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## SEET ENGINEERING AND TECHNOLOGY JOURNAL

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SEET Engineering and Technology Journal, 1 (issue), May (2026), page

Journal homepage: <https://www.seetfutoetj.ng/index.php/setj>

### Diabetic safe care practices and nutrient intake of the diabetic patients attending clinic at the Imo State University Teaching Hospital Orlu, Imo State, Nigeria

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#### Abstract

The study examined the diabetic self-care practices and nutrient intake of the diabetic patients attending clinic at Imo State University Teaching Hospital Orlu, Imo State. A well-structured, validated and pre-tested questionnaire was used to obtain information on the demographic, socio-economic, nutrient intake and the diabetic safe care activities of the subjects. Glucometer was used to measure blood glucose level. The food portion sizes as well as the serving sizes of foods consumed by the subjects were determined in a 3 day weighed food intake. Data were analyzed and compared with standard. Results were presented in tables and charts. The results showed that the sample consisted of 43.5% males and 56.5% females with 25% of the participants under 50 years of age. Approximately 31% were overweight, while 29% were obese and a significant proportion (77%) had high blood pressure. The study also revealed that the diabetic self-care management education was poor as majority of the patients failed in some of the important domains such as exercising, hospital visit, eye and feet examination as well as dietary management. The analysis of nutrient intake revealed high consumption of fiber, vitamin C, iron, protein, and sodium, while energy, calcium, and niacin intake were low. The study also found a high prevalence of overweight/obesity, a known risk factor for diabetes and hypertension among diabetic patients. Additionally, low carbohydrate intake, high protein consumption, and physical inactivity were observed. Therefore, we recommend that the government and healthcare stakeholders provide intensive and comprehensive diabetes care management education in hospitals to equip patients with safe care management skills, ultimately reducing the complications of diabetes mellitus.

**Keywords:** Diabetes; Self care; Nutrient intake; Management education ;overweight.

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#### 1. Introduction

Diabetes is a group of long term metabolic disorders, a non-communicable disease characterized by hyperglycemia (high blood glucose) resulting from defects in insulin secretion, insulin action or both (American Diabetes Association, 2021). It is a defect in the body's ability to convert glucose (sugar) to energy. For glucose to be transferred from the blood into the cells the hormone insulin is provided by the beta cells of the pancreas, but in individuals with diabetes, this process is impaired (Shrinandan, 2014). The prevalence of diabetes mellitus (DM) is increasing at alarming rate worldwide in developed and developing countries and poses an immeasurable threat to global health (Fadupin, 2018).

Despite the great advancements that have been made in the treatment of diabetes in recent years, diabetes is one of the major causes of morbidity and mortality (Hailu et al., 2012). It has a significant impact on the patients' quality of life, productivity

and involves enormous health burden for virtually every society (Sanus, 2016). According to WHO, (2021) diabetes is a disease that occurs both in developed and developing countries. In developing countries like Nigeria, approximately 2.99 people are living with diabetes, in developed country like United States, more than 23 million people have diabetes mellitus, although about, one third of these cases are undiagnosed. In 2024, diabetes resulted in 3.4 million deaths worldwide making it the 8<sup>th</sup> leading cause of death, International Diabetic Federation (IDF, 2014). With an 8.5% global prevalence of diabetes in 2014 various estimates suggest that the number of affected people will be risen from 589 million to 853 million in the world by 2050 (IDF, 2024). In developed Countries, most patients having DM are over sixty years of age but in developing Countries, diabetes mellitus is found to affect people in their prime. (Centre for Disease Control and ,Prevention (CDC, 2021). The

number of people newly diagnosed with DM increases by about 1.2 million people per year,

