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Factors Influencing Diabetes Management Outcome among Patients Attending Government Health Facilities in South East, Nigeria

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Abstract: Diabetes and its complications have huge disease burdens globally especially in developing countries. Morbidity and mortality from diabetes is very high in Nigeria due to poor management and noncompliance with global guidelines. Many studies have observed that diabetes management in Nigeria is suboptimal with very poor outcomes. The purpose of this study is to identify factors that are responsible for the poor diabetes management outcome in Nigeria in other to find solutions to prevent needless deaths and disabilities related to the disease. Study participants consisted of 47 diabetic patients receiving treatment at Federal Medical Center and General Hospital, Umuguma both in Owerri Local Government Area of Imo State of Nigeria. A cross sectional descriptive survey and face to face interviews were conducted to illicit information from the subjects. Results showed that majority of subjects (42.5%) had secondary education, all subjects earned even < $2/day and had a high mean BMI of 28.8. While 80.9% of subjects never had a self blood glucose monitoring kit, 82.7% could not afford the kit, only 19.1% ever engaged in self glucose monitor and only 6.4% has had an HbA1c screening before. Majority (68%) paid for their treatment and care. Majority of subjects (93.6%) lacked basic knowledge of diabetes management or care and reported inability to visit the doctor except when manifesting serious symptoms or complications. Also many subjects (46.8%) had used some sort of herbs or concoctions as medical remedies for their diabetes. The study also recorded 0% interaction rate between health care workers and diabetes patients outside the health facility. Based on these findings, the study concluded that the health care delivery system in Nigeria is grossly inadequate to handle the various intricate lifelong management issues of diabetes and therefore recommends among others the provision and enforcement of policy and guidelines for diabetes management for all healthcare professionals and facilities will ensure that every healthcare provider follows the guidelines for diabetes management as recommended by International Diabetes Federation.

Key words: Diabetes, management outcome, health facility, South East, government, Nigeria

INTRODUCTION

Diabetes is a chronic disease primarily defined by high levels of blood glucose, (hyperglycaemia) giving rise to risk of tiny blood vessel damage (retinopathy, nephropathy and neuropathy) (WHO, 2008). Diabetes is the sixth leading cause of death worldwide (MMWR, 2002) while the number of diabetes cases worldwide has increased significantly in the last decade (Zeck and Mclntyre, 2008). It is associated with reduced life expectancy, significant morbidity and diminished quality of life. Again, overall risk of premature death is twice as high among individuals with diabetes as for those without diabetes (WHO, 2008). The increasing number of people with type 2 diabetes is a worldwide concern (Beran and Yudkin, 2006) and the number of adults with diabetes in the world will rise from 135 million in 1995-380 million in the year 2025. The major part of this numerical increase will occur in developing countries (WHO, 2008). There will be a 42% increase from 51-72 million in the developed countries and a 170% increase from 84-228 million in the developing countries. Thus by the year 2025, >75% of people with diabetes will reside in developing countries, as compared with 62% in 1995 (King *et al*., 1998). It has been noted also that one in twenty adult deaths in developing countries is diabetes related (Gojka *et al*., 2005). Currently, diabetes affects 246 million people worldwide (Levitt, 2008).

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At the beginning of the last century, diabetes mellitus was considered a rare medical condition in Africa but there is now evidence to demonstrate an increasing incidence and prevalence of diabetes in these populations (Kengne *et al*., 2005), regarded as low and middle income (Population Reference Bureau, 2008). While it is estimated that 92% of Nigerians live under $2 a day (Population Reference Bureau, 2008) studies have shown that there has been a progressive increase in the prevalence of diabetes in Nigeria and the burden is expected to increase even further (Adeleye *et al*., 2006).

According to World Health Organization, there are 1.71 million People living with diabetes in Nigeria and this figure is projected to reach 4.84 million by the year 2030 (WHO, 2009). Current prevalence rate estimates of diabetes in Nigeria have been tagged at 2.5% compared to its 2.2% rate in 2003. Diabetes and its complications impose significant economic consequences on individuals, families, health systems and countries (WHO, 2009). The threat is growing, the number of people, families and communities afflicted is increasing. This growing threat is an under-appreciated cause of poverty and hinders the economic development of many countries (WHO, 2009). Diabetes takes a staggering toll on the people in Nigeria and the economic burden is heavy (Popoola, 2005). According to the Nigerian Daily Sun, over 12 million Nigerians have diabetes and most worrisome is the fact that 40% of this people did not know that they had the disease. The life expectancy of a child with Type 1 diabetes is as low as seven months in rural African country like Nigeria caused mainly by limited access to insulin and its cost and a lack of infrastructure within the healthcare system. In parallel, an emerging epidemic of Type 2 diabetes is developing in this part of the world. In the USA, 98% of Type 1 patients are alive six years after diagnosis but only 1% of children currently survive six years in sub-Saharan Africa.

