KNOWLEDGE OF DIABETES MELLITUS MANAGEMENT AMONG DIABETIC PATIENTS ATTENDING GENERAL HOSPITALS IN NORTHERN STATES, NIGERIA

By

Ismaila Abubakar Yakubu
National Teachers' Institute, Kaduna

Abdulsalam, A.
&
Lateefat N.G. Imam
Department of Physical and Health Education
University of Maiduguri
just2abdul@gmail.com

Abstract
The study assessed the knowledge of diabetes mellitus management among diabetic patients attending general hospitals in Northern States of Nigeria. The study use descriptive survey research design which is a non experimental design. The population comprises all diabetic patients attending Out-Patients Department in general hospitals across Northern States of Nigeria. A total of 405 respondents were randomly sampled and were distributed using purposive sampling. 400 copies of questionnaire were retrieved, using multi-stage sampling techniques. A modified four (4) points Likert measuring scale format was used to collect data. Descriptive statistics of frequency counts and percentages were used to describe demographic information of respondents; mean and standard deviation were used for the research questions, while inferential statistics of one Sample t-test, Independent sample t-test and ANOVA was used to test hypotheses. The analyses was conducted with a decision criterion of 0.05 alpha level of significance. Results revealed that knowledge of diabetes management among diabetic patients are significant, (P-value 0.00). There were no significant differences in the knowledge between male and female diabetic patients towards diabetes mellitus management, (P-value 0.330). The knowledge of diabetes mellitus management among diabetic patients of different educational status significantly differ, (P-value 0.00). While the knowledge of diabetes mellitus management do not significantly differ in the Northern States of Nigeria (with P-values greater than 0.05 alpha level of significant). In conclusion, diabetic patients have knowledge towards diabetes mellitus management in Northern States, Nigeria. The participants among male and female patients do not differ in their knowledge of diabetes mellitus management. Significant difference however existed in the knowledge of diabetic patients of different educational status. While the knowledge of diabetic patients of different age groups do not differ. Based on the conclusion, the following recommendation were made; that government should through health educators, design and develop a comprehensive health promotion strategy for diabetic patients in Northern States of Nigeria.

Keywords: Diabetes Mellitus, Knowledge, iebetic Patients.

Introduction

As of 2015, an estimated 415 million people had diabetes Worldwide (International Diabetes Federation, IDF, 2016) with type 2 diabetes making up about 90% of the cases. This represents 8.3% of the adult population, with equal rates in both women and men (International Diabetes Federation, IDF, 2016). As of 2014, trends suggested the rate would continue to rise (IDF, 2016). Diabetes at least doubles a person's risk of early death (World Health Organisation, WHO, 2014). From 2012 to 2015, approximately 1.5 to 5.0 million deaths each year resulted from Diabetes (WHO, 2013; IDF, 2016). The global economic cost of diabetes in 2014 was estimated to be US\$ 612 billion (American Diabetes Association (ADA), 2014).

According to Desalu, Salawu, Jimoh, Adekoya, Busari and Olokoba (2011), some diabetes patients in Northern Nigeria do not have accurate knowledge about the condition. This lack of knowledge has been demonstrated to influence their physical and psychological outcomes. This is because cultural beliefs and practices of persons living with diabetes have been found to interfere with adherence to treatment given to them at the hospitals. While Chinenye, Dada, Ogbera, Adeyeye and Jewo (2010), reported that majority of the diabetic patients (93.6%) lacked basic knowledge of diabetes management or care and also inability to visit the doctor except when manifesting serious symptoms or complications. A large number of diabetes cases are found due to lack of public awareness and knowledge regarding diabetes and poor medical facilities (Moodley, 2007).

Alm-Roijer, Berner, Burge, Wilson and Nieson (2004) in Blalock, Berner, Burge and Wild, (2010) had suggested that general knowledge about management of diabetes and risk for the diseases correlate with compliance to lifestyle changes and with drug therapy; hence ability to attain treatment goals. This agreed with notion that patients belief about their self-efficacy to perform specific actions to promote their health is affected by the knowledge and skills that they attain and that subsequently influence their compliance to treatment plans (Blalock et al, 2010).

