Outcomes of Diabetes Care Intervention on Knowledge and Practice of Self-care in Some Rural and Urban Healthcare Facilities, Edo State

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ABSTRACT

Background: Diabetes Mellitus (DM) is on the increase in Nigeria; consequently, there is a need to promote self-care practices among all patients. The study aimed to evaluate outcomes of diabetes care intervention on knowledge and practice of self-care among diabetes patients in rural and urban healthcare facilities in Edo State. **Materials and Methods:** In a descriptive cross-sectional, data on knowledge and practice of self-care among Diabetes patients were collected using self-developed and Summary of Diabetes Self-Care Activities (SDSCA) questionnaire. Analysis was both descriptive and inferential. Paired *t*-test was performed to compare the results from diabetes patients from General Hospital (GH), Abudu and Specialist Hospital (SH), Benin, and results were considered significant with $P < 0.05$. **Results:** There was a significant difference ($P < 0.05$) in the knowledge of self-care among patients. Diabetes patients in specialist hospital, Benin had a better knowledge of self-care (mean score > 3) than those in general hospital, Abudu. Diabetes patients from general hospital, Abudu (rural) comply more with a mean practice of diabetes self-care in general exercise (5.58 ± 1.42) and specific exercises (5.44 ± 0.98). Diabetes patients from specialist hospital, Benin test their blood sugars themselves and the number of times recommended. After 6 months of educational intervention on diabetes care, knowledge and practice of diabetes self-care improved significantly ($p < 0.05$) across the various domains, but with better performance in specialist hospital, Benin. **Conclusion:** The study justifies a low quality of diabetes care delivery in both rural and urban health care facilities and significantly improved with educational interventions.

Keywords: Diabetes, Prevalence, Self-care, Knowledge, Practice.

INTRODUCTION

There is a worldwide increased of diabetes Mellitus (DM),[1] which constitutes a major health care systems and economic burden and for the patients. Available report in Nigeria recorded crude rates of 2.2% and 6.8% in 1997 and 2003 respectively.[2,3] A value 3.3% rate in urban area have been reported compared to rural area (2.6%).[2] Recent meta-analysis reported 5.8% prevalence in Nigeria.[4]

The chronic nature of diabetes necessitates the need to promote and strengthen self-care practices among all diabetes patients.[5] Appropriate self-care knowledge by patients is crucial to achieving outcomes among outpatient. Through self-care, patient takes responsibility for their health and how to promote it, it is aim to improved physical conditions through actions such as diet, physical exercise, self-monitoring of blood glucose (SMBG), seeking for preventive healthcare services and applying the recommendations to such diseases as diabetes.[6]

Diabetes self-care behaviour is less than optimal in all countries especially in the developing world. Diabetes patients who are educated and diligent with their self-care achieve better diabetic outcomes.[7]

There is little or no studies comparing knowledge and self-care practice of diabetes patients in rural and urban health care facilities in Edo State. The findings of this study shall be beneficial to clinicians and patients alike and will contribute immensely to the knowledge and practice of evidence-based diabetes care. The study aimed to evaluate the effect of self-care interventions on diabetes patients in rural and urban healthcare facilities.

MATERIALS AND METHODS

Setting

The study was carried out in rural General Hospital (GH) at Abudu and at urban Specialist Hospital (SH) in Benin City. General Hospital) Abudu is situated off Abudu-Ogada Road in Orhionmwon Local Government Area. General hospital, Abudu is a secondary healthcare facility which offers healthcare services to the people of the community and other nearby villages as well as to the neighbouring communities in Delta State. It has over 50 bed spaces for inpatients and also runs general outpatient clinic for patients with different ailment. It has only one Pharmacy outlet and is surrounded with several patent medicine stores located within the community. Specialist hospital, Benin offers comprehensive patient care services for majority of Edo State indigenes and other neighbouring States. The facility has over 550-bed with different wards and specialties. The Pharmacy Departments consists of 4 different units which take care for both in-patient and out-patient.

