Journal of
PHARMACY AND BIORESOURCES

Dietary knowledge, attitudes and practices: a cross-sectional survey of type 2 diabetic patients in two tertiary hospitals in Jos, Nigeria

Rotkangmwa C. OKUNLOLA[1*], Samuel J. ABU[1], Benjamin N. JOSEPH[1], Pandell A. DAMUN[1], Temitope T. SELOWO[2], and Maxwell P. DAPAR[1]

[1]*Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmaceutical Sciences, University of Jos, Jos. Nigeria.* [2]*Department of Chemical Pathology, Jos University Teaching Hospital, Lamingo, Jos. Nigeria.*

Abstract

Diet is a crucial aspect of diabetes management and healthy eating is one of the main focus in preventing type 2 diabetes mellitus. Despite mounting evidence of the role of the dietary approach in the management of diabetes mellitus, studies still show low adherence to dietary recommendations. This study aimed at assessing the dietary knowledge, attitudes, and practices of type 2 diabetes mellitus patients in two tertiary hospitals in Jos, Nigeria. This was a descriptive cross-sectional study among 448 type 2 diabetic patients using systematic random sampling. Quantitative data was collected using a self- administered questionnaire and analyzed using Statistical Package for Social Sciences (SPSS) version 20. A 95% confidence interval was used and a probability value of $P \leq 0.05$ was considered statistically significant. The study revealed that dietary knowledge of type 2 diabetic patients attending tertiary health care facilities in Jos, Nigeria was poor, their attitudes were positive, but they had poor dietary practices. A significant association was observed between marital status ($P=0.022$), religion ($P=0.003$), education level ($P=0.000$), employment status ($P=0.000$), family history ($P=0.012$), and dietary knowledge. This study highlights the importance of proper health education as this could possibly improve dietary knowledge, dietary practices that potentially change patient outcomes.

Keywords: Diabetic Diet; Knowledge; Attitudes; Practices; Type 2 diabetes

INTRODUCTION

Diabetes mellitus is a chronic metabolic disease, characterized by elevated levels of blood glucose. Type 2 diabetes mellitus (T2DM) is the most common and usually occurs when the body becomes resistant to insulin or makes insufficient insulin [1]. The prevalence of diabetes mellitus (DM) globally rose from 4.8% in 1980 to 8.5% in 2014; as of 2019, the global prevalence was estimated to be 9.3% [2,3]. According to the World Health Organization (WHO), 422 million people worldwide had diabetes with 1.5 million deaths in 2019, mainly in low- and middle-income countries [4]. In sub-Saharan Africa, 20 million people are estimated to have diabetes, 62% of these are undiagnosed and this number is expected to reach 41.4 million by 2035 [5]. Nigeria has the highest number of people with diabetes in sub-

Saharan Africa with an estimated 3.9 million people having the disease. Though the prevalence varies in different regions, nationally, it is estimated to be 6.8% among adults older than 40 years [4].

Healthy dietary habits ensure the attainment and maintenance of optimal metabolic outcomes, including normal range of blood glucose levels, lipid and lipoprotein profiles that in turn reduce the risks and complications of DM [6]. A variety of dietary meal patterns have proven effective in managing diabetes, these include Mediterranean style diets, plant-based (vegan or vegetarian) diets, low fat and lower carbohydrate diets [7]. Dietary knowledge is a significant factor that improves the dietary patterns in any society [8]. Thus, dietary knowledge could enhance adherence to recommended eating patterns of diabetic patients. This can change unfavorable dietary habits of diabetic patients. In addition, positive attitudes towards dietary management and proper dietary practices may improve blood glucose control and prevent further complications of diabetes [9]. Therefore, there is a need to know about the risk factors associated with the disease and the implications of healthy eating and dieting [10,11,12].

Despite the mounting evidence of the role of dietary approaches in the management of DM, studies still show low adherence to dietary recommendations by diabetic patients [12,13]. In Nigeria, studies indicate low adherence to dietary recommendations and low intake of macronutrients, fruits, and vegetables among diabetic patients [14]. There are deficits and misconceptions about diabetic diet, even though an appropriate diet is necessary for glycaemic and other metabolic outcomes control [2,11,14]. The aim of this study was to assess the dietary knowledge, attitudes and practices of type2 diabetes mellitus patients in two tertiary hospitals in Jos.

