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Full Length Research Paper

Evaluation of Prevalence of Micro- and Macrovascular Complications among Elderly Type 2 Diabetes Patients in a Health Facility

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ABSTRACT

Diabetes complications contribute to reduction in health-related quality of life of patients and increased health resources usage. This study was undertaken to evaluate the prevalence of micro and macro complications among type 2 diabetic patients in Olabisi Onabanjo University Teaching Hospital (OOUTH), Sagamu, Nigeria. This was a retrospective study of case files of elderly type 2 diabetic patients from 50 years old who attended the endocrinology clinic from 2011-2012 and fulfilled the inclusion criteria. Relevant data on micro and macro vascular complications were assessed from the files. Mean age of study population was 63.9±9.6 years. Majority were females (61.7%). Above half of the patients (59.3%) had fasting blood sugar (FBS) level <126-126 mg/dl, normal body mass index 18.5-24.9 kg/m2 was 40.7% and blood pressure (BP) < 120/80-130/80 mmHg was 18.6%. Males had 67.2% in both neuropathy and retinopathy while the females had 54.4% and 52.4% respectively. The males had 25.0% and 14.1% in peripheral vascular disease and presence of foot ulcer respectively but the females had a higher figure (7.8%) than males only in history of loss of consciousness. There was no significant association of gender with microvascular complications but a strong association of age and retinopathy was found (p=0.010). Prevalence of both microvascular and macrovascular complications was higher in males in this study. The patients were of low educational level and on meager wages. This probably made it difficult for them to seek health intervention early and to take the necessary intervention steps to avoid these complications.

Keywords; *Diabetes, elderly, patients, complications, evaluation, hospital.*

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INTRODUCTION

According to International Diabetes Federation, approximately 382 million people had diabetes in 2013, a figure expected to rise to 592 million in 2035 (IDF, 2013). Worldwide, diabetes has become one of the leading non-communicable diseases responsible for premature death especially among the elderly. It has been reported that diabetes claims the life of somebody per second (Jennings *et al*., 2007). In 2010, Africa alone was estimated to harbour roughly 12.1 million people with diabetes mellitus, a figure expected to soar to 23.9 million in 2030 (Whiting *et al*., 2011). Due to the fact that in sub-Saharan Africa, patients are unable to access health care services as at when due, diabetes is in most cases diagnosed rather late. This, in addition to irregular patient monitoring, gives room for early diabetes manifestation in this region (Gill *et al*., 2009; Tuei *et al*., 2010). Previous researchers (Linzer *et al*., 2005; Edelman *et al*., 2002) reported that diabetes complications contribute to reduction in health-related quality of life (HRQOL) of patients and increased health resources usage (Rendell *et al*., 1993). Complications arising from hyperglycemia can be classified

into two groups namely microvascular and macrovascular. Microvascular complications include neuropathy, retinopathy and nephropathy while macrovascular complications include peripheral arterial disease, coronary artery disease and stroke.

According to an earlier work (Gross *et al*., 2005) about 7% of type 2 diabetic patients may likely have been with micro albuminuria during diagnosis. The threat of reduced quality of life and life expectancy posed by diabetes complications is enormous on the individual, community and society. Evaluation of prevalence of diabetes complications could guide health systems in planning interventions to improve quality of life of diabetic patients. The objective of the present study was to evaluate the prevalence of micro and macro vascular complications among elderly type 2 diabetic patients attending endocrinology unit of OOUTH, Sagamu, Ogun State, Nigeria.

MATERIALS AND METHODS

Study location: This study was carried out at the endocrinology clinic of Olabisi Onabanjo University Teaching Hospital (OOUTH), Sagamu, Ogun State, Nigeria. The hospital has 241 bed spaces and handles an average of 974 in-patients and 6,486 outpatients per month.

Study design: Following ethical approval, a retrospective study of case files of elderly type 2 diabetic patients of age 50 years and above who attended the endocrinology clinic between the year 2011-2012 and fulfilled the inclusion criteria was carried out. The case notes of those with incomplete data on socio-demographic characteristics, clinical and diabetes complication reports were excluded. A structured data collection format was used to obtain relevant data on micro and macro vascular complications from the patients' case files as diagnosed by the patient's physician. Microvascular diseases assessed included nephropathy, retinopathy and neuropathy while macrovascular diseases assessed were peripheral vascular disease, history of loss of consciousness, history of stroke, presence of foot ulcer and presence of ischaemia.