Research Question

1. What is the knowledge of diabetes mellitus management among diabetic patients attending general hospitals in Northern States, Nigeria?

Hypotheses

1. Knowledge of diabetes mellitus management among diabetic patients attending general hospitals in Northern States, Nigeria is not significant.
2. There is no significant difference in the knowledge of diabetes mellitus management among diabetic patients attending general hospitals in Northern States, Nigeria on the basis of gender.
3. The knowledge of diabetes mellitus management among diabetic patients based on educational status attending general hospitals in Northern States, Nigeria do not significantly differ.
4. The knowledge of diabetes mellitus management among diabetic patients based on age-groups attending general hospitals in Northern States, Nigeria, do not significantly differ.

Methodology

The study used descriptive survey research. According to Adewumi (1988) and Bello and Ajayi (2000), descriptive survey involves collecting data in order to test hypotheses or answer research questions concerning the current status of the study and report the way things are.

The population for the study comprised diabetic patients attending outpatient department in the general hospitals in Northern States, Nigeria. There are about 5

million people living with diabetes in Nigeria, while more than 1.56 million cases of diabetes were recorded in 2015 (Nigeria Television Authority, 2016).

The sample size was four hundred and five (405) diabetic patients attending Out-patients Department in the twelve (12) General Hospitals across the six (6) states in the three (3) geo-political zones in Northern States, Nigeria randomly selected for the study. Al-yamani (1969); Kreycies and Morgan (1970), Forces and Richer's (1978) table of determining sample size from a given population, who opined that 384 is an adequate sample for a population of 1 million and above. The researcher however decided to used four hundred and five (405) diabetic patients attending Out-patients Department in the General hospitals using Multi-stage sampling technique. Multi-stage sampling technique refers to sampling plans where the sampling was conducted in stages using Smaller and Smaller sampling units at each stage (Research gate, 2015). Stratified random sampling procedure was used to select two states from each of the existing three (3) geo-political zones as strata (North-east, North Central and North West) using deep-hat method. Secondly, using deep-hat method or lucky deep two local government areas were selected from each of the states randomly selected for the study. Thirdly, one general hospital was randomly selected using lucky deep method from each of the local governments areas randomly selected from the randomly states selected from the three (3) existing geo-political zones of Northern States, Nigeria. Deep-hat method or lucky deep is a sampling technique whereby, three containers will be prepared with papers having names of states in each of the three (3) geo-political zones of Northern states, Nigeria. Each container was thoroughly shuffled, while three (3) people were made to pick from each of the containers without looking inside, until two states are picked from each container.

Proportionate sampling was used as the fourth stage to proportionately select 405 respondents from the twelve (12) local government area based on the total number of their populations, which means each local government was determined by their number relative to the entire population of the diabetic patients attending general hospital in the study area. This means each local government had the same sampling fraction.

Purposive sampling was used as the fifth stage. To select the needed sample from the population of the Out-patient Department, every diabetic patients that visited the Diabetes Out-patient Department on clinic days during the period of the research was purposively selected for this study.

Table 1: Sampled States, LGAs Health Facilities and Respondents

Geo-Political Zone	State	Local Government	General Hospital	Respondents
North Central	Niger	Agaie-(132,907)	G/Hospital Agaie	23
		Chanchaga-(201,429)	G/Hospital Minna	34
	Nasarawa	Nasarawa (92, 664)	G/Hospital Nasarawa	16
		Lafia (330, 712)	G/Hospital Lafia	56
North East	Bauchi	Itas/Gadau (229,996)	G/Hospital Itas	39
		Danbam (150, 922)	G/Hospital Danbam	26

North West	Taraba	Takum (84, 054)	G/Hospital Takum	14
		Wukari (241, 546)	G/Hospital Wukari	41
	Jigawa	Kazaure (161, 494)	G/Hospital	28
		Roni (77, 819)	Kazaure	13
			G/Hospital Roni	
	Zamfara	Bungudu (383, 162)	G/Hospital	65
		Maru (291, 900)	Bungudu	50
			G/Hospital Maru	
Total		**2,348,409**		**405**

Sources: National Bureau of Statistics (2010)

To achieve the purpose of this study, a closed-ended structured questionnaire was used for data collection. Bello and Ajayi (2002), stated that the use of a questionnaire has some definite advantages over other sources. A questionnaire is much more efficient in that, it elicits good data and requires less time or save time, it permits collection of data from a much larger sample as it has the ability to reach a number of respondents.