Study design

In this comparative study between rural and urban communities, descriptive cross-sectional prospective design was used to assess knowledge and practice of self-care among diabetes patients attending both rural and healthcare facilities in Edo State. A non-randomized cross-sectional interventional design was used to determine the outcomes of self-care interventions on knowledge and practice of self-care on diabetes patients.

Study population and sampling

The study population comprises of 145 Type-2 diabetes patients from general hospital Abudu and 220 diabetes patients from specialist hospital Benin City, diagnosed in 2017. Convenient sampling was used for knowledge and practice of self-care as well as for the interventional study. Sample size was determined using Cochrane methods.[8] Expected prevalence was 5.8%, Calculated sample size was 250, assuming an attrition rate of 10%, therefore, sample size was adjusted to 278.

Instruments and data collection

Data was collected using SDSCA questionnaire[9] for knowledge and practice of self-care activities (diet, exercise, blood monitoring, foot care and smoking) among diabetes patients. The instrument contains three sections, with section A comprises of the demographic characteristics of the patients, section B, a 5-Likert scale which sought the knowledge of diabetes patients on self-care practices and section C, a 7-Likert scale to ascertain the level of practice of self-care activities among the respondents. Knowledge was classified into good or poor based on the average scores of ≥ 3 or < 3. Self-care practice was also categorized into good or poor with average scores of ≥ 4 or < 4. A 6-months educational intervention study, comprising of 79 Type-2 diabetes ambulatory patients from general hospital Abudu and 124 from specialist hospital Benin City (intervention group) and 110 from General Hospital Abudu and 148 from specialist hospital in Benin City (control group) was conducted to evaluate the effects of diabetes care on knowledge and practice of self-care among diabetes patients in the hospitals. Patients in the intervention group were educated on lifestyle modification, disease state, knowledge and practice of diabetes self-care which focus on diet, exercises, Self-Blood Glucose Monitoring (SBGM), foot care and cigarette smoking. Evaluations were carried out on every clinic visit/appointment day with documentations and follow-up. The study included ambulatory patients diagnosed with Type-2 diabetes who are 20 years and above and currently placed on oral anti-diabetes drugs and/or insulin for more than 12 months, and those who consented to participate in the study. Severely ill patients, pregnant women and those with physical, visual and mental disabilities were excluded from the study. The following outcomes were measured; knowledge and practice of self-care among diabetes patients and impact of diabetes care intervention on knowledge and practice of self-care among diabetes patients.

Ethical considerations

Ethical approval (EC/FP/019/12) was obtained from the Ethics Committee of the Faculty of Pharmacy, University of Benin. Administrative approvals were obtained from the two health facilities. Written and oral informed consents were obtained from the studied participants; confidentiality of information's was maintained by removal of patient's name from the data collection instrument.

Data analysis

Data collected were entered into Microsoft Excel window

7, double checked and thereafter transported to *SPSS*, version 20 for analysis. Analysis was both descriptive and inferential. Results were expressed as percentages, means, and standard deviations. Paired *t*-test was performed to compare the results from diabetes patients from general hospital Abudu and specialist hospital Benin, and results were considered significant with *P*<0.05.

RESULTS

Socio-demographic and clinical characteristics of the respondents

Of the 278 eligible diabetes patients for the study, 258 (148 from SH Benin and 110 from GH Abudu) completely filled and returned the instrument making a response rate of 92.8%. The respondents average age was 54.5±1.09 in GH Abudu and 46±0.75 years in SH Benin respectively. More than half (54.5%) of the patients in rural health facility (GH Abudu) were age ≥ 60 years while 49.3% in SH Benin were between age 40 -49 years. About 60.9% and 58.8% were female in GH Abudu and SH Benin, respectively. Majority (81.1%) in SH Benin had educational qualification up to tertiary level, while one-third (32.7%) in GH Abudu, were of Primary school level. Majority (93.9% and 65.5%) were both married in SH Benin and GH Abudu, respectively. A total of 73.6% of the respondents from SH Benin were employed civil servants while almost half (46.5%) from GH Abudu were majorly farmers. More than half