During the 51st National Council on Health held in Lagos in 2007, the Health Minister observed that the Nigerian health sector has suffered decades of neglect. However, the Minister reported that it has also witnessed various forms of reform since 1999. These are all targeted towards improving health service delivery and quality of care, leading to the development of several policy and strategic framework documents for various projects and programs. However, these programs have fallen short of making a significant impact towards improving health service delivery due to a relatively poor emphasis on implementation, monitoring and evaluation (WHO, 2009). Recent research on common causes of inpatient hospitalizations in Nigeria showed that of 1,327 patients admitted to the medical wards, diabetes mellitus related admissions comprised 15% of the entire medical admissions and the case fatality rate was 16% (Ogbera *et al*., 2007). The most common reasons for the admissions were hyperglycemic emergencies (40%) and hypertension (21%) (Ogbera *et al*., 2007). The most common causes of deaths were hyperglycemic emergencies 46% (15) and Diabetic Foot Ulcers (DFU) 30% (10). Diabetic foot ulcers and Cerebro Vascular Accidents (CVA) commonly known as stroke had the highest case fatality rates of 28 and 25%, respectively (Ogbera *et al*., 2007).

Diabetic foot ulcers had the most prolonged duration of admission ranging from 15-122 days. The report also noted that the combination of diabetic foot ulcer, cardiovascular disease and having type 2 diabetes were highly predictive of fatal outcomes (Ogbera *et al*., 2007). Okoro (2002) showed that diabetes care among patients in the Teaching Hospitals in Nigeria was less than optimal and recommended improvements in the areas of foot and eye examinations.

Similarly, Ogbera *et al*. (2006) supported this claim and reported that the short stay hospital admission outcome for patients with diabetes in Nigeria is death.

In the light of the foregoing, the following questions were posited: should the diagnosis of diabetes in any individual in Nigeria be viewed as a death sentence? What are the factors that impact on the management outcome of diabetes in Nigeria? What role does socioeconomic status such as education, gender and income play in diabetes outcome in Nigeria? Does patient education or healthcare delivery system have any effect on the management outcome of diabetes in Nigeria? How does the standard of diabetes care in Nigeria compare with the standard of diabetes care practiced in the developed countries such as North America and Europe?

This study is justified by the fact that it will make an attempt to reexamine the possibilities of re-evaluation, modification and restructuring of the healthcare delivery systems in Nigeria in other to adopt more appropriate and effective preventive treatment strategies in the management of diabetes in Nigeria. It is also intended to increase government awareness of the high morbidity and mortality associated with this disease in Nigeria and emphasize on its burden on the patients, their families and the country. Consequently, it may result in better planning and increased budgetary allocations from the health ministry. Moreover, findings of this study is intended to inform, educate and empower diabetic patients to be able to take care of themselves better, thereby reducing complications and fostering improved quality of life free of disabilities. The study may also

provide the much needed information that will enable public health educators in the planning and provision of effective and efficient diabetes education.

MATERIALS AND METHODS

The study is descriptive in nature and it is aimed at determining the influence of some variables on diabetes management outcome in Nigeria. The research was conducted with diabetic patients receiving treatment at the Federal Medical Center Owerri and General Hospital Owerri in Imo State, Nigeria. Federal Medical Center is a tertiary health institution with attached medical and nursing schools which is run by the Federal government while General Hospital Umuguma is run by the State government. Patients from all over Imo State and beyond with varied diagnosis such as diabetes, hypertension and other medical or surgical needs seek medical care from these hospitals. This is the main justification for choosing them for this study.

