



ORIGINAL ARTICLE

Nutritional Knowledge, Dietary Habits and Nutritional Status of Diabetic Patients Attending Teaching Hospitals in Lagos, Nigeria

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Keywords

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ABSTRACT

Background: This study assessed the nutritional knowledge, dietary habits and nutritional status of adult diabetic patients attending teaching hospitals in Lagos State, Nigeria.

Methods: A cross-sectional study was conducted among adult diabetic patients attending the out-patient clinics of the two Teaching Hospitals in Lagos. Respondents were recruited from the clinics consecutively until the desired sample size (342) was obtained. A pre-tested interviewer-administered questionnaire was used to collect data. Dietary habits were assessed using food frequency questionnaire and BMI was assessed following standard procedure and compared with the World Health Organization (WHO) standards. Data was analyzed using IBM SPSS (Version 20). Chi-square and Fisher's exact probability test were used to determine the association between variables. The level of significance was set at p-value less than 5%.

Results: The mean age of the respondents was 59.6 ± 13.0 years. Only 125 (37%) of the respondents had good nutritional knowledge. Majority ate three meals every day, 237 (69.3%) and have had dietary counseling, 255 (74.6%). More than half of the respondents, 202 (59.1%) skipped meals, 80 (23.4%) consumed alcohol while only 42 (12.3%) ate fruits and vegetables daily. The commonest food consumed was processed cereals. Majority of the respondents were overweight or obese (74%). Obesity was associated with being female and not having dietary counseling.

Conclusion: Nutritional knowledge and dietary habits were poor while overweight and obesity were high. Dietary counseling will be necessary to improve the dietary pattern and nutritional status of the diabetic patients.

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INTRODUCTION

The global prevalence of diabetes mellitus among adults over 18 years of age rose from 4.7% in 1980 to 8.5% in 2014; and has been rising more rapidly in middle- and low-income countries. ¹ In 2010, 12.1 million

people were estimated to be living with diabetes in Africa, and this was projected to increase to 23.9 million by 2030. ² In Nigeria, the prevalence varies in different regions but the national prevalence has been estimated to be 6.8% in adult

Nigerians aged older than 40 years.^{3, 4} Diabetes mellitus can play a vital role in the cause of morbidity and mortality through continued clinical consequences and effect on cardiac functions, renal failure, visual impairment and blindness, diabetic ketoacidosis or hypoglycaemia and infection.^{5, 6} Diabetes mellitus (DM) and related complications are associated with long-term damage and failure of various organ systems. It induces changes in the microvasculature which combine with advanced glycation end products of oxidative stress, low grade inflammation and neovascularization of vasa vasorum to cause vascular complications.⁵ If the risk factors (hyperglycemia, hypertension and dyslipidaemia) are not well controlled, diabetic peripheral neuropathy, and nephropathy are common complications of diabetes. The prevalence of neuropathy can be as high as 33.5%.^{6, 7} An increased incidence of atherosclerosis in insulin-dependent diabetic patients has long been recognized.

There is increased risk of stroke, heart diseases, retinopathy, peripheral nerve damage and renal problems among diabetic patients compared to the general population.⁸ According to the World Health Organization diabetes will be the 7th leading cause of death by 2030.⁹ The economic burden of diabetes mellitus in a developing country like Nigeria is enormous in terms of the direct cost of intensive monitoring and control of blood glucose, managing cardiovascular, renal, and neurological consequences, as well as cost of care.¹⁰ The

quality of life and life expectancy of the patients are also reduced.^{11, 12} Adequate knowledge of diabetes is very important in diabetic care. Nutrition knowledge and skills enable individuals with type 2 diabetes (T2DM) to make food choices that optimize metabolic self-management and quality of life. Increasing patient knowledge regarding the disease and its complications have significant benefits with regard to compliance to treatment and decreasing complications associated with the disease. However, research shows that diabetics have significant deficits in diabetes-related nutrition knowledge and skill.^{13, 14} Moreover, studies in Nigeria indicate low adherence to dietary recommendation for macronutrients intakes as well as fruits and vegetables consumption among diabetic patients whereas an appropriate diet is necessary for glycemic and other metabolic outcomes control.¹⁵⁻¹⁶