(56.8%) of respondents in SH Benin had higher income of ≥ ₦ 80,000.00 and 44.5% from GH Abudu received ≤ ₦20,000.00 as monthly income. Less than half (40%) of patients in GH Abudu were diagnosed of DM for more than 10 years ago compared to 40.5% in SH Benin whose duration of diabetes was 1–5 years. In addition, 74.4% and 80.8% of DM patients from both SH Benin and GH Abudu were prescribed more than 2 medication therapy, respectively. Only 3.6% and 39.9% from GH Abudu and SH Benin were on health insurance scheme.

Self-care knowledge and practice among diabetic patients

On a 5-likert scale, self-care knowledge among DM patients in GH Abudu was generally poor across all domains of self-care with a mean knowledge score less than 3. DM patients in SH Benin had a better (average) knowledge of self-care Table 1. The mean knowledge scores of the respondents in SH Benin were remarkably higher (*p*< 0.05) than that of their counterparts in GH Abudu in all items. Table 2 shows self-care practice among DM patients. The practice of self-care among DM patients in both facilities was also generally poor, however in area of exercised, DM patients from GH Abudu (rural) comply more with a mean practice score of DM self-care in general exercise (4.37±1.72) and specific exercises (4.49±1.07) compared to 3.16±1.60 and 2.45±1.05 in SH Benin. Although not considered good enough, DM patients from SH Benin test their blood sugars themselves

Table 1: Mean knowledge of self-care among diabetic patients in studied health care facilities.			
Variables	GH ABUDU *n* = 110	SH BENIN *n* = 148	
	Mean±SD	Mean±SD	*P* value
Diet			
Dietary modification beneficial to control of DM.	2.76±2.3	3.30±1.27	0.0001**
DM patient to eat food with low glycemic index.	2.54±0.98	3.18±1.11	0.0001**
Exercise			
Physical activities per session at least 3 days per week is essential.	2.53±0.99	2.89±1.23	0.0001**
Regular exercise does not reduce the need for insulin/OHA.	2.54±1.24	3.02±1.20	0.001*
Blood Sugar			
No DM Patient should check BS except qualified health professionals.	2.66±1.20	3.12±1.14	0.0001**
SBGM help patient to monitor and react to changes in BS level.	2.53±1.00	2.94±1.13	0.0001**
If BS is close to normal, Patient to have more energy, less thirsty, urinate less.	2.76±1.33	3.09±1.30	0.0001**
Foot Care			
Take extra care feet.	3.46±1.24	3.57±1.18	0.068
Tight elastic hose or socks, not bad for DM patients.	3.15±1.07	3.47±1.08	0.0001**
Cigarette Smoking.			
Cigarette smoking can worsen DM.	3.46±1.24	3.53±1.22	_

*Where * = statistically significant at P-value < 0.05 at 95% CI, BS = Blood sugar, OHA = Oral Hypoglycemic Agents*

Table 2: Mean practice of DM self-care in both healthcare facilities.			
Variables	**Rural**	**Urban**	***P* value**
Diet			
Follow a healthful eating plan?	3.12 ± 0.99	3.30 ± 1.05	0.002*
On average over the past month follow eating plan/week?	2.65 ± 2.83	2.83 ± 0.99	0.002*
Eat 5 or more serving fruits and vegetables?	2.83 ± 1.61	3.09 ± 1.53	0.0001**
Eat high fat food such as red meat, full fat dairy products?	2.98 ± 1.12	3.22 ± 1.06	0.144
Exercise			
Participate in at least 30 min of physical activity?	4.37 ± 1.72	3.16 ± 1.60	0.0001**
Participate on specific exercise (swimming, walking, and biking)?	4.49 ± 1.07	2.45 ± 1.05	0.0001**
Blood Sugar			
Test your blood sugar?	1.67 ± 1.03	2.11 ± 1.16	0.0001**
Test BS on number of times recommended?	0.85 ± 0.90	1.34 ± 1.28	0.0001**
Foot Care			
Check feet?	1.40 ± 1.15	1.75 ± 1.16	0.0001**
Inspect the inside of your shoes?	0.87 ± 0.90	1.54 ± 1.28	0.0001**
Cigarette Smoking			
Smoked a cigarette even one puff during the past seven days? YES, N (%)	32 (29.1)	57 (36.8)	-
If yes, how many cigarettes did you smoke on an average day?	3.19 ± 1.27	3.89 ± 1.17	0.002*