Volunteer sampling method was utilized to select samples of diabetic patients. Recruitment flyers were posted at the hospitals for diabetic patients to voluntarily enlist in the study. Participants were selected based on the following inclusion criteria: response to the recruitment advertisement for voluntary participation in the study; diagnosis of diabetes; receiving medical care from the Federal Medical Center Owerri and General Hospital, Owerri and should be 18 years of age and above. Thus population sample comprised of 50 diabetic patients who were attending the hospital clinics or admitted to the hospital wards during the two month period of the study (March-April, 2008) and who fulfilled the inclusion criteria stated earlier.

Interview and survey instrument which was developed by the researchers was utilized in this study to elicit information on factors which impact on diabetes management in Nigeria. Interviews were used for participants who could not read or write in the English language. The survey instrument was divided into two sections: the demographic information and 36 questions which addressed diabetes care by healthcare providers and knowledge and practices amongst diabetic patients including inhibiting factors to diabetes management outcomes. Survey questions were written in simple English language to foster easy comprehension by the subjects.

Approval was given for this study by The Institutional Review Board (IRB) of the Minnesota State University, Mankato. Permission from the medical directors or ethics committee of both hospitals was also granted before commencement of data collection. Nigeria does not operate the IRB protocol and as such permission in writing from heads of hospitals is considered sufficient. The instrument was pilot tested among patients in an urban mission hospital in Imo State to determine its content and construct validity and reliability before its final adoption and administration.

Data collection was by both self report and face to face interview for illiterate patients, who cannot read or write in the English language. The same questions on the questionnaires were used as guidelines for the interview which were done by the researcher in the local language and responses checked and written into the questionnaire. Through an informed consent protocol, participants consent were sought after issues such as confidentiality, potential risks to participants, right to withdraw or refuse to answerany question (s) which they feel uncomfortable with were explained. Data analysis was done after manual coding and tallying into a statistical analysis program, SPSS and running for results.

RESULTS AND DISCUSSION

Demographic information of the participants: A total of 47 diabetic patients were recruited for this study in response to the advertisement for recruitment into the study. Thirty seven patients were recruited from Federal Medical Center Owerri and 10 patients were recruited from General Hospital Owerri. Participants consisted of 27 (57.3%) males and 20 (42.7%) females. The largest number of Participants 13 (27.6%) was in the age range of 63 and above and the lowest number was 2 in the age range of 18-26, representing 4.4% of the study sample. The data also showed that 10 (21.3%) of participants had a mean weight of 170 lbs and 24 (51%) had mean height of 5 feet, 9 inches. This translates to a mean Body Mass Index (BMI) of 28.8 among study participants indicating obvious obesity problems which could be contributory to their predisposition to diabetes.

The educational level of participants showed that 20 (42.5%) of participants have secondary education followed by college graduates, 17 (36.2%). Only three participants (6.4%) had no formal education. Many of the participants, 16 (34.1%) belong to the income group of ₦ 71,000-100,000 ($ 701-1000) annually. Note that Naira is Nigeria currency and is equivalent of $ 1-150 Naira. Thirteen (27.7%) of the sample group earned ₦ 30,000 and below (<$ 300) while participants earning over $1,001 annually were only six (12.8%). Participants in the study earn even <$2 a day which is categorized as earnings for low income countries. This means that participants in this

study are mostly poor. It also showed that majority of the participants had only high school education which is responsible for low income and poor health literacy. This leads to the inability of the participants to understand the intricate details of diabetes management and care and consequently, results in poor diabetes control and outcome.

Health care system and diabetes management outcome: Participants' responses (Table 1) showed that only nine (19.2%) of participants have a self glucose monitoring meter while 38 (80.9%) did not have the meter but said they checked their blood sugar monthly at the Doctor's office. A total of 30 (82.7%) respondents reported they could not afford the glucose meter while 6 (12.8%) did not know what the equipment is.

On ways of payment for treatment for Diabetes care, 32 (68%) paid for themselves, 7 (14.9%) mentioned family members while 8 (17%) said government paid. Only 3 (6.4%) of the participants has had a HbA1c screening. Nine participants (19.2%) said that they have heard about cholesterol but only 2 (4.3%) has had a screening. No single communication was recorded between the participants and the hospital staff by means of a written letter, visit or phone conversation.

Socio economic status and diabetes management outcome: Analysis of the participants demographic profile such as educational level, gender and income showed the following results: 27 (57.5%) of the participants were males and 20 (42.5%) were females. A total of 6 (12.8%) of the females in each case earned the lowest income of less than US $ 300.00 per annum and also had a low percentage of college education, while 11 (23.4%) of males had a college education.