METHODS

Study setting. The study was conducted in two teaching hospitals in Jos, Nigeria: Jos University Teaching Hospital (JUTH), and Bingham University Teaching Hospital, (BhUTH). Plateau state is located in the North Central region of Nigeria and has 17 Local Government Areas (LGAs) with Jos as its capital. Based on the 2006 population and housing census, Plateau State has a population of 3,206,531. Jos North LGA in which both study hospitals are situated has a landmass of 291 square kilometers with a population of about 434,090 [15]. In JUTH, the endocrinology unit of the department of medicine co-ordinates the diabetic out-patient clinic every Tuesday and Thursday with an average of 250 patients while BhUTH diabetic clinic holds every Tuesday with an average of 100 patients.

Study design and population. This was a descriptive, cross-sectional study involving 448 participants. The study population included all type 2 diabetes mellitus patients 18years and above attending JUTH and BhUTH for regular follow-up visits and who were willing to participate in the study. Type 2 diabetes mellitus patients who did not give their consent were excluded from the study.

Sample size determination, sampling, study instrument and data collection. The required sample size (n) was calculated using the formula for population estimate [16].

$$n = \frac{Z^2 \, P \, q}{d^2}$$

Where n = minimum sample size, Z = standard normal deviation = 1.96, P = 0.5 (assuming prevalence rate of dietary knowledge among T2DM in Jos is 50%), d = 0.05 (margin of error). Using this formula, a minimum sample size of 384 was calculated. This was rounded up to 422 after adjusting for non-response rate of 10%.

Systematic random sampling was used. The first patient was selected on a random basis and the additional elementary patients who met the inclusion criteria were sampled at a space interval of 2, which was determined by

dividing the average number of patients seen in a month by the sample size. Patients were recruited consecutively into the study until the sample size was attained.

Data was collected between October and December 2019, with the aid of a structured self-administered questionnaire. The questionnaire was adapted from American Diabetes Association's (ADA) Diabetes Self-Management Assessment Research Tool (D-SMART) from a similar study [17]. A test for reliability in this study showed a Cronbach alpha of 0.705. The questionnaire had four sections. Section "A" contained 8 questions used to collect demographic information such as age, sex, marital status, religion, education level, employment status, family history and duration of diabetes mellitus since diagnosis. Section "B" consisted of 16 questions to elicit information on the dietary knowledge of the participants. The third section "C" consisted of 6 questions which dealt with dietary attitude of the respondents. The last section "D" contained 3 questions which dealt with dietary practices of T2DM patients attending the outpatient clinics in the two hospitals.

Data grading, scoring, and analysis. Data collected was analyzed using IBM Statistical Package for Social Sciences (SPSS) version 20.0 software. Sixteen questions were scored for knowledge with each correct answer given one mark. A score of < 8 was graded "poor", while a score of ≥ 8 was "good". Dietary attitude questions were graded on a Likert scale with "Strongly agree" scoring 5, "Agree" scoring 4, "Neutral" scoring 3, "Disagree" scoring 2, and "Strongly disagree" scoring 1. A score between 1-3 was positive attitude, while 4-5, negative attitude. Dietary practices of respondents were also graded on a Likert scale with "Strongly agree" scoring 5, "Agree" scoring 4, "Neutral" scoring 3, "Disagree" scoring 2, and "Strongly disagree" scoring 1. A score of 1-6 was considered good practice, while 7-15 was considered poor practice. Questions negatively worded were presented in the reverse direction during analysis. The results for demographic characteristics of participants were presented using descriptive statistics while Pearson's chi-square (χ^2) was used to determine significant relationships and associations between knowledge and sociodemographic characteristics. A *P*-value of ≤ 0.05 was considered statistically significant.

Ethical considerations . Ethical approvals were obtained from the Jos University Teaching Hospital Human Ethics Research Committee, number JUTH/DCS/IREC/127/XXX/1958, and Bingham University Teaching Hospital Health number NHREC/21/05/2005/00685. Written informed consent was obtained from each respondent before administering the questionnaire, and confidentiality was assured and maintained during the study.