*Where * = statistically significant at P-value < 0.05 at 95% CI*

(SBGM) with a mean score of 2.11±1.16 and the number of times recommended (1.34±1.28).

Impact of DM care interventions on knowledge and practice of self-care

There was a significant ($p<0.05$) improvement in knowledge of self-care among DM patients across all the self-care areas, particularly in exercise, SBGM, foot-care and effect of cigarette smoking at GH Abudu. In SH Benin, although knowledge increased generally, it was only limited to dietary modifications, extra feet care and cigarette smoking, Table 3. Practice of self-care improved significantly across all areas of self-care in both DM patients at GH Abudu and SH Benin, Table 4. After interventions, DM patients in GH Abudu, had better performances in self-care practice in exercise (5.48±1.42), foot-care (4.18±0.38) and were more willing to reduce the number of cigarettes smoked on an average day (2.43±0.85). Level of practice of self-care among DM patients in SH Benin increases in diet (4.29±0.99), exercises (4.01±1.36) and testing blood sugar themselves (4.01±1.36), but were however not willing to cut down on average number of cigarettes smoked per day (3.93±0.98).

DISCUSSION

The study revealed that female accounted for about two-third of the total number of patients. This gender distribution is in agreement with earlier studies,[10,11] all of which demonstrated an increasing trend in the number of female DM patients, but opposed to other studies pertaining to Indian population.[12,13] This may be due to the fact that Nigeria is a female dominated society they are more concerned regarding their health status and may report for consultations more in comparison to their male partner. Study in Nigeria; have reported higher prevalence of obesity and insulin resistance to risk Type-2 DM among females.[14]

Knowledge of self-care among DM patients in GH Abudu was generally poor across all domains of self-care. Diabetes patients in SH Benin had a better (average) knowledge of self-care. It was observed that majority of the subjects in rural area, were unaware about beneficial effects of dietary modification, exercises, SBGM compared to the urban setting with average knowledge across all the domains of self-care. But in the domains of foot care and cigarette smoking cessation, there was a much similar and good knowledge among rural residents to those in the urban area. The findings are similar to a study in South East, in Abia State were 14.6% of the patients had good knowledge of the dietary approach.[15] This is in an agreement with other studies from Asian and African which reported poor knowledge among DM patients, and also established to have poor self-care behaviours and poor medication adherence.[16-20] This is in contrast with findings from other studies.[21,22] This could be because of a greater number of illiterates studied

Table 3: Intervention on knowledge of self-care among diabetic patients.