The income of participants is very significant in their inability to procure diabetes supplies, medications and doctor's visits. An annual income of $ 300 is even below $2 a day as reported by Population Reference Bureau (2008). This is too meager and cannot sustain diabetes care.

Diabetes is a very expensive health condition. The financial implication of the disease is too heavy for even the high income earners or the wealthy let alone the poor families. Poverty is linked with poor diabetes outcome due to inability to receive and procure diabetes supplies regularly. Poor and uneducated people cannot also recognize the inherent danger in not complying with their diet or medications or even early warning signs of complications (Nwankwo, 2004).

Table 1: Survey questions with related healthcare delivery variables

Question	Male (%)	Female (%)	Total (%)
How do you monitor your blood sugar?			
Self monitor	7 (14.9)	2 (4.3)	19.1
Doctor's office	20 (42.5)	18 (38.3)	80.9
Total	27 (57.4)	20 (42.6)	100.0
How often do you check your blood sugar?			
Daily	2 (4.3)	1 (2.1)	6.3
2-3 times a day	(0.0)	(0)	0.0
Weekly	4 (8.5)	1 (2.2)	10.6
Whenever I can	6 (12.8)	7 (14.9)	27.7
Never	0 (0.0)	0 (0.0)	0.0
Total	27 (57.3)	20 (42.7)	100.0
Do you have a blood glucose meter?			
Yes	7 (14.9)	2 (4.3)	19.1
No	20 (42.5)	18 (38.3)	80.9
Total	27 (57.4)	20 (42.6)	100.0
If no to question above, why?			
I cannot afford the cost of the equipment	14 (27.9)	16 (30.0)	82.7
I don't know how to use it	2 (4.3)	0 (0.0)	4.3
I don't know what it is	4 (8.5)	2 (4.3)	12.8
How do you pay for your medical treatment?			
Self pay	19 (40.4)	13 (27.7)	68.0
Government subsidy	6 (12.8)	2 (4.3)	17.0
Family members	2 (4.3)	5 (10.6)	14.9
Humanitarian or charitable organization	0 (0.0)	0 (0.0)	0.0
Total	27 (57.4)	20 (42.6)	100.0

Cultural practices and diabetes management outcome: Participants responses to the question regarding cultural beliefs and practices showed that 44 (93.6%) of participants said they did not believe that the herbalist can cure diabetes. However, 22 (46.8%) have taken herbal medicine during the course of their disease. This showed that cultural practices in terms of medicaments or rites influence the outcome of diabetes, some for good and some result to very dangerous consequences. This finding supports previous study by Popoola (2005) regarding the use of alternative source of treatments by Nigerians for diabetes and other chronic diseases.

The study also showed that the few participants who believed that the herbalist can cure diabetes were all women. Women are more likely than men to seek alternative forms of treatment due to their lower socioeconomic status (Nwankwo, 2004). It could also be as a result of the fact that this study was conducted in an urban area rather than the rural communities where these practices are rife (Table 2).

Patient education and diabetes management outcome: Participants responses to questions regarding patient education, knowledge and practices produced varied information (Table 3-5). Participants were asked questions to determine whether they receive verbal or written one-on-one education regarding diabetes management such as medication compliance, self monitoring of blood

Table 2: Survey questions addressing cultural practices variables

Question	Male (%)	Female (%)	Total (%)
Do you think that the herbalistcan cure diabetes?			
Yes	0 (0.0)	3 (6.4)	6.4
No	27 (57.2)	17 (36.2)	94.0
Total	27 (57.4)	20 (42.6)	100.0
Have you taken any herbal medicines or visited the witch doctor for your diabetes?			
Yes	15 (31.9)	7 (14.9)	46.8
No	12 (25.5)	13 (27.7)	53.2
Total	27 (57.4)	20 (42.6)	100.0