Despite the fact that teaching hospitals offer the highest level of medical care, research shows that 88% of patients in teaching hospitals in India and Umuahia in Nigeria had poor knowledge, attitude and practices concerning diet and a significant proportion were obese.¹⁷ Studies done on nutritional knowledge among diabetics are few and some of them are old. Nutritional status and food consumption pattern of diabetics were assessed in Federal Medical Centre Owo recently¹⁸ but information on the nutritional knowledge, dietary habits and nutritional status of diabetic patients attending teaching hospitals in Lagos is scarce. This study was therefore conducted

to assess the nutritional knowledge, dietary habits, nutritional status and its associated factors among adult diabetic patients in teaching hospitals in Lagos State.

METHODOLOGY

The study was a descriptive cross-sectional study conducted among diabetic patients attending out-patient diabetic clinics in teaching hospitals in Lagos State. There are two teaching hospitals in Lagos: Lagos University Teaching Hospital (LUTH) and Lagos State University Teaching Hospital (LASUTH) and the two of them were included in the study. In LUTH, the endocrinology unit in Department of Medicine coordinates diabetes clinic which holds weekly on Tuesdays. An average of eighty patients attend the clinic weekly. In LASUTH, the endocrinology unit in Department of Medicine also coordinates the diabetic clinic which holds twice a week on Tuesdays and Thursdays. An average of 60 patients attend the clinic on each diabetes clinic day.

The minimum sample size was estimated using Cochran's formula $n = z^2pq/d^2$ where p , is the prevalence of those who met the recommended dietary allowance in a previous study, 70.7%¹⁹ The value obtained after compensating for possible non-response was 342. Only adult diabetic patients who were eighteen years and above and had been on management for diabetes for at least one year were interviewed. Patients who had had limb amputation were excluded from the study. Patients were recruited consecutively into the study until

the sample size for each center was completed. Equal number of patients were recruited from both hospitals since the patient loads were similar.

The data was collected using a pre-tested, structured, interviewer-administered questionnaire. The pretesting was done at Federal Medical Centre, Ebute-meta, another tertiary hospital in Lagos. The section of the questionnaire on knowledge of nutrition and management of diabetes mellitus was adapted from past studies.^{5, 8, 13, 15, 16, 18} The food frequency questionnaire (FFQ) used for the Nigerian National Food Consumption Survey in year 2001 was adopted for the assessment of dietary habits.²⁰ The FFQ contains details of food that are commonly consumed in Nigeria and gives room to record the number of days each of the foods is consumed in a week.

A digital electronic weighing scale (Digital OMRON Body Composition (BF 508) calibrated to the nearest 0.1 kg was used to measure the weight or body mass of each patient while a stadiometer calibrated to the nearest 0.1 cm. was used to measure the height of each student. The weight was measured to the nearest 0.1kg and the height was measured to the nearest 0.5cm. The body mass index (BMI) of each participant was calculated using the formula: $BMI = \text{weight (kg)} / \text{height (m}^2\text{)}$ and participants were classified according to the WHO International classification of adult weight.²¹

Two research assistants who have first degree in Biochemistry and Nutrition were recruited and trained successfully on

administration of questionnaires and measurements of anthropometric parameters. The researchers were fluent in both English and Yoruba languages. Administration of questionnaires was done on clinic days of the respective teaching hospitals for a duration of eight weeks. Ethics approval was obtained from the Health Research and Ethical Committee (HREC) of Lagos University Teaching Hospital (Ethical approval No is ADM/DCST/HREC/APP/1567) and Lagos State University Teaching Hospital (Ethical approval No is LREC.06/10/849). Permission was obtained from the Chief Medical Directors of both hospitals. Written informed consent was obtained from each respondent before administering the questionnaire and confidentiality was assured and maintained during the study. Data was analyzed using IBM SPSS version 20.0. Seventeen questions were scored for knowledge; each correct answer was given one mark and the maximum obtainable mark was seventeen. Scores of 11 and above were rated as good knowledge; 7-10 as fair knowledge and less than 7 as poor knowledge. The results were presented using frequency tables. Chi-square and Fisher's exact probability test were used to determine the association between dependent and independent variables. The dependent variable is the nutritional status of the diabetic patients while the independent variables are sex, skipping of meals, alcohol, exercise and dietary counselling. The test of significance was performed using a 95% confidence interval

and the level of significance was set at p -value < 0.05 .