RESULTS

Sociodemographic characteristics of study participants. The mean age of the respondents was 56.0±12.7. Majority (51.1%) of the T2DM studied were females, out of which 65.2% were married. Most of the participants practiced Christianity (59.6%), and 42.4% had tertiary level of education. About half of the respondents were employed with majority (69.6%) having a family history of T2DM and 22.3% had a duration of between 6 to 10 years (Table 1).

Dietary knowledge, attitudes, and practices of respondents. Majority of the respondents 336 (76.9%) knew that diabetic diet should be a healthy diet. Out of the respondents, (36.8%) knew that glycosylated haemoglobin test (HBA1C) is a test that measures the average blood glucose level in the past month. Only 42.2% knew that one kilogram of chicken had more carbohydrate in it than a kilogram of sweet or Irish potatoes. Majority (73.2%) knew that using olive oil in cooking lowers the level of cholesterol in the blood. Most

respondents (66.1%) knew the importance of eating foods low in fat as shown in Table 2. Assessment of dietary attitudes of respondents revealed that 71.9% had overall positive attitudes while 28.1% had negative attitudes as displayed in Table 3. Only (30.4%) had good practices while majority (69.6%) had poor dietary practices as displayed in Table 3.

Relationship between sociodemographic and knowledge. Poor dietary knowledge was observed mostly among females (52.0%) even though this was not statistically significant (*P*=0.828). Widows (63.8%) had poor dietary knowledge, and this was statistically significant (*P*=0.022), religion was statistically associated with poor knowledge (*P*=0.003). Respondents with only primary education (73.9%) had poor knowledge which was statistically significant (*P*=0.000), and regarding employment status, the unemployed

had poor knowledge (*P*=0.000). Those with no family history of diabetes mellitus had poor knowledge which was statistically significant (*P*=0.012), and duration of diagnosis had no statistical significance (*P*=0.248) as presented in Table 4.

DISCUSSION

The dietary knowledge of T2DM patients in this study was poor. This was similar to studies carried out in China, Pakistan, and Nigeria where a greater percentage of the participants had poor knowledge regarding healthy diet to control blood glucose level [4,11,17,18]. However, it differed from a study in India where participants had fair knowledge about diet plan and a balanced diet in diabetes management [19].

Table 1: Socio-demographics of study participants (n=448)

Sociodemographic variable	Attribute	Frequency	%
Gender	Female	229	51.1
	Male	214	47.8
Marital status	Married	292	65.2
	Divorced	32	7.1
	Widowed	80	17.9
	Single	41	9.2
Religion	Christianity	267	59.6
	Islam	175	39.1
	Others	2	0.4
Education level	Primary	88	19.6
	Secondary	133	29.7
	Tertiary	190	42.4
	None	25	5.6
	Others	6	1.3
Employment status	Employed	227	50.7
	Unemployed	147	32.8
	Retired	70	15.6
Family history	Yes	312	69.6
	No	136	30.4
Duration of diagnosis	1	69	15.4
	2.5	117	26.1
	6-10	100	22.3
	11-15	86	19.2
	16-20	45	10.0
	> 20	29	6.5

Age (mean±SD) = 54.0±12.7   SD = Standard Deviation   Frequencies less than 100% are due to missing values

Table 2: Knowledge Gaps of Respondents(n=448)

S/N	Knowledge variable	Score n (%)
1	Diabetes diet is healthy diet for most people.	336 (76.9)
2	Glycosylated hemoglobin (HbAlC) is a test that measures your average blood glucose level in the past month.	161 (36.8)
3	A kilogram of chicken has more carbohydrate in it than a kilogram of potatoes. Sweet or Irish Potatoes	189 (42.2)
4	Orange juice has more fat in it than low fat milk.	182 (41.6)
5	Unsweetened fruit juice raises blood glucose levels	213 (48.7)
6	Urine testing and blood testing are both equally as good for testing the level of blood glucose.	241 (55.1)
7	A can of diet soft drink can be used for testing low blood glucose levels.	165 (37.7)
8	Using olive oil in cooking can help lower the cholesterol in your blood.	320 (73.2)
9	Exercising regularly can help reduce high blood pressure.	363 (83.0)
10	For a person in good control, exercising has no effect on blood sugar levels.	200 (45.7)
11	Infection is likely to cause increase in blood sugar levels.	123 (28.1)
12	Wearing shoes, a size bigger than usual helps prevent foot ulcers.	176 (40.3)
13	Eating foods lower in fat decreases your risk for heart diseases.	289 (66.1)
14	Numbness and tingling may be symptoms of nerve disease.	171 (39.3)
15	Lung problems are usually associated with having diabetes.	159 (36.4)
16	When you are sick with flu you should test for glucose more often.	179 (41.0)