Table 3: Survey questions relating to patient education variables

Question	Male (%)	Female (%)	Total (%)
Do you have a good understanding about diabetes care?			
A little bit	15 (31.9)	12 (25.5)	57.4
Quite a bit	7 (14.9)	6 (12.8)	27.7
A lot	5 (10.6)	2 (4.3)	14.9
Total	27 (57.4)	20 (42.6)	100.0
Do you know what HbA1C is?			
Yes	3 (6.4)	0 (0.0)	6.4
No	24 (51.0)	20 (42.6)	93.6
Total	27 (57.4)	20 (42.6)	100.0
Have you heard about Cholesterol?			
Yes	7 (14.9)	2 (4.3)	19.1
No	20 (42.5)	18 (38.3)	80.9
Total	27 (57.4)	20 (42.6)	100.0
What is your current blood pressure reading?			
Knows	24 (51.0)	18 (38.3)	89.3
Doesn't know	3 (6.4)	2 (4.3)	10.7
Total	27 (57.4)	20 (42.6)	100.0

glucose and nutrition. Participants were also asked questions to determine their knowledge regarding diabetes care. Responses and findings (Table 3), showed that only 3 (6.4%) of respondents knew what the definition of HbA1C is 44 (93.6%) did not know what it is and were never checked.

A total of 38 (80.9%) did not have any knowledge about cholesterol and also never got screened. However 42 (89.3%) knew their blood pressure readings and 22 (46.8%) of the participants had elevated readings of 140 mmHg or more of systolic reading and 90 mmHg or more of diastolic blood pressure reading. About 27 (57%) reported having a little bit of knowledge about diabetes care, 13 (27.5%) had quite a bit of knowledge and only 7 (14.8%) said they knew quite a lot.

When participants were asked about the names doses and side effects of their medications (Table 4), only 8 (17%) said they knew but 29 (61.7%) knew some of the medications while 7 (14.8%) had no clue what so ever about their medications. Regarding frequency of doctor's visits, 18 (38.4%) of respondents said they did go for monthly visits and 15 (29.8%) reported visits to the doctor on appointments but did not state the frequency while 6 (12.7%) said they visited the doctor occasionally as the case may be. A total of 38 (80.9%) of the

Table 4: Participants' knowledge and practices

Question	Male (%)	Female (%)	Total (%)
Do you know the Names, doses and side effects of all the medications you are taking for your diabetes?			
Yes	5 (10.6)	3 (6.4)	17.0
No	3 (6.4)	4 (8.5)	14.9
Know some	17 (36.1)	12 (25.5)	61.6
Don't know	2 (4.3)	3 (6.0)	10.6
Total	27 (57.4)	20 (42.6)	100.0
How often do you see your doctor for checkups in a year?			
Once a year	0 (0.0)	0 (0.0)	0.0
Twice a year	0 (0.0)	0 (0.0)	0.0
Three times a year	2 (4.3)	2 (4.3)	8.6
Other			
Monthly	9 (19.2)	9 (19.2)	38.4
On appointment	9 (19.2)	6 (12.8)	29.8
Often	2 (4.3)	1 (2.1)	6.4
Whenever	5 (10.0)	1 (2.1)	12.7
Consults a nurse	0 (0.0)	1 (2.1)	2.1
Total	27 (57.4)	20 (42.6)	100.0
How often do you receive any education about your disease?			
Every visit	22 (46.9)	16 (34.0)	80.9
Once a year	0 (0.0)	0 (0.0)	0.0
Twice a year	0 (0.0)	0 (0.0)	0.0
Never	1 (2.1)	4 (8.6)	10.7
Other			
Often	1 (2.1)	0 (0.0)	2.1
Occasionally	3 (6.4)	0 (0.0)	6.4
Total	27 (57.4)	20 (42.6)	100.0