RESULTS

Socio-demographic characteristics of respondents

The age range of the respondents was 21-81 years while the mean age was 59.6 ± 13.0 years. Almost one third, 96 (28.1%) were aged 61-70 years. Majority of them were females 220 (64.6%), married 225 (65.8 %) while 288 (84.2%) of them were Christians. More than half of the respondents 206 (60.2%) have had the disease for between 2 and 12 years. Two hundred and five (59.9%) of them have a family history of diabetes and 150 (43.9%) of them earned ₦10,000-₦50,000 monthly (\$1 - \$4 per day).

Knowledge of nutrition and diabetes

Majority of the respondents 245 (71.6%) knew the meaning of a balanced diet, 289 (84.5%) knew healthy snacks and 250 (73.1%) knew types of drinks permitted for diabetics. Fifty-seven (16.6%) of them knew the recommended number of servings of fruits and vegetables per day (i.e. five servings) while 81 (23.7%) knew that foods rich in whole grains are good for diabetics. Majority of the respondents, 295 (86.3%) knew the meaning of Diabetes Mellitus (DM), 234 (68.4%) and 225 (65.8%) knew that family history and unhealthy diet, respectively are risk factors for DM. Only a few, identified stress 101 (29.5%), inadequate physical activity 92 (26.9%) and alcohol drinking 103 (30.1%) as risk factors for DM while 138 (40.4%) erroneously

thought that bitter substances can control DM Only 125 (37%) of the respondents had overall good level knowledge. **(Table 1)**

Dietary habits and food consumption pattern of respondents

Majority of the respondents, 237 (69.3%) ate three meals every day, 242 (59.1%) skipped meals while 47 (13.7%) ate away from home and 80 (23.4%) consumed alcohol daily.

Majority, 255 (74.6%) have had dietary counseling. **(Table 2)**

The commonest cereal consumed was processed cereals 93 (27.2%) followed by wheat, 34 (9.9%). Roots, tubers and legumes were rarely consumed. Plantain 11 (3.2%) and beans (9.9%) were the commonest consumed daily among tubers and legumes respectively.

Table 1: Respondents' Knowledge about Nutrition and Diabetes

Correct knowledge	Frequency (n=342)	Percent
Meaning of a balanced diet	245	71.6
Recommended number of servings of fruits & vegetables	57	16.6
Meals good for diabetics		
Sugar free foods	297	86.8
Vegetable rich foods	284	83.0
Foods rich in whole grains	81	23.7
Food that are high in protein	197	57.6
Food that are high in fats	215	62.9
Food that are high in carbohydrate	266	77.8
Food that are high in cholesterol	191	55.8
Meaning of Diabetes Mellitus (DM)	295	86.3
Risk factors for DM		
Hereditary/ family history of diabetes	234	68.4
Unhealthy diet	225	65.8
Inadequate physical activity	92	26.9
Stress	101	29.5
Smoking	32	9.4
Alcohol drinking	103	30.1
Foods that can be used to control blood sugar	184	53.8
Foods that raises blood sugar	233	68.1
Foods that are good for weight management	310	90.6
Snacks that are healthy for diabetics	289	84.5
Role of snacks in a diabetic diet	82	24.0
Drinks permitted without limit	250	73.1
Level of nutritional knowledge		
Good	125	37.0
Fair	181	53.0
Poor	36	10.0

Daily consumption of fruits 42 (12.3%) leafy vegetables 80 (23.4%) and non-leafy vegetables 71 (20.8%) was inadequate. Fish was the commonest flesh foods consumed 113 (33%) while palm oil was the commonest type of oil, 55 (16.1%) used daily. Many, 82(24%) consumed confectioneries and beverages daily. **(Figure 1)**

Nutritional status of respondents and associated factors

Less than a quarter, 84 (24.6%) had normal weight. 119 (34.8%) were overweight, 132 (39.2%) were obese while 5 (1.5%) were underweight.