Diabetes is due primarily to lifestyle factors and genetics (AACE, 2019). A number of lifestyle factors are known to be responsible for the development of diabetes, such as obesity, lack of physical activity, poor diet, stress, excess alcohol intake (.Zaniti 2017) poorly managed diabetes leads to a host of long term serious complication like heart attack, stroke, diabetic foot, blindness, kidney failure, blood vessel disease that may require amputation, nerve damage and even impotence in men posing an additional burden on the country's limited health care ( Miki et al., 2016)The care of the people with diabetes is traditionally seen as doctor centered, but the concept of self-care of people with diabetes is a new domain and is proven beneficial (Rajarekharan, 2015). In managing diabetic mellitus (DM), proper self-care practice and optimal glucose control is an essential cornerstone in achieving successful health outcomes (Agu et al., 2016). Glucose control is almost entirely in the hands of the patient who lives with this condition. The patient's motivation to eat, exercise, take medication, test glucose levels and maintain a healthy body weight all play a significant role in the management of DM (Sigurdardottor, 2015; WHO, 2024 & American Diabetic Association, 2021).

Diabetes Self-Care Management Education (DSME) is a vital component of diabetes care, empowering individuals and families to effectively manage the condition. People with diabetes make daily decisions regarding their behavior, such as diet, medication adherence, and physical activity. Acquiring self-management skills is crucial for individuals with diabetes to control their chronic condition, prevent complications, and improve their quality of life (Mahalaskshmy, 2016). The primary goal of DSME is to optimize glycemic control by providing individuals with the necessary knowledge, skills, and positive attitudes to manage their diabetes effectively (Fadupin, 2018). In line with this, the American Diabetes Association recommends that all individuals with diabetes receive DSME at diagnosis and as needed thereafter (ADA, 2015).

A cornerstone of DSME is dietary management, which involves choosing and quantifying healthy foods to control diabetes. Using serving sizes to ensure accurate food portions is essential in diabetes meal planning (Fadupin, 2018).

Dietary diversification has long been recognized as a key element of assessing the quality of diets. Increasing the variety of foods across and within food groups is recommended in most dietary guidelines because, intake of variety of foods ensures adequate intake of essential nutrients which promote good health. (Fadupin, 2018). It is estimated that diets that do not match nutritional guidelines contribute to 70,000 premature deaths in the United Kingdom. Inadequate consumption of fruits and vegetables in particular is estimated to contribute to 5% of excess mortality globally. Many national and international policies acknowledge the importance of supporting individuals in achieving a healthy balanced diet, and numerous dietary guidelines emphasize the critical role of the consumption

of a diet that is varied and includes different foods from different food groups (WHO, 2021).

Nutritional assessment is an evaluation of the nutritional status of individual or population through measurement of food and nutrient intake and evaluation of nutrition related health indicators (David et al., 2019). The nutritional status of individual which is defined as the condition of health of an individual as influenced by the individual utilization of nutrient and energy can be determined only through nutritional assessment procedures. Nutritional assessment of groups and individual is a pre-requisite to planning for the prevention or solution of nutrition-related health problems (Brown, 2015). The nutritional status of diabetes is affected by long standing dietary habits, education, family support, gender, age, size of the family, income, occupation, lack of proper self care and nutrition education(Sanus, 2016).

The effectiveness of diabetes management hinges on patients' knowledge and adherence to self-care practices, a crucial aspect of disease control (; Ogbera and Ekpebehg, 2014). Diabetes self-care encompasses healthy eating habits, regular exercise, blood sugar monitoring, and medication adherence. Neglecting these activities can exacerbate the condition, while adherence can significantly reduce cardiovascular complications, which account for 70-80% of diabetes-related mortality. Self-care is therefore a cornerstone in managing chronic diseases like diabetes, enabling patients to achieve optimal outcomes. By identifying gaps in knowledge and self-care practices, healthcare providers can tailor interventions to meet the specific needs of diabetic patients. Therefore, this study is intended to pioneer an assessment of self-care management practices and nutrient intake among individuals living with diabetes in Orlu.

## 2. Materials and Methods

### 2.1 Study Area

The study was carried out in Imo state University Teaching Hospital . (IMSUTH) Umunna Orlu. Imo state university teaching hospital is located at Umunna in Orlu local Government Area of Imo state, Nigeria.