Table 5: Patient education topics received

Question	Male (%)	Female (%)	Total (%)
What information did you receive in such education?			
Self glucose monitoring	12 (25.5)	9 (19.1)	44.6
Diet and meal planning	21 (44.6)	12 (25.5)	70.1
Medication compliance	87 (38.3)	14 (29.8)	68.1
Blood pressure control	16 (34.0)	11 (23.4)	59.4
Routine eye and foot examination	5 (10.6)	4 (8.6)	19.2
Insulin therapy	5 (10.6)	4 (8.6)	19.2
Signs and symptoms of low and high blood sugar	3 (6.4)	5 (10.6)	17.0
Weight control	17 (36.1)	14 (29.8)	65.9
Cholesterol creatinine screening	8 (17.3)	7 (14.8)	32.1
None of the above	0 (0.0)	0 (0.0)	0.0
Did you ever receive any follow up care in the form of a home visit or telephone call from your care provider?			
Yes	0 (0.0)	0 (0.0)	0.0
No	0 (0.0)	0 (0.0)	0.0
Total	27 (57.4)	20 (42.6)	100.0
Do you have any of these diabetes complications?			
Kidney disease	0 (0.0)	1 (2.2)	2.2
Nerve damage	2 (4.3)	1 (2.2)	6.4
Visual problems	2 (4.3)	2 (4.3)	8.6
High blood pressure	12 (25.5)	10 (21.2)	46.7
Heart disease	0 (0.0)	0 (0.0)	0.0
Foot or leg ulcers (gangrene)	2 (4.3)	0 (0.0)	4.3
Amputations	0 (0.0)	0 (0.0)	0.0
None	9 (19.2)	6 (12.8)	32.0
Total	27 (57.4)	20 (42.6)	100.0

participants reported that they received health education regarding diabetes care on every visit while 5 (10.7%) reported that they never received any education. Participants responses endorsed poor diabetes education as participants could not give details of education such as

Table 6: Satisfaction rating of diabetes care by the participants

Question	Male (%)	Female (%)	Total (%)
How satisfied are you with the care provided byyour health team regarding your disease?			
Very satisfied	3 (6.4)	3 (6.4)	12.8
Just satisfied	20 (42.6)	13 (27.6)	70.2
A little satisfied	4 (8.5)	4 (8.5)	17.0
Unsatisfied	0 (0.0)	0 (0.0)	0.0
Very unsatisfied	0 (0.0)	0 (0.0)	0.0
Total	27 (57.4)	20 (42.6)	100.0

names of medication and cholesterol knowledge. Although majority of the participants reported that they received some form of education on every monthly visit, findings from the study revealed poor educational activities about self glucose monitoring, cholesterol and HbA1c measurements. Every diabetes education should involve and revolve around these topics because education is an essential factor in understanding of self care and management of diabetes, glycemic control and perception of self worth.

When Participants were asked about topics covered during such education, 33 (70.1%) said they received education regarding diet management, 32 (68.1%) received medication compliance education, 31 (65.9%) had education regarding weight control, 27 (59.4%) had blood pressure education and 15 (32.1%) received education regarding cholesterol screening. Despite all difficulties, none of the participants reported an unsatisfactory diabetic care (Table 6). About 33 (70.2%) reported being just satisfied with their care, while only 6 (12.8%) of the participants said they were very satisfied.

DISCUSSION

Participants in this study included 27 male and 20 female diabetes patients who responded to the advertisement for participation posted in the hospitals. The participants mean age was 58 years, the mean annual income was US $850 and the mean educational level was secondary education. These data are consistent with the reports of previous studies regarding mean age of diabetes patients to be the young adults contrary to popular beliefs that diabetes is a disease of the elderly. Most people with diabetes in low and middle income countries are middle aged (45-64) not elderly (65+) which is contrary to the popular opinion that diabetes is a disease of the elderly (Beran and Yudkin, 2006). Alarmingly, during the past 10 years, Type 2 diabetes has been diagnosed more frequently in patients younger than 44 years. In this context, physicians face a dual challenge: not only are there more patients with diabetes but also the disease is being increasingly diagnosed in younger patients who will require lifelong management (Beran and Yudkin, 2006).

The findings demonstrated strong influence of low income and lower educational levels on poor diabetes outcomes as evidenced by ignorance and lack of relevant knowledge or skills required to maintain quality diabetes care and control. This is in support of a recent study that showed that most patients with diabetes in Nigeria have little or no formal education and are poor with little understanding of the nature of their disease (Enwere *et al*., 2006). Diabetes education whose goal is to help patients better understand the importance of the many aspects of diabetes care such as the importance of ongoing monitoring of blood glucose and regular measurements of HbA1c values maintaining of healthy weight and diets, eye and comprehensive foot examinations should be an ongoing process (Bergenstal *et al*., 2001).

Again research over the past decade has demonstrated an association between literacy and health-related knowledge, self management behaviors, self-reported health, rates of hospitalization and control of diabetes. However, research to date has not analyzed the factors that mediate the relationship between low literacy and worse health outcomes (Schillinger *et al*., 2002). Finding a relationship between literacy and health implies that an inability to acquire and understand health related information is an important mediating factor for determining good outcomes (Nwankwo, 2004).