Table 2: Respondents' Dietary Habits

Respondents dietary habits	Frequency (n=342)	Percent
Frequency of eating in fast food restaurants		
Daily	47	13.7
4-6 times/week	30	8.8
1-3 times/week	92	26.9
Occasionally (less than once a week)	76	22.2
Avoid eating in fast food restaurant	97	28.4
No of meals taken daily		
One	7	2.0
Two	79	23.1
Three	237	69.3
Four	19	5.6
Skipping meals		
Always skipped breakfast	65	19.0
Always skipped lunch	69	20.2
Always skipped dinner	68	19.9
Don't skip meals	140	40.9
Preferred method of cooking		
Frying	61	17.8
Boiling	255	74.6
Roasting	26	7.6
Alcohol consumption		
Drink alcohol	80	23.4
Don't drink alcohol	262	76.6
Diet counseling		
Has had diet counselling	255	74.6
Has never had diet counselling	87	25.4
Frequency of exercise/week		
Daily	81	23.7
4-6 times per week	29	8.5
1-3 times per week	67	19.6
Occasionally (Less than once a week)	89	26.0
Never	76	22.2

There was a statistically significant association between nutritional status and sex; women had lower prevalence of normal weight and higher prevalence of obesity than men ($p=0.0003$).

Dietary counseling was also associated with nutritional status, those who have had dietary counselling had higher prevalence of normal weight and lower prevalence of obesity compared to those who had not ($p=0.007$). (**Table 3**)

DISCUSSION

The mean age of respondents was 59.6 years. Most of them, 245(71.6%) knew the

meaning of a balanced diet but few, 57 (16.6%) knew the recommended daily servings of fruits and vegetables. This contrasts with the report of an Indian study where 86.7% did not know the meaning of balanced diet but 62.7% knew the number of servings of fruits and vegetables.²² Knowledge of definition of DM (86.3%), snacks that are healthy (84.5%) and drinks that are permitted for diabetics (73.1%) was high.

This is in contrast with studies done in other developing countries such as Gambia (47%) and Saudi Arabia (24.8%) where low level of knowledge was obtained. Similar reports were however obtained from Bangladesh