Descriptive statistics of frequencies and simple percentages were used to described the demographic characteristics of respondents; mean and standard deviation was employed to answer the research questions on knowledge of diabetes mellitus management among diabetic patients in Northern States, Nigeria. Constant mean of 2.5 was used to determine whether a mean response is positive or negative. Inferential statistics of one sample t-test, Independent sample t-test and Analysis of Variance (ANOVA) was used to test the formulated hypotheses, at decision criterion of 0.05 alpha level of significance.

Results

Table 1: **Demographic Characteristics of the Respondents**

S/N	Variable	Frequency	Percentage
	Age range in years:		
a.	16-20 years	31	7.75
b.	21-25 years	23	5.75
c.	26 – 30 years	68	17.0
d.	31 – 35 years	102	25.5
e.	36 years and above	176	44.0
	Gender:		
a.	Male	253	63.3
b.	Female	147	36.7
	Level of Education:		
a.	Primary	54	13.5
b.	Secondary	107	26.8
c.	Tertiary	163	40.6
d.	Non formal education	51	12.8
e.	None	25	6.3

Marital Status:

a.	Single	69	17.2
b.	Married	290	72.5
c.	Divorced	15	3.8
d.	Widow	20	5.0
e.	Separated	6	1.5
Occupation:			
a.	Full Housewife	71	17.7
b.	Civil Servant	134	33.5
c.	Business	63	15.7
d.	Farmer	56	14.0
e.	Student	76	19.1
Year diagnosed with diabetes			
a.	0 - 2 years	117	29.3
b.	3 - 5 years	109	27.3
c.	6 - 8 years	73	18.3
d.	9 -11 years	47	11.6
e.	12 years and above	54	13.5
Total		**400**	**100.0**

Observation of Table one (1) shows that, majority (176; 44.1%) of the respondents were of ages 36years and above and the remaining respondents (102; 25.5%; 68; 17%; 31; 7.8%; 23; 5.6%; 31; 7.8%; 23; 63%) were of different age range as shown in the table two above. Furthermore, table one reveals that many (253; 63.3%) of the respondents were male patients and the remaining (147; 36.6%) were females. This implies that male diabetic patients responded more than their female counterparts. Concerning the respondents' level of education, the above table reveals that quite a number (163; 40.8%) of the respondents attended tertiary institution; 107 (26.8%), secondary; 54(13.5%), primary; 51(12.8%), non-formal education, while 25 (6.3%) did not attend any level of education. With regards to marital status, most (4,290; 72.5%) of the respondents were married; 69 (17.2%) were single; 20(5.0%) were widow; 15 (3.8%) were divorced and 6(1.5%) were separated respectively. Concerning the occupation of the respondents, the table reveals that majority (134; 33.5%) of the respondents were civil servants; 76(19.1%) were students; 71(17.7%) were full house wife, 63(15.7%) were business and 56(14.0%) of them were farmers respectively. 117(29.3%) had 0 to 2years; 109 (27.3%) had 3.5years; 73(18.3%) of the respondents had 6 to 8years; 54(13.5%) had 12years and above and 47 (11.6%) of them had 9 to 11years respectively.

Answering of Research Questions
Research Question One: What is the knowledge of diabetes mellitus management among diabetic patients attending general hospitals in Northern States of Nigeria?