### 2.1a Research Design

This research adopted a cross sectional design to access the knowledge of diabetic self-care management education, dietary diversification and nutritional status of the diabetics. All the diabetic patients attending the hospital from January 2018 to February 2020, who agreed to participate were purposely selected to get a sample size of 200. Questionnaire and weighed food intake were administered to the recipients and the data collected and collated.

### 2.1b Sample size

Diabetic subjects attending clinic at Imo state teaching hospital Orlu during the period of study and who agreed to participate during the period of study constituted the sample size. The sample size was calculated according to the procedure of IDF(

2014) the extended population formula for determination of sample size

$$\text{Equation 1.0} \quad N = \frac{Z^2 \cdot p \cdot (1-p)}{X}$$

Where n=minimum sample size, Z=1.96 (which is z score for 95% confidence interval).p= previous prevalence and x=5% margin of error .The calculated minimum sample size was 186 but it was increased to 200 to ensure data quality.

### 2.1c Validation of Method of Study

The structured questionnaire was validated and corrected by the lecturers in the department of Nutrition and dietetics. Scales used were validated from time to time using a material of known weight.

### 2.1d Preliminary Visit

A prior visit was made to Imo state University teaching hospital Orlu where the study was carried out .During the preliminary visit contacts were made to the management of the hospital and permission to carry out the work was obtained.

### 2.1c Ethical Clearance

Ethical approval was sought and obtained for the study from the ethical committee of Imo State University Teaching Hospital Umunna Orlu LGA Imo state. The informed consent was obtained from each participant.

### 2.1.1 Methods of Data Collection

The instruments used for data collection were as follows;

#### 2.1.1a Questionnaire

Validated and well structured questionnaire was used to collect data on socioeconomic, health status, knowledge of diabetic self care management practices such as diabetic control measures, compliance level to food and drugs etc of diabetic men and women attending clinic at the above mentioned hospital during the period of study.

#### 2.1.1b Diabetic Safe Care Management Practices

The diabetic safe care practices of the subjects were determined by asking diabetic safe care activity questions on the questionnaire such as knowledge of etiology of diabetes, knowledge of recommended fasting sugar, monitoring/management of diabetes, frequency of exercise, following recommended general routine care, knowledge of nutrition, role of insulin in glucose control, dietary pattern of the patients.

#### 2.1.1c. Determination of Blood Pressure and the Fasting Sugar level

These were determined using the Cuff of the sphygmomanometer and the glucometer respectively

A 24 hour dietary recall was obtained from the respondents using the questionnaire, the respondents were asked to recall all food eaten and beverages taken in the previous 24h prior to the

interview in terms of complete food description detailed food preparation method and divers portion size description .Food models and graduated measuring utensils were made available to help subjects estimate food portion sizes

### 2.1.1d Determination of the Subject Nutrient Intake

#### 2.1.1e Weighed food intake

This was according on a sub sample of 30 subjects according to Gregory et al.,( 1990) Henderson et al.,(2002), food intake was estimated by direct weighing of food about to be eaten using a kitchen scale, with the local name of the food item entering into the recorded book. During each visit food stuff used in the preparation of meals, the cooked food , amount eaten at meals the food left over, plate waste, discarded food and snacks were weighed daily during the survey period. The food taken away from home or food purchased from the vendors, the equivalent portions of these foods were purchased and weighed. All the snacks eaten between meals were also weighed. The actual quantity of the foods consumed were weighed.

#### 2.1.1f The food portion sizes

A 24 h diet recall was conducted to obtain information on subjects food intake, measuring guides (house hold measures) and food models were used to aid the respondent in estimating amounts of food at a sitting /portion size. An average amount of foods consumed of each food type reported by all subjects were determined using WHO Anthroplus statistical software package.

The caloric content of determined mean portion sizes consumed were calculated using the food composition data and the food exchange list

#### 2.1.1g Food Exchange List

The food exchange list was calculated using the food exchange list system by Fadupin 2018

**Group 1;** Starchy vegetables and legumes are grouped together on the food exchange list as each serving of them yields the same. Energy 80 g, carbohydrate (15g) and protein (3g)

#### **Group 11**

One exchange of vegetable group yields 5 g of carbohydrate, 2 g of protein, no fat and 25 calories while one fruits exchange yields 15 g of carbohydrate and 60 calories (Fadupin, 2011)

#### **Group 111**

One meat/milk exchange yields 7 g of protein, 6 g of fat and 90 calories.