n = number of respondents

Table 3: Dietary knowledge, Attitude, and Practices of Respondents (n=448)

Variable	Attribute	Frequency (n)	Percent (%)
Knowledge	Good	218	48.7
	Poor	230	51.3
Attitudes	Positive	314	71.9
	Negative	123	28.1
Practices	Good	133	30.4
	Poor	304	69.6
Total		448	100.0

n=number of respondents

Poor knowledge was one of the factors associated with non-adherence to diet in Nepal [20]. The differences in findings may be due to lack of proper health education that could result in poor food selection and thus poor diabetic outcomes. This study thus buttresses the need for proper health education to be provided by physicians, nurses, dietitians and pharmacists; the effects of this health education could help people with T2DM make the right decisions about their health and acquire necessary confidence to put their decisions into actions, it could also motivate them to adopt health promoting behaviours. There was a statistically significant relationship between marital status, education level, employment status, family history, and dietary knowledge. This differed from a similar study in Pakistan where there was a statistically significant relationship between gender and dietary knowledge [17]. The reasons for the association between marital status and dietary knowledge might not be fully understood but it is possible that a spouse might have an influence on knowledge. In Japan, family members, were facilitators for better adherence to dietary guidelines [21]. This could be because they serve as a support system in either the preparation of meals, and ensuring portion sizes are adhered to, or in educating and motivating.

Table 4: Association Between Sociodemographic Characteristics and Knowledge

Sociodemographic	Attribute	Poor n (%)	Good n (%)	p- value
Gender	Female	119 (52.0)	110 (48.0)	0.828
	Male	109 (50.9)	105 (49.1)	
Marital Status	Married	135 (52.0)	157 (53.8)	0.022
	Divorced	19 (59.4)	13 (40.6)	
	Widowed	51 (63.8)	29 (36.2)	
	Single	24 (58.5)	17 (41.5)	
Religion	Christianity	120 (44.9)	147 (55.1)	0.003
	Muslim	105 (60)	70 (40)	
	Others	2 (100)	0 (0)	
Education level	Primary	65 (73.9)	23 (26.1)	0.000
	Secondary	83 (62.4)	50 (37.6)	
	Tertiary	65 (34.2)	125 (65.8)	
	None (informal)	14 (56)	11 (44)	
	Others	0 (0)	6 (100)	
Employment status	Employed	83 (36.6)	144 (63.4)	0.000
	Unemployed	109 (74.1)	38 (25.9)	
	Retired	37 (52.9)	33 (47.1)	
Family history	Yes	148 (47.4)	164 (52.6)	0.012
	No	82 (60.3)	54 (39.7)	
Duration of diagnosis (years)	1	31 (44.9)	38 (55.1)	0.248
	2-5	57 (48.7)	60 (51.3)	
	6-10	48 (48)	52 (52)	
	11-15	54 (62.8)	32 (37.2)	
	16-20	24 (53.3)	21 (46.7)	
	> 20	16 (55.2)	13 (44.8)	

$P \leq 0.05$ (Statistically significant)

The association between education level and dietary knowledge could be because majority of the respondents in the study had their highest level of education at secondary school which might influence their dietary knowledge from an increased level of exposure. This agrees with a study in Australia where individuals with greater education had significantly better diabetic knowledge [22]. Regarding employment status and dietary knowledge, majority of the unemployed respondents had poor knowledge. Socio-economic status has an impact on nutrition knowledge because it might be easier to afford healthier food choices [14]. Family history was also associated with dietary knowledge. This was similar to a study in Lagos, Nigeria [4]. Family history played a preventive role in positive health behaviour of T2DM African Americans [23]. Most of the respondents had a family member with type 2 diabetes mellitus but probably, due to their poor knowledge and practices were a negative influence. It is possible that having family members with a history of diabetes provide firsthand information regarding diabetes and ways to curtail it.