Table 2: Mean score of responses on knowledge of diabetes mellitus management among diabetic patients. N=400

S/N		Mean	Standard Deviation
1	I know that diabetes mellitus is a condition of high blood sugar	3.4125	.63114
2	I know that the usual cause of diabetes mellitus is lack of insulin in the body	3.2275	.64559
3	Diabetes mellitus is a chronic problem which is directly related with life style modification	3.2175	.65671
4	I know that diabetes mellitus can be inherited from parents who have this history of diabetes	3.1875	.74413
5	The most accurate way of monitoring diabetes mellitus is by regular checking of blood sugar	3.3200	.71686
6	Complications due to diabetes mellitus can be prevented by drug therapy and life style modification.	3.2875	.66780
7	Healthy eating and regular exercise can delay diabetes mellitus and its complications.	3.1950	.66940
8	Diabetic patients will have eyes, dental and foot problems if not well manage.	3.3250	.62878
9	Diabetes mellitus if left untreated is responsible for causing other serious health complications like hypertension, kidney failure, foot ulcers and other related illness.	3.3625	.62214
10	Diabetic patients should avoid smoking and alcohol consumptions	3.3075	.68492
11	Diabetic should always take extra care when cutting their toenails. Cuts and abrasion on diabetes mellitus heal more slowly	3.3300	.68723
	Aggregate Mean	3.288409	0.668609

A careful observation of Table 2 shows that, most of the respondents know that diabetes mellitus is a condition of high blood sugar (at mean score of 3.41). This implies that, many of the respondents were knowledgeable about the condition of high blood sugar in diabetes mellitus. Furthermore, the table shows that, all the items from the responses were significant, but some of them, their mean score were not as high as the aggregate mean score of 3.29, which was found to be greater than bench mark score of 2.5. This implies that, diabetic patients have knowledge on diabetes mellitus management.

Hypothesis One: Knowledge of diabetes mellitus management among diabetic patients attending general hospitals in Northern States, Nigeria is not significant.

Table 3: **Result of One sample t-test on Knowledge of diabetes mellitus management among diabetic patients attending general hospitals**

	Mean	Std. Deviation	t-value	df	P-value
Aggregate mean	3.2884	0.6686	6.387	399	0.00
Constant mean	2.50	0.00			

t (399) = 1.972, P = < 0.05

A careful observation of Table 3 reveals that the respondents have knowledge of diabetes mellitus management. This is because the one-sample t-test calculated value is 6.387 greater than the t-critical is 1.972 at degree of freedom 399 with probability value 0.00 is less than 0.05 level of significance. Thus, this result shows that the sub-hypothesis which states that "Knowledge of diabetes mellitus management among diabetic patients attending general hospitals in Northern States of Nigeria is not significant" was therefore rejected. The sub-hypothesis was rejected because the respondents revealed being knowledgeable with a P-value of 0.00 at 0.05 level of significant.

Hypothesis two: Knowledge of diabetes mellitus management among male and female diabetic patients attending general hospitals in Northern States of Nigeria do not significantly differ.

Table 4: Result of Independent t-test Statistics on Differences between Male and Female diabetes patients attending general hospitals on the knowledge of diabetes mellitus management

	Gender	N	Mean	SD	df	t	P
Knowledge of diabetes patients	Male	253	35.8538	5.00380	398	1.629	0.248
	Female	145	36.6897	4.79079			

t (398) = 1.972, P = < 0.05

Results of the table 4 showed that there is no significant difference between male and female diabetes patients attending general hospitals in their knowledge of diabetes mellitus management. This was because the calculated P-value of 0.248 is higher than the 0.05 alpha level of significance, while the calculated t-value of 1.629 is lower than the 1.972 t-critical at df 398. This showed that gender of diabetes patients does not determine knowledge of diabetes mellitus management. Therefore, the null hypothesis which states that knowledge of diabetes mellitus management among male and female diabetic patients attending general hospitals in Northern States of Nigeria do not significantly differ. Thus, the null hypothesis 4(a) was therefore retained. It was retained because the P-value of 0.248 in knowledge is higher than the 0.05 alpha level of significant.

Hypothesis three: Knowledge of diabetes mellitus management among diabetic patients of different education status attending general hospitals in Northern States of Nigeria do not significantly differ.

