%, respectively, had no health education on foot complication of diabetes. Our study was carried out in a specialist clinic in a tertiary health institution while the study by Ekore *et al*. was in a primary health center attached to a tertiary institution. Our subjects obviously had visited other healthcare practitioners where they may have been educated before being referred to the specialist clinic while Ekore *et al*.'s respondents probably had their first visit to the primary health center. Our respondents may likely have had some form of medical talk or advice before they presented. Further, access to the internet these days may have provided the necessary information to the respondents who took part in our study. Need for proper health education on foot complications has been highlighted by a study in Lebanon University (Akel and Hamadeh, 1999).

Despite high level of education on foot complications seen in DM, only 24.7% of our respondents recognized foot gangrene as foot complication. 27% recognized loss of sensation in the foot as foot complication. Not being able to recognize loss of sensation (at risk foot) as a big complication is worrisome as diabetic foot complication is usually a result of interplay of varied factors, of which neuropathy is regarded to be the most important (Reiber *et al*., 1996). This underscores the need for continuous health education of all DM patients. This will teach them greater details of prevention and also to seek help early to limit foot complications (Bader 2008).

Ekore *et al*. (2011) reported that only 19.7% of participants in their study examined their feet daily. This differs from our study with 85% examining their feet daily. Our result largely reflects the fact that our respondents had some form of prior foot complication information/education. This behavior is expected as radio jingles on such practices by diabetics are common. Further, quarterly and annual meetings of women in our environment have incorporated healthy lifestyle teachings by experts into it and the women learn from such meetings and subsequently pass knowledge gained to the entire family. Diabetes Association visits our clinics regularly to disseminate information on complications of the pathology and how to minimize them.

Only 26% of the people who took part in our study will inform their physician as soon as they notice a cut in the foot. This is quite low and buttresses the need for a well-structured health education program that will give all round information to diabetics. Our respondents may have chosen not to present to their physician out fear that the treatment offered may snow ball into amputation which is seen as a taboo and culturally unacceptable. Consideration for the extra financial demand or requirement for further treatment may also be a factor discouraging them from presenting early for treatment. It is also possible that they do not appreciate the link between a wound in the foot and development of foot complication. Early intervention in management of diabetic foot complication helps in delaying further foot compromise with possible financial gain on the long run.

Let us stress again that all diabetes are at risk for foot complications as there is no such thing as mild diabetes. However, patients most at risk of diabetic foot complications are elderly, poorly controlled, maturity-onset (type 2) diabetics; younger patients with longstanding type 1 diabetes, and patients with diabetic renal or retinal complications (Burkitt *et al*., 2007).

Table 4: Identification of common foot complications

Sex	Loss of sensation			Foot gangrene			Foot ulcer		
	Yes	No	Total	Yes	No	Total	Yes	No	Total
Males	33	76	109	26	83	109	88	21	109
Females	37	113	150	38	112	150	128	22	150
Total (%)	70 (27)	189 (73)	259 (100)	64 (24.7)	195 (75.3)	259 (100)	216 (83.4)	43 (16.4)	259 (100)

Box 1: Six important questions to incorporate in any health educational program to control diabetic foot diseases

1. Age of patient - elderly Type 2 patient's fare poorly
2. Duration of diabetic mellitus - long standing Type 1 patients fare poorly
3. Care of insensitive, warm foot - daily self-examination and prompt medical attention following injury
4. Control of blood sugar - a must to prevent complications
5. Eye and urinary complications - increases morbidity and foot complications
6. Funding of care - necessary for prompt medical attention as and when due

Conclusion

Our study demonstrated that these diabetics studied have good knowledge of the foot complications of DM, especially foot ulceration. However, diabetic foot ulceration is a failure of preventive management and many such ulcerations progress to diabetic foot gangrene. Healthcare providers for diabetics at all levels of contact must educate them vigorously to recognize the early neuropathic foot complications (insensate, cold, and easily injured foot) which can progress to foot ulcer and prevent it by proper diabetic control, regular foot inspections, and chiropody (podiatry). Health educators must ensure that diabetics know the specific complications they are at risk of and be able to identify them early not to fall victims of such complications. Education should be a continuous one without assuming that the individuals know all they should know using Box 1 as a guide.

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Conflicts of interest
There are no conflicts of interest.

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