Inclusion criteria: Patients with diagnosis of type 2 diabetes mellitus who received medical care from endocrinology clinic of OOUTH between the year 2011-2012 for diabetes and who were at least 50 years old during the study period were included.

Exclusion criteria: Patients with mental incompetence, incomplete information, acute illness and those who declined participation were excluded.

Data Analysis: Data collected were entered into Microsoft Excel for sorting and SPSS version 16 was used for further analysis. Chi-square and Fisher Exact-tests were used for comparison of proportions. A $p \leq 0.05$ was considered statistically significant.

Ethical approval: All procedures in this research were carried out according to the research protocol approved by the Ethical committee of Olabisi Onabanjo University Teaching Hospital, Sagamu, Ogun State. Confidentiality and anonymity of the patients' information were assured and maintained during and after the study. (Ethical approval No: OOUTH/DA.326/271).

RESULTS

Socio-demographic characteristics of respondents

A total of 167 patients whose case notes fulfilled the study criteria were used for this research. Mean age of the study population was 63.9±9.6. Majority of the study population were females (61.7%) and patients within the age range 50-59 years had the highest (39.5%) representation. Those with primary level of education made up 43.1%, the married (85.6%), traders (36.1%) while those who earned above ₦30,000 monthly were 36.1%. See Table 1.

Table 1:
Socio-demographic characteristics of respondents.

Characeristics	Variables	n (%)
Sex	Males	64 (38.3)
	Females	103(61.7) P=0.018
	Total	167 (100)
Mean age	63.9±9.6	
Age range	50-59 years	66 (39.5)
	60-69 years	54 (32.3)
	>69	47 (28.1)
	Total	167 (100)
Address	Sagamu & environs	152 (91.0)
	Outside Sagamu	15 (9.0)
	Total	167 (100)
Marital status	Married	143 (85.6)
	Single	1 (0.6)
	Divorced	1 (0.6)
	Widow	18 (10.8)
	Widower	4 (2.4)
	Total	167 (100)
Educational background	Primary	72 (43.1)
	Secondary	35 (21.0)
	Tertiary	25 (15.0)
	None	35 (21.0)
	Total	167 (100)
Occupation	Civil servant	19 (11.4)
	Trader	61 (36.5)
	Teacher	11 (6.6)
	Pensioner	22 (13.2)
	Others	54 (32.3)
Average monthly income (₦)	Less than 5,000	11 (6.6)
	5,000- 10,000	19 (11.4)
	11,000- 20,000	29 (17.4)
	21,000- 30,000	47 (28.1)
	Above 30,000	61 (36.5)
	Total	167 (100)

₦ = Naira, n= number, P = *p* value

Clinical information of patients

Slightly above half of the patients (59.3%) had FBS level of <126-126 mg/dl, normal body mass index of 18.5-24.9 kg/m2 was 40.7%, obesity group was 54.5% and BP of < 121/80-130/80 was 18.6%.

Table 2:

Clinical information of patients

Characteristic	Variable	n (%)	Normal
Body mass index (Kg/m^2)	<18.5	8 (4.8)	18.5-24.9
	18.5-24.9	68 (40.7)	
	25.0-29.9	54(32.3)	
	30 and above	37 (22.2)	
	Total	167 (100)	
Fasting blood sugar (mg/dl)	< 126-126	99 (59.3)	< 126
	>126	58 (40.7)	
	Total	167 (100)	
Blood pressure (mmHg)	< 120/80	18 (10.8)	<130/<80
	120/80	7 (4.2)	
	121/80-130/80	31 (18.6)	
	130/90-140/90	60 (35.9)	
	>140/90	51 (30.5)	
	Total	167 (100)	
Co-morbidity	Hypertension	105 (62.9)	
	Osteoarthritis	16 (9.6)	
	Erectile dysfunction	4 (2.4)	
	Enlarged prostate	2 (1.2)	
	Peptic ulcer	5 (3.0)	
	Jaundice	3 (1.8)	
	Parkinson's disease	1 (0.6)	
	None	31 (18.5)	
	Total	167(100)	
Presence of foot ulcer	Yes	16 (9.6)	
	No	149(89.2)	
Time since diagnosis	< 1year	17 (10.2)	
	1-3 years	36 (21.5)	
	4-6 years	24 (14.4)	
	More than 6 years	90 (53.9)	
	Total	167 (100)	

n= number

The main co-morbidity was hypertension (62.9%), presence of foot ulcer was 9.6%, while majority (53.9%) were diagnosed with diabetes more than 6 years ago (Table 2).