Table 5: Result of ANOVA statistics on knowledge of diabetes mellitus management among diabetic patients of different education status attending general hospitals

Variable	Sum of Squares	Df	Mean Square	F	P-value
Between Groups	614.737	4	153.684	6.649	.000
Within Group	9130.361	395	23.115		
Total	9745.098	399			

f (4, 395) = 2.06, P = < 0.05

Observation of Table 5 shows that result was significant, because P-value of 0.00 observed is less than P-value of 0.05. The observed F-value of 6.649 is greater than the critical value of 2.06 at degree of freedom 4,395 at df 4,395 at 0.05 level of significant set for study. The result revealed that, there is significant difference in the knowledge of diabetic patients of different educational status attending general hospitals towards diabetes mellitus management in Northern States of Nigeria. Since the calculated F-

value indicates a significant difference, therefore, the need to investigate the causes by using Scheffe's post hoc test. The post hoc test using Scheffe, reveals that, there exist a significant difference between pairs of levels of education of tertiary and non-formal with a mean difference of 3.37062*, none and tertiary with a mean difference of 3.38945*. Therefore the null hypothesis is rejected. The sub-hypothesis was rejected because the P-value of 0.00 is less than the 0.05 alpha level of significant.

Table 6: Scheffe post hoc test on the knowledge of diabetes mellitus management among diabetic patients of different education status attending general hospitals

Multiple Comparisons

(I) Level of Education	(J) Level of Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Primary	Secondary	-.32416	.80255	.007	-2.8079	2.1596
	Tertiary	-1.74426	.75489	.006	-4.0805	.5920
	Non formal education	1.62636	.93877	.008	-1.2790	4.5317
	None	1.64519	1.16303	.006	-1.9542	5.2446
Secondary	Primary	.32416	.80255	.007	-2.1596	2.8079
	Tertiary	-1.42010	.59819	.000	-3.2714	.4312
	Non formal education	1.95052	.81808	.006	-.5813	4.4824
	None	1.96935	1.06800	.004	-1.3360	5.2746
Tertiary	Primary	1.74426	.75489	.006	-.5920	4.0805
	Secondary	1.42010	.59819	.000	-.4312	3.2714
	Non formal education	3.37062*	.77139	.001	.9833	5.7580
	None	3.38945*	1.03267	.001	.1935	6.5854
Non formal education	Primary	-1.62636	.93877	.008	-4.5317	1.2790
	Secondary	-1.95052	.81808	.226	-4.4824	.5813

	Tertiary	-3.37062[*]	.77139	.001	-5.7580	-.9833
	None	.01882	1.17381	1.000	-3.6139	3.6516
	Primary	-1.64519	1.16303	.006	-5.2446	1.9542
	Secondary	-1.96935	1.06800	.004	-5.2746	1.3360
None	Tertiary	-3.38945[*]	1.03267	.001	-6.5854	-.1935
	Non formal education	-.01882	1.17381	.000	-3.6516	3.6139

The Scheffe post hoc test analysis also shows significant difference in knowledge of diabetes mellitus management among diabetic patients of different education status attending general hospitals in Northern States of Nigeria.

Hypothesis four: Knowledge of diabetes mellitus management among diabetic patients of different age groups attending general hospitals in Northern States, Nigeria do not significantly differ.

Table 7: Result of ANOVA statistics on knowledge of diabetes mellitus management among diabetic patients of different age group attending general hospitals.

Variable	Sum of Squares	Df	Mean Square	F	P-value
Between Groups	41.285	4	10.321	.420	.794
Within Group	9703.812	395	24.567		
Total	9745.098	399			

f (4, 395) = 2.06, P < 0.05

Observation of Table 7 shows that result was not significant, because P-value of 0.794 observed is greater than P-value of 0.05. The observed F-value of 0.420 is less than the critical value of 2.06 at degree of freedom 4, 395 at 0.05 level of significant. This means that the null hypothesis which stated that Knowledge of diabetes mellitus management among diabetic patients of different age groups attending general hospitals in Northern States of Nigeria do not significantly differ and was therefore retained. It was retained because the P-value of 0.794 is higher than 0.05 alpha level of significant.