#### 2.1.1 h Weighed food intake

The nutrient levels of the weighed food consumed by the subjects were calculated using the food consumption table. The nutrient content of the foods were determined and compared with the standard in order to ascertain the nutritional adequacy of the diabetes.

#### 2.1.1.1. Statistical Analysis

Statistical package for social sciences software (SPSS version 18) was used to analyze data obtained from the knowledge of

etiology of diabetes, diabetes safe care management practices, nutritional knowledge, dietary practices)etc.

**3.0 RESULTS**

**Socio-Economic Characteristics of the Respondents**

Figure 1. Gender distribution of recipients of diabetic safe care practices and nutrient intake of the diabetic patients

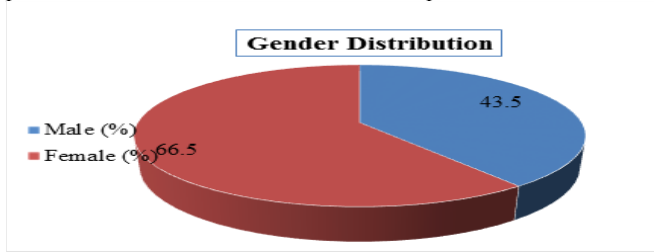


Figure 2. Age Distribution of the recipients of diabetic safe care practices and nutrient intake of the diabetic patients

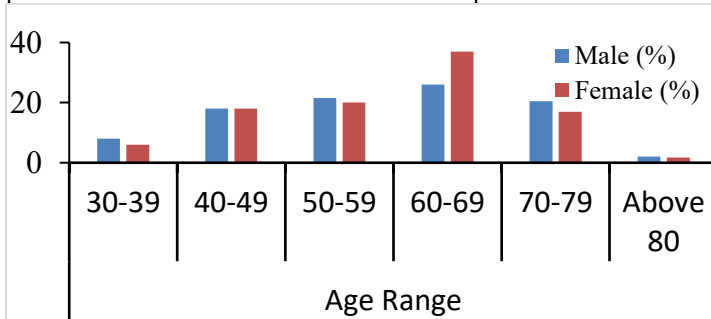


Figure 4. Health status of recipient of diabetic safe care practices and nutrient intake of the diabetic patients.

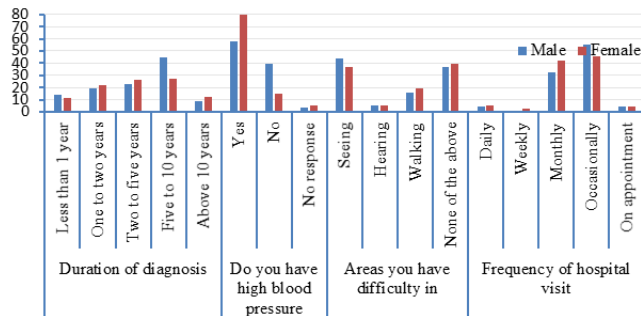


Figure 4 shows the duration of the disease, the highest percentage (30.5) had been diabetic for 5-10 years, 25% had it between two to five years 11% of them had been with diabetes for more than 10 years. The findings show that 70% of the subjects suffered from hypertension, 65.5% observed weight loss, and a good number 40% had difficulty in seeing, 5.2% had hearing problem, 17.5% had problem with their legs while 36% had none of these problems. Findings revealed the frequency of

hospital visit to be 50% occasionally, 33% monthly visit and 4.5% on appointment.