Education and income have been identified as major socioeconomic determinants of health (Brown *et al*., 2004). Lower education begets lower income. Unfortunately, 92% of Nigerians live on under $2.00 a day (Population Reference Bureau, 2008) and low income and low education have been associated with higher diabetes rates in adults of all ages (Brown *et al*., 2004). Consequently, poor economic base and illiteracy can result in poor outcomes of diabetes due to poor accessibility to healthcare services and ignorance of the severity of diabetes complications.

Having a higher income therefore means having access to goods and services of greater monetary value with concomitant health benefits such as the consumption of more expensive foods (organic foods, lean meats, poultry, fruits and vegetables) which may lead to reduced intake of saturated fat. Similarly, more affluent individuals may enjoy regular physical exercise as a consequence of member of fitness clubs (Tang *et al*., 2003). The study by Levitt (2008) reported that drug costs for diabetes are beyond the reach of many particularly those requiring insulin. Therefore, many people have difficulty meeting the demands of their illness and as a result, experience poorer outcomes. Again low socio economic status has been consistently linked to worse

health outcomes and individuals living in low income areas have higher rates of mortality and morbidity related to chronic diseases while the poorest of the poor, around the world have been known to have the worst health (MMWR, 2002; Brown *et al*., 2004).

The findings also showed that healthcare delivery system does influence diabetes outcome greatly for this sample. Healthcare delivery system in Nigeria has suffered great neglect. Monitoring of key diabetes care markers such as cholesterol screening, HbA1c measurement and self glucose monitoring were very poor and even nonexistent. A recent study agreed with this finding which showed that 36% of type 2 diabetes patients in a study in Africa never had HbA1C measurements with resultant poor outcomes (Chan *et al*., 2009).

Lack of adequate infrastructure undermines optimum diabetes management greatly. Participants had 0% rate of home visits or communication with healthcare providers outside the hospital. This situation was highlighted by Levitt (2008) which reported that providers are challenged by the nature of interventions needed to reduce risks of developing complications of Type 2 diabetes, which involves frequent patient visits for counseling on nutrition and physical activity. Public health nurses should pay monthly home visits to diabetes patients and offer or reinforce whatever education previously received.

A total of 38 (80.9%) of this sample did not have self blood glucose monitoring equipment, 44 (93.6%) lacked the basic knowledge of diabetes management or care and reported inability to visit the doctor except when manifesting serious symptoms or complications. Optimum diabetes management outcome can only be achieved if people with diabetes are able and willing to manage their disease on a daily basis for life. This is in line with the result of the study by Nugent (2008) who reported that the added burden of screening, diagnosing and treating the growing numbers of people who have diabetes threaten to overwhelm public healthcare services in Africa and is therefore neglected (Nugent, 2008). People with diabetes have the responsibility to manage their condition on a day to day basis, communicate with their healthcare provider periodically throughout the year and seek advice when necessary.

Cultural practices showed mixed results as 25 (53.2%) of the participants denied visiting witch doctors or using traditional herbs for diabetes treatment. This could be as aresult of the fact that most participants in this study live in the urban area of Owerri rather than the remote villages where this practice is rampant. However, 22 (46.8%) of participants endorsed using some sort of herbs or concoction as medical remedies for their diabetes. This phenomenon is very common in Nigeria's medical history. Many Africans regard alternative healing systems as the primary source of healthcare or, alternatively consult both (Levitt, 2008). Recent Nigerian news media have featured articles about a Nigerian trado-medical practitioner who has claimed to have discovered remedies for the intractable disease diabetes, through the use of herbs and roots. Though the Nigerian Medical Association has challenged the claim but it is worth exploring. However, the challenge posed by traditional medicine practice is that of the scientific explanation of the active ingredients, dosages, shelf life and side effects of such products.

CONCLUSION

Diabetes incidence and prevalence is on the increase in Nigeria and the healthcare structures in the country are not adequately equipped to handle the various intricate lifelong management of the disease. The healthcare delivery system in Nigeria is grossly inadequate with lack of medicines, patient education and functional laboratory for screening for complications. There is no health insurance coverage for medical care and high percentage of the sample group is poor and unable to afford the bills for medical treatment.