Microvascular complications in patients: The males had 67.2% in both neuropathy and retinopathy but 14.1% of nephropathy respectively whereas the females had 54.4%, 52.4% and 10.7% respectively. Age range 60-69 years had 68.5% in both neuropathy and retinopathy and 13.0% of nephropathy while age range >69 years had 83.0% of retinopathy. There was a significant ($p \leq 0.05$) difference in the rate of occurrence of microvascular complications as nephropathy was significantly less as compared to both neuropathy and retinopathy ($p < 0.001$). There was however no such difference with age groups ($p \geq 0.05$). There was no significant association of gender with microvascular complications but a strong association of age and retinopathy was found (p=0.010) (Table 3).

Macrovascular complications in patients: The males had 25.0% and 14.1% for peripheral vascular disease and presence of foot ulcer respectively while both history of stroke and presence of ischaemia had equal figure (6.3%). Females had a higher figure (7.8%) than males only in history of loss of consciousness. Age range 60-69 years had 31.5% and 11.1% in peripheral vascular disease and presence of foot ulcer respectively, age > 69 years had 8.5% in both history of loss of consciousness and history of stroke respectively while age range 50-59 years had 9.1% in presence of ischaemia. There was no significant ($p > 0.05$) difference in the rate of occurrence of macrovascular complications in gender and age groups. There was also no significant association of gender and age with macrovascular complications ($p > 0.05$) (Table 4).

DISCUSSION

The mean age recorded in this study was 63.9±9.6 years, a representation of mainly elderly diabetic patients as compared to a previous finding (Rudasingwa *et al*., 2012) with mean age of 49 years. This study disagrees with some earlier findings (Mbanya *et al*., 2010; Morgan *et al*., 2010) who reported higher prevalence of diabetes among the elderly while the reverse is said to be the case in the developing countries. Female diabetes preponderance in our study is in agreement with some earlier studies (Tuei *et al*., 2010; Mbanya *et al*., 2010).

Female preponderance may relate to the unwillingness of most women to engage in physical exercise, lack of understanding and poverty.

Table 3:
Microvascular complications and its association in gender and age

Variable	Neuropathy n (%)	Retinopathy n (%)	Nephropathy n (%)	p-value
Sex				
M: (n=64)	43 (67.2)	43 (67.2)	9 (14.1)	
F: (n=103)	56 (54.4)	54 (52.4)	11 (10.7)	< 0.001
Association	P=0.489	P=0.408	P=0.737	
Age				
50-59 (n=66)	30 (45.5)	21 (31.8)	7 (10.6)	
60-69 (n=54)	37 (68.5)	37 (68.5)	7 (13.0)	
>69 (n=47)	32 (68.1)	39 (83.0)	6 (12.8)	0.627
Association	P=0.318	P=0.010*****	P=0.260	

***=** Significant, n= number, M=male, F=female

Table 4: Macrovascular complications and its association in gender and age

Variable	Peripheral vascular disease n (%)	History of loss of consciousness n (%)	History of stroke n (%)	Presence of foot ulcer n (%)	Presence of ischaemia n(%)	P-value
Sex						
M: (n=64)	16 (25.0)	4 (6.3)	4 (6.3)	9 (14.1)	4 (6.3)	
F: (n=103)	19 (18.4)	8 (7.8)	6 (5.8)	7 (6.8)	6 (5.8)	0.794
Association	P=0.450	P=1.000	P=1.000	P=0.187	P=1.000	
Age						
50-59 (n=66)	10 (15.2)	5 (7.6)	3 (4.5)	5 (7.6)	6 (9.1)	0.605
60-69 (n=54)	17 (31.5)	3 (5.6)	3 (5.6)	6 (11.1)	2 (3.7)	
>69 (n=47)	8 (17.0)	4 (8.5)	4 (8.5)	5 (10.6)	2 (4.3)	
Association	P=0.184	P=0.857	P=0.706	P=0.808	P=0.438	