Figure 3. Knowledge status of recipient of diabetic safe care practices and nutrient intake of the diabetes

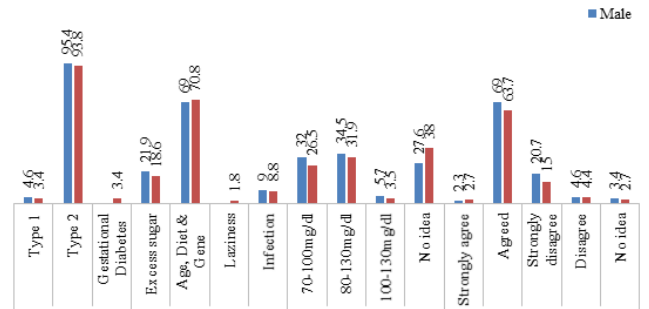
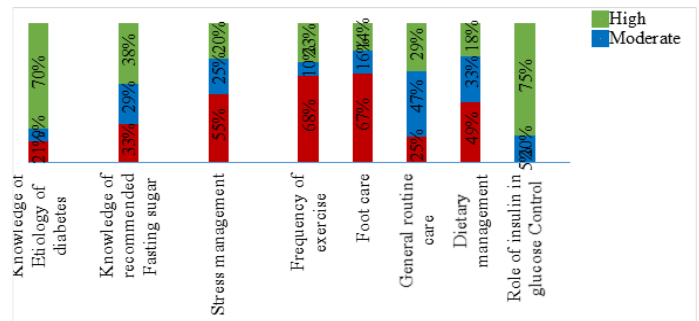


Figure 5 indicates the patient’s knowledge about diabetes. About 70% got the causes of diabetes, 20% agreed that it was excess sugar while 4% indicated infection. The knowledge of recommended fasting blood sugar shows that 29% knew what the recommended fasting blood sugar level should be, 33% indicated 180-130mg/dl, 4.5 marked 100-130mg/dl while 33.5% didn’t have any idea. The study revealed that majority of the patients 66% agreed that diabetes could be controlled, whereas 24% strongly disagreed

Figure 6The Diabetic Self Care Practices Ratings of the Subjects that received diabetic safe care practices and nutrient intake of the diabetic patients



(Figure 6) indicates that 70% of the patients scored high in the first domain (knowledge of etiology of diabetes) while(9%) had a moderate score, and 21% had a poor performance. In result of the knowledge of recommended fasting sugar, 38% scored high, 29% got moderate score, while 33% didn’t get it accurately. Also for frequency of exercise, 22.5% scored high, 9.5% moderately passed the question while 68% failed. The result of the foot care shows that 13.5% took good care of their foot (high score), 16% did moderately well while 66.5% scored very poor in foot examination and care. The result of the general routine care shows that only 29% scored high, 46% do general body routine care occasionally whereas 24.5% had poor general

routine body care. The result of dietary management/healthy eating pattern shows that 49% had a poor eating habit, 30% had moderately eating habit while 18% had a high eating habit. Also 75% of the respondents got the knowledge of the role of insulin in diabetes control, 20% had moderate knowledge while 5% of

the respondents didn't know the role of insulin in glucose control.

Table 1. Mean nutrient intake of the subjects that received diabetic safe care practices and nutrient intake of the diabetic patients.

Nutrient	Male Respondents			Female Respondents			t-value	P-value	Remark
	Mean Intake +SD	Recommended Nutrient Intake	% Intake of Requirement	Mean Intake +SD	Recommended Nutrient Intake	% Intake of Requirement			
Energy (kcal)	1813.71±287.5	2400	5.57	1981.25±425.43	2000	79	51870.6	0.000	S
Protein (g)	108.07±199.3	48-60	225	59.54±10.97	40-50	148	41457.2	0.000	S
Fat (g)	45.65±16.1	NA	-	42.92±19.3	NA	-	25477.5	0.000	S
Fibre (g)	27.96±33.23	19-48	147	27.98±38.97	16-40	170	2.0	0.183	S
Carbohydrate (g)	293.78±126.67	330-450	89	237.95±82.77	275-375	89	-64314.2	0.000	NS
Potassium (mg)	1070.06±961.17	3400	31	973.60±888.37	2600	37	53946.8	0.000	S
Calcium (mg)	515.57±430.4	600-960	85	275.44±256.9	500-800	55	146038.5	0.000	S
Phosphorous (mg)	601±467.27	NA	-	607.65±277.67	NA	-	-2530.9	0.000	NS
Iron (mg)	23.69±10	13.2	171	21.66±8.13	11.0	186	1053.6	0.000	S
Sodium (mg)	128.43±223.2	6.0	114	106.05±128.3	5.0	232	74644.8	0.000	S
Vitamin C (mg)	118.43±369.4	14.4-24	800	114.29±95.83	12.2-20	952	72089.5	0.000	S
Thiamine (mg)	0.98±0.97	1.2-1.9	81	2.77±8.4	1.0-1.6	173.	-658.5	0.000	NS
Niacin (mg)	22.73± 2.53	14.4-24	7.57	14.55±45.23	12.2-20	.12	-116104.1	0.000	NS