This study findings showed that majority of the participants (80.6%) did not have self blood glucose monitoring equipment as 44 (93.6%) lacked the basic knowledge of diabetes management and care and reported inability to visit the doctor except when manifesting serious symptoms or complications. Self efficacy was totally lacking. Optimum diabetes management outcome can only be achieved if people with diabetes are empowered to be able to manage their disease on a daily basis for life.

People with diabetes have the responsibility to manage their condition on a day to day basis, communicate with their healthcare provider periodically throughout the year and seek advice when necessary. To effectively self-manage diabetes, those with the disease must identify symptoms of emerging health crises, adhere to complex medication schedules and modify long-standing lifestyle behaviors such as their diet and physical activity levels.

Cultural practices showed mixed results as 25 (53.2%) of the participants denied visiting witch doctors or using traditional herbs for diabetes treatment. This could be as a result of the fact that most participants in this study live in the urban area of Owerri rather than the remote villages where this practice is rampant. However, 22 (46.8%) of participants endorsed using some sort of herbs or concoction as medical remedies for their diabetes. This phenomenon is very common in Nigeria's medical history.

RECOMMENDATIONS

The following recommendations will help to promote positive outcomes of diabetes in Nigeria:

For healthcare professionals in Nigeria: Provision and enforcement of policy and guidelines for diabetes management for all healthcare professionals and facilities will ensure that every healthcare provider follows the guidelines for diabetes management as recommended by International Diabetes Federation. In this regard, the health ministry should step up with regulation, surveillance and monitoring of healthcare providers' practices to ensure compliance with diabetes protocols. Also healthcare professionals need to be aware of barriers to diabetes management in other to tailor diabetes care and services to accommodate individual socioeconomic and cultural needs.

Diabetes screening is also advocated during routine hospital visits in other to achieve early diagnosis before complications sets in. One of the interventions needed to reduce risks of developing complications of Type 2 diabetes involves frequent patient visits for counseling on nutrition, medication compliance, self blood glucose monitoring and physical activity.

Health education efforts should utilize every means available to them such as the media, community groups and religious fora to reach out to the public with health education regarding diabetes prevention, management and care. Provision of age and culturally appropriate diabetes education in the health facilities to diabetes patients will go a long way in enhancing good outcomes. It has been shown that when patients are adequately educated regarding their disease, cares and management, positive outcomes are always achieved.

Healthcare professionals should develop a workable plan of referral; follow up care and interdisciplinary collaboration of cares with other specialties such as dietitians, ophthalmologists, podiatrists and so on. Adequate diabetes management requires the collaboration of various professionals in the healthcare industry.

For further research: This study should be extended beyond the patients in the hospitals to rural communities who do not even attend the clinics in other to have a clearer picture of the impact of diabetes on all Nigerians and should also be done with a larger sample. Further research efforts geared towards better and appropriate ways of treating diabetes such as stem cell research should be encouraged and will help in ameliorating the agony of diabetic patients.

For the Nigerian government: There is need for increase in the number of healthcare facilities in Imo state especially in the rural communities in other to make for easy accessibility to care. Provision of free medical care for all and especially diabetic patients and or subsidy for medications and diabetes supplies will be beneficial and helpful in decreasing the already stressed financial positions of diabetes patients. Most importantly, the provision of health insurance for workers and their families or sliding fees will cushion the burden of diabetes care for families as well as improved healthcare infrastructure in the hospitals and clinics such as medications, functional laboratory and adequately trained staff. Provision of free glucose meters and free glucose testing in the hospitals will be very effective in maintaining blood glucose control. Establishment of diabetes clinics and centers in the rural communities for easy accessibility and at affordable price where cultural and age appropriate health education will be provided is very essential.

Offering of current and standard education to healthcare workers on diabetes management will empower them to be able to tackle the menace of diabetes. It is very difficult to manage diabetes if the healthcare workers themselves do not know the essential elements of diabetes care.

Finally, improvement of the socioeconomic status of the people through employment and commensurable wages for workers, provision of good road network andtransportation services and steady supply of electricity will be helpful in improving the quality of life for all people and diabetic patients in particular.

Study limitations: The major limitation of this research lies in the use of a very small sample size and the short duration of data collection. However the inclusion criteria made the above limitations unavoidable. Consequently, caution should be applied in generalizing the findings here unto a larger Nigerian population.

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