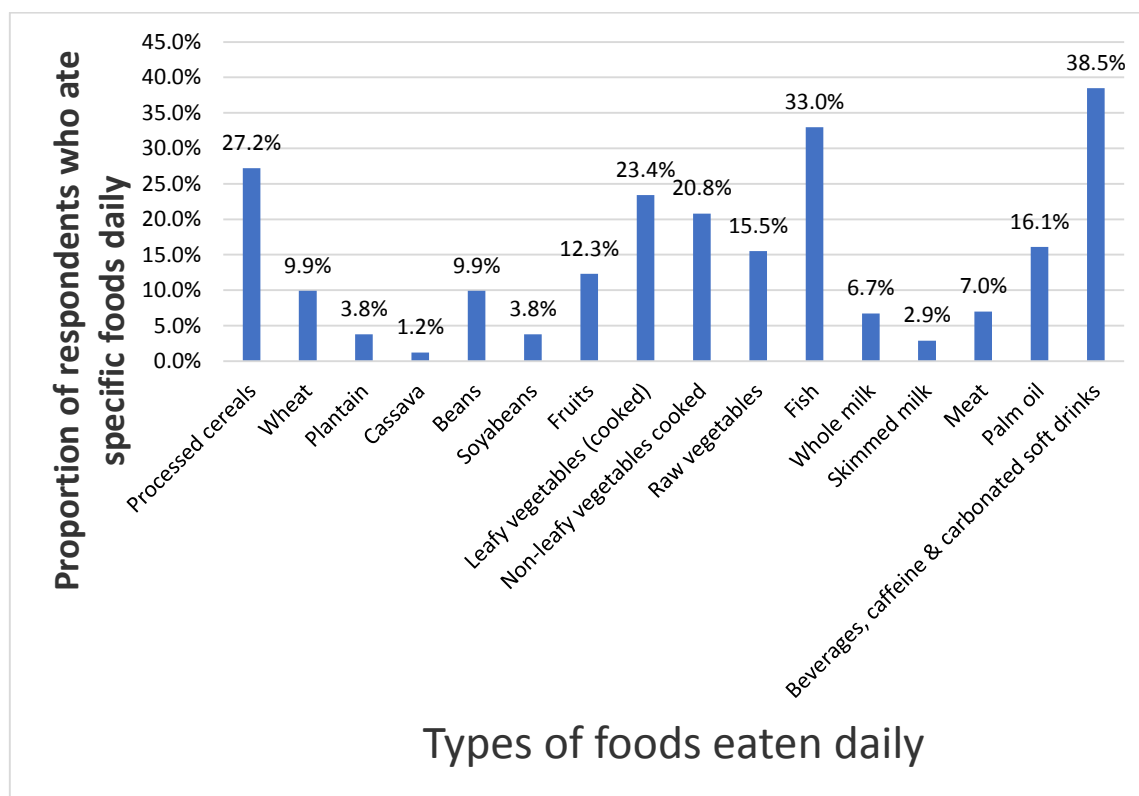


Figure 1: Food Consumption Pattern of Diabetic Patients

Table 3: Relationship between Nutritional Status and Socio-demographic Characteristics of Respondents

Variable	Under Weight	Normal	Over Weight	Obese	χ^2 value	p-value
Sex						
Male	2 (1.7)	40 (33.1)	50 (41.3)	29 (24.0)		
Female	3 (1.4)	44 (19.9)	69 (31.2)	105 (47.5)	18.905	0.0003*
Skipping meals						
Yes	4 (2.0)	42 (20.8)	70 (34.7)	86 (42.6)		
No	1 (0.7)	42 (30.0)	49 (35.0)	48 (34.3)	5.031	0.158
Alcohol						
Yes	1 (1.3)	15 (18.8)	28 (35.0)	36 (45.0)		
No	4 (1.5)	69 (26.3)	91 (34.7)	98 (37.4)	2.409	0.467
Exercise						
Yes	3 (1.1)	60 (22.6)	98 (37.0)	104 (39.3)		
No	2 (2.6)	24 (31.2)	21 (27.3)	30 (39.0)	4.558	0.186
Diet counseling						
Yes	1 (0.4)	67 (26.3)	95 (37.3)	92 (36.1)		
No	4 (4.6)	17 (19.5)	24 (27.6)	42 (48.3)	11.8	0.007*
TOTAL	5 (1.5)	84 (24.6)	119 (34.8)	134 (39.2)		

*Fisher's exact test

(81%). This may be due to higher level of education among the cohorts in Lagos, Nigeria and Bangladesh. Lagos is an urban area full of educated people compared to the rural areas of Nigeria.

Only 125 (37%) of them had overall good nutritional knowledge. This is in consonance with another study in Dublin, Republic of Ireland where there were knowledge deficits among the diabetics. Although the role of patient knowledge

about diabetes and nutrition has not been recognized adequately in recent years, dietary modification is still considered a cornerstone of effective T2DM self-management; therefore, it is one of the most important areas for patients to understand, support informed decision-making and self-care. Family history, unhealthy diet was identified as risk factors for diabetes by many respondents in this present study (68.4%) similar to that of Bangladesh (55%)²³ and Gujarat (58%).²⁴ On the other hand, only few of them identified stress (29.5%), inadequate physical activity (26.9%) and alcohol drinking (30.1%) as risk factors. This is similar to the findings in Saudi Arabia and Kerala where only a few identified stress and physical activity as risk factors for diabetes mellitus.^{25, 26} However, many participants from the Bangladesh study recognized stress and physical inactivity as risk factor.²³ This suggests that diabetics in low- and middle-income countries had less knowledge of risk factors compared to others. Understanding of the disease and its risk factors can affect food choices and other preventive practices over the years thereby preventing it or delaying the onset of the disease. Research also shows that patients with higher knowledge, attitude and practice scores exhibit better control of blood glucose.²⁷