Table1 shows that the mean energy intake for both males (1813) and females (1781) was low against recommended intake of 2400 and 2000 respectively. Also both males 108 grams and females (59.54g) had higher protein intake against the required Intake of (40-56) and (40-50) respectively. Males had higher fat (45g) than females (42g). The carbohydrate intake shows that both males and females subjects did not meet up with daily requirement of 350g. The mean mineral intake shows that males and females had low potassium contents (males: 1070, female: 973) against 3400 and 2600 respectively. Their mean intake of phosphorus were the same; males 601 and females 607 while their iron intake did not meet their iron requirement. Their Sodium was in excess (128 and 166) against 6 required daily.

**DISCUSSION**

**Socioeconomic Characteristics of the Subjects that Received Diabetic Safe Care Practices and Nutrient Intake of the Diabetic Patients**

This study found a higher prevalence of diabetes among females (55.5%) compared to males (45.5%), consistent with previous research (Eme et al., 2016). The higher prevalence of obesity among females may contribute to this disparity. Additionally, financial constraints may play a role, as women are more likely to rely on family members for financial support for healthcare expenses (Chinenye and Young, 2011). The majority of participants (51%) were between 60-69 years old, which aligns with the International Diabetes Federation's report that most people with diabetes are between 50-69 years old (IDF, 2014). This age group is likely more susceptible to diabetes due to age-related risk factors. Notably, many respondents (56%) had low

educational attainment and were unemployed, consistent with previous studies (Khattab et al., 2016; Eme et al., 2016; Adesun et al., 2016). Low income was also prevalent among the study group, which may impact their access to nutritious food and medical care. Research has shown that individuals with diabetes have significantly higher medical expenses than those without diabetes, forcing them to make difficult choices between essential needs (Kim et al., 2001). Income level has been linked to food quality and quantity (Eme Obung, 2016) and access to improved care (Asinobi and Akeredolu, 2012).

**Health status of the respondents of the Subjects that Received Diabetic Safe Care Practices and Nutrient Intake of the Diabetic Patients**

According to the results of the disease duration, 30.5 percent have been diabetic for two to five years, and 21 percent have been diabetic for 1-2 years.

This is consistent with the findings of (Gandy et al., 2016) and (Rajeisekharen et al., 2015), who reported that the majority of the sampled population had disease for 1-10 years.

The majority of respondents (70%) had high blood pressure. Most studies have found an increased prevalence of hypertension among diabetic patients (Eme et al., 2016). This hypertension prevalence was comparable to that reported by Mohammed et al (2013), who reported hypertension rates of 76, 74, and 73 percent in UK Caucasians, Italians, and Spaniards, respectively. The results also show that more than half of the respondents had vision impairment, hearing loss, or difficulty in walking. Only 36% of the respondents did not have any of the aforementioned issues.

Uncontrolled diabetes, as well as undiagnosed diabetic retinopathy, can result in severe vision loss and blindness (Miki et al., 2017). Research has shown that diabetes can also cause muscle weakness and difficulty in walking, in this study, 40 percent and 17.5 percent of respondents, had vision and walking impairment respectively.