From this study majority of respondents had positive dietary attitudes. This was similar to a study in Ethiopia where majority of the respondents had a positive attitude towards lifestyle modification using healthy diet [24]. Although this differed in Pakistan [17]. The reason for the good dietary attitudes might be due to the health seeking behaviour of people with diabetes mellitus especially when faced with an inability to control their glucose level over an extended period of time. Positive dietary attitude is essential because it improves the ability to adhere to a healthy lifestyle which helps reduce

blood glucose level and aid in the long-term management of diabetes mellitus.

From this study, majority of the participants had poor dietary practices, this was similar to a study conducted in Umuahia Abia state, Nigeria [18]. These poor practices might be due to inadequate or poor dietary knowledge on what type of diet is best and in what proportion. Finances could also contribute to the poor practices because most of the participants complained of not being able to afford the required diet. Poor dietary practices by diabetes mellitus patients can lead to poor control of the disease, complications and increased risk of hospitalization. Participants with lower level of education had poor dietary knowledge. This is probably because people with lower level of education have lower level of exposure and they are less likely to source for educational information all of which could result in poor knowledge of the right diet.

REFERENCES

1. World Health Organization (WHO). Diabetes. Accessed May 17,2021. https://www.who.int/westernpacific/health-topics/diabetes.

2. Olatona FA, Airede CA, Aderibigbe SA, Osibogun A. Nutritional knowledge, dietary habits and nutritional status of diabetic patients attending teaching hospitals in Lagos, Nigeria (2019). *J Community Med Prim Health Care*. 31(2):90–103. https://www.ajol.info/index.php/jcmphc/article/view/190417

3. Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, Colaguri S, Guaviguata L, Motala AA, Ogurtsova K, Shaw JE, Bright D, Williams R (2019). Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the international Diabetes Federation Diabetes Atlas 9th Edition. *Diabetes Research and Clinical Practice.* 157 (107843): 1872-8227. https://www.diabetesresearchclinicalpractice.com/article/s0168-8227(19)31230-6/abstract

4. World Health Organization (WHO). Diabetes. Accessed May 17,2021. https://www.who.int/news-room/fact-sheets/detail/diabetes

5. Dahiru T, Aliyu AA, Shehu AU (2016). A review of population-based studies on diabetes mellitus in Nigeria. *Sub-Sahar Afr J Med*. 3(2):59–64. https://www.ssajm.org/article.

6. American Diabetes Association (2004). Nutrition Principles and Recommendations in Diabetes. Diabetes Care. 27(Supp1): s36–s36. https://care.diabetesjournals.org/content/27/suppl_1/s36

7. American Diabetes Association (2012). Standards of Medical Care in Diabetes. Diabetes Care. 35(Supplement 1): S11–63. https://care.diabetesjournals.org/content/35/Supplement_1/S11

8. Iris AL, Danijela G, Scott AL (2014). The association between acculturation and dietary patterns of South Asian immigrants. *PloS One*. 9(2). https://pubmed.ncbi.nlm.nih.gov/24558396/

9. Huan W, Zhenfeng S, Yanhui B, Lin Z, Ying W (2014). Nutritional and eating education improves knowledge and practice of patients with type 2 diabetes concerning dietary intake and blood glucose control in an outlying city of China. *Public Health Nutr*. 17(10). https://pubmed.ncbi.nlm.nih.gov/24124930/

10. Edah JO, Odoh G, Kumtap CY, Onwukeme OC, Ojo SO, Okpara UC, Mwarak OB, Puepet FH (2015). Exercise and other lifestyle habits of patients with type II diabetes mellitus in Jos, Nigeria. *Jos J Med* .9(1):9–15. https://www.ajol.info/index.php/jjm/article/view/138964

11. Odili VU, Isiboge PD, Eregie A (2011). Patients' Knowledge of Diabetes Mellitus in a Nigerian City. *Trop J Pharm Res*. 10(5):637–42. https://www.ajol.info/index.php/tjpr/article/view/71701