Diabetes control measures that were identified by the participants include diet modification and medication (49.4%) and a combination of physical activity, diet and medication (43.3%). Less than half of the respondents (43.3%) knew that a

combination of physical activity, diet and medication were necessary for DM control, similar to the finding in another study in Gambia.²⁸ Knowledge about the various food groups, their sources and effects of each of these foods on glucose level is very vital, and will enable diabetics choose their meals properly, reducing certain foods or avoiding them completely for proper management of their blood sugar levels and to prevent development of other non-communicable diseases. In this study, only 24% of respondents knew the role of snacks in a diabetic diet, in contrast with the study in Jordan where well above half (59.1%) of diabetics knew that healthy snacks were important.²⁹

Knowledge of the drinks and food types that can control blood sugar was high (>50%) Majority knew foods that could raise blood sugar levels (68.1%) and knew that fiber rich foods are good for weight management (90.6%) like the Bangladeshi and Jordan cohort (97%).^{23, 26} Fiber reduces appetite which leads to less food consumption. This level of knowledge might be due to the level of education since 42.4% had at least secondary education and they are able to understand messages better than their illiterate counterparts. However, this knowledge about foods that control blood sugar was marred by the wrong perception that all bitter substances reduce blood sugar (40.4%). The wrong idea that all bitter substances reduce blood sugar featured among 70% of respondents in this study.³⁰ Prevalence of myths about curative substances serve to perpetuate unpleasant

diet among diabetics and could lead to other chronic diseases such as kidney, liver and heart diseases. In many cases, herbal drugs may not be produced under hygienic environment or approved by the regulatory bodies. Moreover, since drugs or their metabolites are excreted through the kidney, using them in large doses or for a prolonged period as is common with herbal drugs which do not have prescribed dosing could result in kidney damage.

Majority of the respondents ate fast foods regularly (71.6%) and ate at least three meals daily (69.3%). This finding is similar to other studies in Karachi and Abeokuta,^{26, 31} but contrasts an Iranian study where only 41% ate at least three meals daily.³² More than half of the respondents (59.1%) usually skipped meals. The most prevalent missed meal among our participants was lunch (20.2%), unlike the Iranian study where it was dinner (95.1%).³³ Skipping meals is bad for blood sugar level and can cause hypoglycemia, especially when patients are on hypoglycemic medications. This type of hypoglycemic complication, could result in unconsciousness that can lead to other morbidity and even death if not properly handled on time. Most of the respondents (74.6%) have had diet counseling in contrast to the report of the studies in India (39%) and Iran (25.2%). Diet counseling motivate patients to modify their diet and lifestyle which in turn can lead to better control of blood sugar to normal range, thereby reducing complications and morbidities associated with poor diabetes management.

Dietary patterns identified among respondents were largely similar to those of other regional studies. The most frequently consumed food on a daily basis was refined cereal (grains) (27.2%) similar to the habit of an undergraduate population whose commonest food was pastry snack (made from refined cereal). In another study in Abeokuta, 5% of diabetic patients also reported eating bakery products daily.³⁴ Refined grains and other high glycemic index (GI) foods such as bread, rice and pasta cause sudden increase in glucose levels because they are digested more rapidly, whereas whole grains are rich in dietary fiber and resistant starch which control blood sugar. They also contain antioxidants, and other important micronutrients such as folic acid and other vitamins. Altogether, these components of wholegrain have relevant functional properties that can justify its beneficial effect on Diabetes and other non-communicable diseases.^{35, 36} It is therefore of concern to discover that refined grains are the commonest foods among diabetic patients in this study. Low GI foods such as legumes, roots and tubers (5.9%) which control the blood sugar level were rarely consumed by the patients. This is unlike the study done in Ondo where 33% consumed roots and tubers daily. Roots and tubers are very high in fiber and therefore recommended for diabetic patients in moderate amounts to control blood sugar. The disparities in frequently consumed foods in Lagos and Ondo could be due to the types of food commonly available in the

different localities. Yam is more accessible in Ondo state compared to Lagos where packaged foods are more accessible.¹⁸