Variables	Pre intervention n = 110	GH ABUDU Post-intervention n = 79		Pre intervention n = 148	SH BENIN Post intervention n = 124	
	Mean±SD	Mean±SD	P value	Mean±SD	Mean±SD	P value
Dietary modification beneficial to control of DM.	2.76±2.3	3.72±0.10	0.0001**	3.30±1.27	4.19±1.08	0.0001**
DM patient to eat food with low glycemic index	2.54±0.98	3.73±0.66	0.0001**	3.18±1.11	4.02±0.92	0.0001**
Physical activities for 20-30 min per session at least 3 days per week is essential.	2.53±0.99	3.80±0.63	0.0001**	2.89±1.23	3.81±1.04	0.0001**
Regular exercise does not reduce the need for insulin/OHA.	2.54±1.24	4.27±0.86	0.0001**	3.02±1.20	3.85±0.96	0.0001**
No DM Patient should check BS except qualified health professional.	2.66±1.20	3.72±0.10	0.0001**	3.12±1.14	3.75±0.78	0.0001**
SBGM help patient to monitor and react to changes in BS level.	2.53±1.00	3.73±0.66	0.0001**	2.94±1.13	3.89±1.04	0.0001**
If BS is close to normal, Patient to have more energy, less thirsty, urinate less.	2.76±1.33	3.80±0.63	0.0001**	3.09±1.30	3.98±1.18	0.0001**
To take extra care of feet especially when cutting toe nails.	3.46±1.24	4.27±0.86	0.0001**	3.57±1.18	4.29±0.90	0.0001**
Tight elastic hose or socks, not bad for Diabetes patients.	3.15±1.07	4.27±0.86	0.0001**	3.47±1.08	3.45±0.91	0.0001**
Cigarette smoking can worsen DM.	3.46±1.24	4.27±0.86	0.0001**	3.53±1.22	4.24±0.94	0.0001**

*Where * = statistically significant at P-value < 0.05 at 95% CI*

Table 4: Self-care practice interventions among diabetic patients in rural and urban healthcare facilities.

Variables	GH Abudu			SH Benin		
	Pre- intervention n = 110	Post- intervention n = 79	P value	Pre- intervention n = 148	Pre- intervention n = 148	P value
	Mean±SD	Mean±SD	P value	Mean±SD	Mean±SD	P value
Follow a healthful eating plan.	3.12±0.99	4.11±0.97	-	3.30±1.05	4.29±0.99	-
Follow eating plan/ week/month.	2.65±2.83	3.65±1.0	-	2.83±0.99	3.88±1.00	-
Eat 5 or more serving fruits and vegetables.	2.83±1.61	3.91±1.35	0.0001**	3.09±1.53	4.27±1.19	0.0001**
Eat high fat food such as red meat, full fat dairy products.	2.98±1.12	5.06±1.04	0.0001**	3.22±1.06	4.87±1.11	0.0001**
Participate in at least 30 min of physical activity.	4.37±1.72	5.48±1.42	0.0001**	3.16±1.60	4.01±1.36	0.0001**
Participate on specific exercise (swimming, walking, biking).	4.49±1.07)	5.44±0.98	0.0001**	2.45±1.05	3.59±0.95	0.0001**
Test blood sugar	1.67±1.03	2.71±0.79	0.0001**	2.11±1.16	4.01±1.36	0.0001**
Test BS on number of times recommended.	0.85±0.90	2.28±0.55	0.0001**	1.34±1.28	3.39±0.99	0.0001**
Check feet.	1.40±1.15	4.29±0.48	0.0001**	1.75±1.16	3.35±1.03	0.0001**
Inspect inside of shoes.	0.87±0.90	4.18±0.38	0.0001**	1.54±1.28	3.29±1.06	0.0001**
If yes, numbers of cigarette smoked on an average day?.	3.19±1.27	2.43±0.85	0.001*	3.89±1.17	3.93±0.98	0.0001**

*Where * = statistically significant at P-value < 0.05 at 95%*

subjects in the rural setting. In addition, DM patients with poor socio-economic status have little access to self-care education and training. For good glycemic control and adequate DM management, sufficient knowledge of DM self-care is needed by patients, a view that can encourage MA, good dietary practice and physical activity.[21,23]

Diabetes self-care practice in both facilities was also generally poor, however in area of exercised, DM patients from GH Abudu (rural) performed better. This could be attributed to the fact that many of the rural respondents are farmers and are engaged with much physical activities compared to the urban residents with sedentary lifestyle activities. This is similar to other studies.[24,25] About average of the diabetes patients in both rural and urban areas followed a healthy eating plan, but this was however not consistent over the past month/week. This is also in agreement to other study carried out in Mangalore, which found out that 45.9% followed diet plan throughout the week.[26] There was a more regular dietary practice in similar study in Pune.[27] Majority in both setting had not test their blood sugar level in the past week. This is in line with the findings of the study of Thungathurthi et al. (2012)[29] in which the patient's lacked knowledge of home blood sugar test but had a good dietary knowledge. Other studies also observed that 92.3% and 69.5% for rural and urban, respectively, had not tested even for a single time.[27,28] This could be due to DM patients not being able to afford the glucometer and the strips and also due to lack of required skills to carry out the SBGM. Foot care practice among urban DM patients was found to be poor but a little better compared to those attending rural healthcare facility. Better practice of foot care has been reported in previous study.[27]