Discussion
Concerning the knowledge of diabetes management, the result of the study revealed that knowledge of diabetes management among diabetic patients attending general hospitals is significant. This is line with Farmer et al (2006), who examined the influence of patients beliefs on the medication taking behaviour of diabetic patients and concluded that concerns about beliefs such as possible weight gain and changes to daily routine were the principal factors which led to poor compliances. In a recent review articles, Serrano-Gil and Jacob (2010), suggested that, there is a knowledge, attitude and practice gap in T2DM management, and that although there is theoretical knowledge of how the condition should be managed, the attitude of patients and health care professionals influence the practicalities of implementing lifestyle changes for patients

living form day to day with the condition. To encourage patients with diabetes to engage in optimal self-management with healthy lifestyle, healthcare providers need to update and develop their own knowledge of diabetes and of effective behavioral strategies to effect change in patients' lifestyles (Hjelm, mufunda, Nambozi, & Kemp, 2003). They should master methods and strategies to obtain and apply up to date knowledge about diabetes to educate patients on management of blood glucose levels, nutrition and medications so as to minimize development and progression of the acute and chronic complications associated with poorly managed diabetes (Hjelm et al., 2003). Poor knowledge of diabetes-related complications can pose serious risk to the health of patients with diabetes and may result in serious complications such as lower limb amputations, cardiovascular disease and nephropathy in these patients. Farmer et al, (2006) advocated that knowledge remains an important pre-requisite to good compliance with medical therapy. Attitudes and beliefs towards medications have also been found to be highly correlated to medication compliance (Wilson, 2006). Patients' health-related knowledge, attitudes and practices constitute important constructs affecting medication adherence and medication-taking behavior. Healthcare practitioners play a pivotal role in improving the general well being of diabetic patients by addressing these areas in their day to day interactions with the patients. In addition, pharmacists in particular, because of their unique skills in therapy management, should be able to improve health outcomes by addressing the medication-taking behavior of patients (Wu, 2008). Known modifiable risk factors can be reduced and controlled by patients themselves through effective education and enhanced knowledge. While, Adler, et al (2000) who

indicated that diabetic patients can benefit from education about the disease and treatment, good nutrition to achieve a normal body weight and exercise, with the goal of keeping both short term and long term blood glucose levels within acceptable bounds. The findings of this study, is contrary to the findings of a study on knowledge of diabetes mellitus management, which showed a serious deficiency in knowledge of diabetes management among community members in Kenya. Only 27.2% respondents had good knowledge of diabetes mellitus management (Maina, Ndegwa, Njenga & Muchemi, 2010). This might be because the study participants were hospital-based and they have better health education access. In contrast, this finding was lower when compared to the study done in Mekelle, Ethiopia (93.7%) (Berhe, Gebru, Kahsay & Kahsay, 2014), and in Assam University Clinic, Buraydah, India (71.9%) (Saadia, Rushdi, Alsheha, Saeed & Rajab, 2010).

Equally, Heisler et al., (2007) reported that, patients' knowledge and skills are required to communicating with their physicians and participating in making medical decisions. Berhe, Kahsay and Gebru, (2013) reported in their findings, that, self-care behaviour among diabetic patients significantly affected by their level of education, marital status, income, age etc. Other findings, indicated that diabetic patients illiteracy and low economic status are significantly associated with poor diabetes knowledge and practice (Desalu, et al, 2011). Sousa et al., (2006) reported in their studies that, individuals who had more education had greater diabetes knowledge. This was expected since individuals who have more education can learn more quickly and generally have a broader base of knowledge that may help to reinforce new information. The difference in the knowledge level might be directly related

to the level of literacy and availability of information.

Recommendation
- Health Educators should further a comprehension health education, further emphasise a comprehensive health promotion strategy for diabetes and its related risk factors to sustain their knowledge.
- Enlightenment Education and development of preventive programme to improve strategies and interventions to meet the needs of diabetic patients with regards to self-care management, in order to sustain their knowledge, attitude and practice of diabetes management.

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