Fruit (12.3%) and vegetable (20%) consumption was inadequate and similar to many other national and foreign studies.^{18, 37} Unlike the report of a study in Malaysia where 76.1% consumed fruits daily.³⁸ These findings are far below the WHO recommendation for five or more daily servings of fruits and vegetables (FV). Ignorance about the right portion of fruits and vegetables to be taken daily might have contributed to the low intake since only few of them (16.6%) knew the daily recommendation of five servings of FV. Inadequate consumption of FV may also be due to the low level of income of the patients who are mostly elderly. Almost half (43.9%) of them earned ₦10,000 - ₦50,000 monthly (\$1 - \$4 per day) indicating that many of them live below the poverty line. A study conducted among adults in Lagos showed that low income is associated with inadequate consumption of fruits and vegetables.³⁹

Fish was the commonest animal food consumed (33%) and few respondents (3.2%) ate meat daily; however, the participants did not fulfill the recommendations that everyone should eat fish at least three times a week with at least one of the portions being oily fish. Fish provides a good source of protein and omega 3 fatty acids, which are healthy polyunsaturated fat that could contribute to glycemic control and reduce the risk of early and late age-related macular degeneration

(AMD).⁴⁰ Palm oil was the commonest oil taken daily (16.1%) followed by groundnut oil. This is quite similar to another Nigerian study conducted in Abia where palm oil was reported to be the commonest cooking oil used.⁴¹ Palm oil consumption results in higher HDL cholesterol than do other vegetable oils that are low in saturated fat and higher LDL cholesterol than do trans-fat-containing oils in humans. The effects of palm oil on blood lipids supports the reduction in palm oil use by replacement with vegetable oils that are low in saturated and trans-fat.⁴²

Consumption of beverages and confectioneries was rather too high for diabetic patients. This is similar to other national studies in Abeokuta and Abia.^{31, 41} Carbonated drinks contain very high amount of refined sugar and cause fluctuations in the blood sugar levels when consumed. Research has also shown that regular consumption of sugary drinks including cola and energy drinks raises the risk of obesity and heart diseases. Apart from the risk of obesity and heart diseases, a major by-product produced during caramelization of soft drinks, 4-methylimidazole (4-MEI) is detected in noteworthy concentrations in colas and other beverages and its chronic intake induces Hyperinsulinemia and Hypoglycemia through Pancreatic Beta Cell Hyperplasia leading to disruption of glucose and lipid homeostasis.⁴³

Only one quarter of the patients had normal weight (24.6%) whereas prevalence of overweight (34.2%) and obesity (39.2%) were

high especially among females (47.5%). The higher prevalence of obesity among females agrees with other local and foreign studies.^{11, 19} Diabetes is obesogenic and can be responsible for the high BMI but inadequate exercise can also be implicated since only 23.7% of the patients exercised daily. These results are similar to the reports from Abeokuta and Malaysia.^{31, 38} Gender and diet counseling were significantly associated with BMI ($p < 0.05$) which is similar to what was obtained from an Iranian study. Diet counselling has been shown to be effective in glycemic control as well as the complications of Diabetes Mellitus.

Limitations of the study: Ideally dietary habit is most objectively assessed through direct observation and weighing of meals to be consumed but it was assessed through a one-week diet recall in this study. It is possible that recall bias might have been introduced.

In conclusion, nutritional knowledge and dietary pattern were poor while overweight and obesity were high among the diabetic patients. Innovative dietary counselling targeting behavioral change will be necessary to improve the nutritional status of the diabetic patients in Lagos.

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