At 6-month intervention, self-care knowledge improved significantly among DM patients across all domains, particularly in exercise, SMBG, foot-care and effect of cigarette smoking at GH Abudu. In SH Benin, although knowledge seems to increase generally, it was only limited to dietary modifications, extra feet care and cigarette smoking. This finding is substantiated by the reports on self-care knowledge among DM patients in Cochrane data base systematic review, Benin City, five States in South East, Nigeria and North Ethiopia[30-33] and also in partial agreement with the findings of studies in Mopani District South Africa and South Ethiopia.[34,35]

After interventions, practice of self-care improved significantly across all areas of self-care in both DM patients at GH Abudu and SH Benin. This is related to previous findings which reported significant improvements in practice of self-care due to the influence of the educational intervention.[33-35] This improved practice of self-care observed in the study is similar to other studies where there was remarkable improvement in attitude and knowledge among DM patients in Turkey after intervention.[36,38] Diabetes patients who are educated and counseled about knowledge and practice of self-care helped to strongly take care of their activities. Self-care interventions play fundamental roles in life-style, dietary and behavioural changes. It is vastly endorsed for DM patients to be frequently educated in order to enhanced self-care and knowledge, which promotes proper management of their conditions. This however may not guarantee automatic enhancement in the total DM management outcomes. Competent provision of satisfactory self-care instructions and guidance have been considered to be of great benefits to DM patients' capacity to execute practice of self-care.

Diabetes patients in rural area had above performance in self-care practice in exercise, foot-care and were more willing to reduce the number of cigarettes smoked on an average day. Practice of self-care increases in diet, exercises and testing blood sugar themselves in both rural and urban area. Previous study in Bangladesh revealed that majority of Type-2 diabetes patients, with primary knowledge on DM, failed to monitor blood sugar themselves and at the same time failed to take extra care to their feet regularly.[21] There was an improvement after providing the educational interventions on self-care practice to the patients. Similar study in Pakistan also found that the practice of SMBG was not good enough despite half of them having personal glucometers; only few of them faithfully checked their blood sugar and carried out regular or specific physical activities. Poor knowledge, absence of proper motivation and lack of finance may be attributed to this.[38] It was however revealed that after intervention, many of the patients particularly those from urban area were not willing to cut down on average number of cigarettes smoked per day. This is contrary to other study which showed that most patients significantly withdrew smoking after achieving basic knowledge of DM self-care.[21]

CONCLUSION

Despite the increasing prevalence of diabetes in Nigeria, self-care knowledge and practice were generally poor among diabetics in both facilities. Diabetes care interventions significantly improved self-care knowledge and practice. The study is not without limitations, only DM patients from two healthcare facilities were assessed, some of the information provided was based on self-reporting therefore findings cannot be generalized. There was no detailed analysis on the various aspects of DM

care due to the small sample size used in this study.

This can be a template for further studies with large sample size on chronic diseases in rural and urbans attending healthcare facilities.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

DM: Diabetes mellitus; **SDSCA:** Summary of Diabetes Self-Care Activities; **GH:** General Hospital; **SH:** Specialist Hospital; **SMBG:** Self-Monitoring of Blood Glucose; **OHA:** Oral Hypoglycemic Agents; **BS:** Blood Sugar.

SUMMARY

Knowledge and practice of self-care were generally poor among diabetes patients in both rural and urban healthcare facilities. Diabetes care interventions significantly improved knowledge and practice of self-care among diabetics.

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