The majority of patients, 50%, visit the hospital on occasion, while 33% visit monthly. This research supports the findings of Sanus (2016), who found that 50.5 percent of the elderly visit the hospital on a regular basis. Diabetic patients' lack of a health-seeking attitude is extremely detrimental because diabetic complications develop gradually over time and can pose a significant health challenge, if not death (Chinenye and young, 2011).

### **Diabetic Safe Care Management Practices of the Subjects that Received Diabetic Safe Care Practices and Nutrient Intake of the Diabetic Patients**

The study revealed that the diabetic patients knowledge about the self care was poor because majority of the patients failed in in some of the important domains like exercising the body, frequency of hospital visit, frequency of eye and feet examination and dietary management. All these are very essential factors that affect the stability of patients according to Salim, 2016, positive safe care can affect the level of blood glucose, and quality of life ,also the researcher discovered poor level of exercise and called on doctors and nurses to include exercise in their agenda when providing instruction and health education to their attendees to improve their skills thereby improving quality of life. The outcome of this study is consistent with that of Schwedes *et al.* (2010) in which they found that type 2 diabetic patients are not performing exercise or doing any activities related to physical fitness. Foot care is another essential self-care activity that plays a crucial role in preventing complications. Unfortunately, over half of the diabetic patients in this study had never received any information on proper foot care methods.

### **Nutrient Intake of the Diabetics**

The result showed low energy and carbohydrate intake for both men and women. It was observed that they consumed more of legumes and legume products than starchy roots and tubers. This is a strategy most diabetics use to avoid excess consumption of starchy foods since it is commonly believed that starchy carbohydrates foods raises blood sugar level. This is not in agreement with the basic dietary recommendation of avoidance of simple sugar like sugars, sweets, honey etc as they tend to cause a sharp rise in the blood glucose level due to their high glycemic index (ADA, 2016). Carbohydrate should constitute around 60 to 70 % calories and should be in form of complex polysaccharides with adequate amount of fibre. (Khalili, 2019)

Protein intake was much higher probably because of high consumption of proteinous foods. The result showed high intake of fibre, iron sodium and vitamin C. This could be because most the subjects reported that they had good appetite and majority

ate at least three meals daily. On the other hand, calcium, niacin were deficient, only the females met their thiamine requirement. This could be as a result of low intake of green vegetables nuts and grains. Moreover, milk which is a major source of calcium was not consumed in adequate.

### **Recommendation**

Diabetes care is a lifetime commitment; therefore, proper safe care practices and optimal glucose control should be emphasized. A multidisciplinary approach to diabetes management, involving ophthalmologists, optometrists, nurses, dieticians, and the patient, should be advocated. The importance of weight management for diabetics who are overweight or obese should also be encouraged and emphasized.

Individual nutrition advice from a registered nutritionist dietician should be given to all diabetics. The nutrition recommendations should include eating a variety of foods from six food groups (cereals and starchy products, meat and meat products, fruit and vegetables), maintaining a healthy weight, limiting saturated fat intake to less than 10% of calories, getting enough CHO, protein, vitamins, and minerals, and exercising regularly .Intense and extensive diabetic safe management education should be implemented in our hospitals to educate them on safe care management skills such as the need for regular blood and urine glucose testing. Patients should always have medical check-ups to determine their blood glucose level. Finally, in order to improve health and well-being, individuals and populations must be empowered through education, nutrition, and poverty eradication.

### **Declaration Statement**

The authors agreed with total interest to submit the manuscript entitled, Diabetic safe care practices and nutrient intake of the diabetic patients attending clinic at the Imo State University Teaching Hospital Orlu, Imo State, Nigeria for publication in your reputable institution without conflict of interest be it design and implementation, respect towards society, resources and research output and conduct without deceptive acts.

### **Conflict of interest**

The authors declare no conflict of interest.

### **Author Contribution**

Ezeh C.F: writing – original draft, Methodology. Afam Anene O. Supervision, Investigation, Conceptualization. Adeoyi Chisom and Uzoukwu: Formal analysis. Odimegwe N.E and Eze E.E.

### **Acknowledgments**

My acknowledgment goes to the Federal University of Technology Owerri for funding this work.

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