12. Udogadi NS, Onyenibe NS, Abdullahi MK (2019). Dietary Management of Diabetes Mellitus with Focus on Nigeria. *Int J Diabetes Res*. 2(1):26–32. http://96.126.98.199/index.php/ijdr/article/view/2493

13. Simeni Njonnou SR, Boombhi J, Etoa EMC, Tiodoung TA, Jingi AM, Nkem Efon K, Mbono SE, Ntsama EM, Kengmi KO, Tsitso MN, Talbit NS, Dehayem YM, Sobngwi E (2020). Prevalence of Diabetes and Associated Risk Factors among a Group of Prisoners in the Yaoundé Central Prison. *J Diabetes Res*. (2020). https://www.hindawi.com/journals/jdr/2020/5016327

14. Ogbera AO, Ekpebegh C (2014). Diabetes mellitus in Nigeria: The past, present and future. *World J Diabetes* 5(6):905. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4265879/

15. National Population Commission (NPC) [Nigeria] and ICF (2019). Nigeria Demographic and Health Survey 2018 Abuja, Nigeria, and Rockville, Maryland, USA. https://dhsprogram.com/pubs/pdf/FR359/FR359.pdf

16. Ogbonna C (2016). The Basics in Biostatistics, Medical Informatics & Research Methodology. Yakson Press; 260–261 p.

17. Bano A, Afzal M, Sarwar H, Waqas A, Kousar S, Gulzar S (2017). Dietary knowledge, Attitude and Practices of Diabetes Patients at Services Hospital Lahore. *Int J Appl Sci Biotechnol*. 5(2):227–36.

18. Marian AO, Osuu JI (2012). Knowledge, Attitudes and Practices of People with Type 2 Diabetes Mellitus in a Tertiary Health Care Centre, Umuahia, Nigeria. *J Diabetes Metab*. 03(03). https://www.omicsonline.org/knowledge-attitudes-and-practices-of-people-with-type-2-diabetes-mellitus-in-a-tertiary-health-care-centre-umuahia-nigeria-2155-6156.1000187.php?aid=5764

19. Gupta RK, Shora TN, Jan R, Raina SK, Mengi V, Khajuria V (2015). Knowledge, Attitude and Practices in Type 2 Diabetes Mellitus Patients in Rural Northern India. *Indian J Community Health*. 27(3):327–33. https://www.iapsmupuk.org/journal/index.php/IJCH/article/view/579

20. Janaki P, Farzana S, Narbada T, Liaquat A (2014). Factors associated with nonadherence to diet and physical activity among Nepalese type 2 diabetes patients: a cross sectional study. *BMC Res Notes*. 7;758. https://pubmed.ncbi.nlm.nih.gov/25344089/

21. Han CY, Chan CGB, Lim SL, Zheng X, Woon ZW, Chan YT, Bhaskaren K, Tan KF, Mangaikarasu K, Chong MF (2020). Diabetes-related nutrition knowledge and dietary adherence in patients with Type 2 diabetes mellitus: A mixed-methods exploratory study: *Proc Singap Healthc*. 29(2) 81-90. https://journals.sagepub.com/doi/full/10.1177/2010105820901742

22. Fenwick EK, Xie J, Rees G, Finger RP, Lamoureux EL (2013). Factors Associated with Knowledge of Diabetes in Patients with Type 2 Diabetes Using the Diabetes Knowledge Test Validated with Rasch Analysis. *PLOS One*.8(12): e80593. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0080593

23. Ard D, Tettey NS, Feresu S (2020). The Influence of Family History of Type 2 Diabetes Mellitus on Positive Health Behavior Changes among African Americans. *Int J Chronic Dis*. 2020;8016542. https://www.hindawi.com/journals/ijcd/2020/8016542/

24. Adem AM, Gebremariam ET, Gelaw BK, FromsaSeifu MAM (2014). Assessment of Knowledge, Attitude and Practices Regarding Lifestyle Modification among Type 2diabetic Mellitus Patients Attending Adama Hospital Medical College, Oromia Region, Ethiopia. *Glob J Med Res*. 14(7):14.