n= number, P = p-value, M=male, F=female

Earlier works (Mbanya *et al*., 2010; Melendez-Ramirez *et al*, 2010) asserted that poverty and lack of education about diabetes among the general populace including the low socioeconomic status of the countries would tend to make the diabetic patients to access health care rather late. Other researchers (Dagogo-Jack, 2006; Prentice and Moore, 2005) suggested factors such as 'health-seeking behaviour' of women and the seemly lack of time by men for clinic attendance to be contributory to this gender difference. Neuropathy and retinopathy were higher than nephropathy in this study and our results showed male preponderance (in retinopathy) of diabetic microvascular complications. According to a study carried out by Knuiman *et al*., 2005 retinopathy was present in 28% of their patients which was slightly higher in females but our result found prevalence of retinopathy to be significantly higher in the most older patients with no significant gender difference. Among patients with type 2 diabetes mellitus severity of hyperglycemia and hypertension were two main factors linked to diabetic retinopathy (UK Prospective Diabetes Study Group, 1998) and this has also been found in this study. Prevalence of microvascular complications has earlier been reported to be higher among African diabetic patients when compared to reports from elsewhere (Liu *et al*., 2010; Morgan *et al*., 2010). Although end-stage renal disease from diabetes mellitus according to Nelson *et al*., (1995) amounted to 50% among all new patients, our result reported nephropathy as the least prevalent of the microvascular complications.

The rate of occurrence of macrovascular complications found in this study was low as compared to that of microvascular complications within the same groups of patients. A previous study (Kengne *et al*., 2005) also reported fewer macrovascular complications in Africa as compared to that in the Western societies and Asia. Prevalence of macrovascular complications was higher in males just like in microvascular complications and occurrence of the various types presented here were not significantly different from each other. Peripheral vascular disease is known to affect males more when compared to females (Feinglass *et al*., 2000). Awori and Atinga, (2007) found vascular amputations in their Kenyan study to occur more in males than in females below 60 years with no regard to age difference. This may be due to lack of timely health seeking behaviour in men unlike what obtains in women. Diabetes foot ulceration is one of the greatest burdens of diabetes complications. The presence of foot ulcer was higher among males (14.1%) in our findings. Previous work (Benbow and Gill, 1998) found foot ulceration in about 15% of their diabetic patients. Prevalence of known risk factors for cardiovascular diseases were found to be high in this study as our results showed only 40.7% of our patients had normal BMI of 18.5-24.9 kgm^2, 59.3% of normal FBS while 33.6% had the recommended blood pressure level of < 80mmHg /<130mmHg. Among the elderly, hypertension and diabetes have been known to be cardiovascular disease main risk factors (Hassing *et al*., 2004). In a retrospective study by Aguomoh and Unachukwu (Aguomoh and Unachukwu, 2007) carried out in Nigeria, hypertension and diabetes were reported as the main indications for admission. Presence of ischaemia was slightly higher in males and among 50-59 years in this study but another study (Bhupathy *et al*., 2010) found in general population prevalence and incidence of cardiovascular disease increased with age and higher for men as compared to women, a situation ascribed to female sex hormones. Another work (Amu *et al*., 2005) found patients with diabetes to have about 3.23-fold increase in stroke while a similar one (Kolawole and Ajayi, 2000) reported stroke related death of 50% among diabetic patients with hypertension but our study revealed stroke to be lower than this and slightly higher in the males and in age group >69 years.

In conclusion, prevalence of both microvascular and macrovascular complications was higher in males in this study. In addition, many of the patients were of low educational background and on meager wages. This probably could have made it difficult for them to seek health intervention early and take the necessary intervention steps to avoid diabetes complications. Diabetes mellitus has become a public health burden which should be urgently and decisively addressed with all political will in every societies and communities in order to curtail its disabling effects. Preventing or delaying the development of diabetes complications while ensuring optimal

glyaecemic control should be the focus of successful management. The most important issue in diabetes management is avoidance of complications which normally result from poor glycaemic control. The populace with particular reference to male patients should however be educated as well as counselled on the benefits of early diabetes screening, adherence to prescribed medications and life style modifications. This study is therefore advocating that early diagnosis coupled with good glycaemic control and prevention of cardiovascular risk factors in diabetic patients should be the focus of appropriate government interventions to minimize the burden of acute and chronic diabetes complications.

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