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# Knowledge and Factors Associated with Treatment Compliance among Diabetes Mellitus Patients in Selected Hospitals in Ibadan, Oyo State, Nigeria

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***Authors' contributions***

*This work was carried out in collaboration between all authors. Authors FIO and FO designed the study and wrote the protocol. Authors ALA and FIO supervised the data collection. Author ALA performed the statistical analysis and wrote the first draft of the manuscript together with author CEU. All authors read and approved the final manuscript.*

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## ABSTRACT

Diabetes mellitus (DM) is an emerging public health problem of the 21st century that threatens to overwhelm the health care system and has been identified as the sixth leading cause of death worldwide. The overall prevalence of Diabetes has been estimated to be as high as 17%, due to drastic lifestyle changes accompanying urbanization and westernization and this make diabetics prone to complications and increased mortality as a result of lack of proper awareness and education. This project made use of a descriptive cross-sectional study design to assess knowledge and factors associated with treatment compliance among diabetic patients in Ibadan,

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Nigeria. The estimated target population for the study was 372 and research assistants were recruited and trained to assist in data collection. Data was entered using the Statistical Package for Social Sciences (SPSS) and was analyzed using both descriptive and inferential statistics, Chi-square, t-test, and logistic regression.

A total of 65 patients had a good knowledge of DM and 96.7% of the respondents knew that too much sugar intake, alcohol consumption, sedentary lifestyle, pancreas disorder, and old age are some of the possible causes of DM while 23.7% and 42.9% listed lack of funds to purchase drugs and taking too much food which ought to be taken in small amount as some of the factors associated treatment compliance of DM. The patients' knowledge relating to diabetes is fairly high but despite this, more needs to be done to combat the challenges of high cost of drugs, distance to health care facilities, inadequate financial assistance as well as limited social support faced by diabetic patients.

*Keywords: Diabetes mellitus; sedentary lifestyle; medical adherence; diabetes management; Nigeria.*

## 1. INTRODUCTION

Diabetes Mellitus (DM) has emerged as one of the most challenging public health problems in the 21st century. It is a serious, chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces [1].

Globally, an estimated 422 million adults were living with diabetes in 2014, compared to 108 million in 1980. The global prevalence (age-standardized) of diabetes has nearly doubled since 1980, rising from 4.7% to 8.5% in the adult population. The greatest burden of this condition is felt in low and middle-income countries, and these nations account for about 80% of all cases of diabetes [2]. In sub-Saharan Africa alone, there are about 12 million people suffering from this condition and there are projections that this number will reach 18 million by 2030, making the region the one with the fastest growing rates of diabetes mellitus in the world [3].

In Nigeria, studies have shown that several factors affect treatment compliance in type 2 diabetes specifically. Nwaokoro et al. [4] and Abdulazeeez et al. [5] opined that, there was significant association (P≤0.05) between patients' level of education, and compliance. In a recent study, it has been stated that the barriers to diabetes medication and dietary regimen include knowledge, and educational level of individual and this study has been supported by Ajibade et al. [6], Brides et al. [7] and Ataur et al. [8]. Many studies have shown that increasing patient knowledge regarding disease and its complications have significant benefits with regard to patient compliance to treatment and to decreasing complications associated with disease [9]. Numerous researches involving various diseases have evaluated the effect of the patient–physician relationship on patients' compliance, and have found it to be another strong factor in favour of patient compliance [10]. Diabetics are also prone to complications and increased mortality as a result of lack of proper awareness and education. Majority of the people with diabetes in developing countries are within the productive age range of 45–64 years and persons within this age range are expected to drive the economic engines of their countries in order to achieve the development goals [11]. Besides their reduced productivity, diabetes further imposes a high economic burden in terms of healthcare expenditure, lost productivity, and foregone economic growth [11]. The WHO report estimates that 90.2% of Nigerians live below the poverty level of $2 per day thus, accessing health care is a challenge for people living with diabetes in Nigeria [12].

Evidence indicates that optimal glucose control through strict compliance to medications and diets will minimize serious long-term complications [13]. Also, Awareness of experiences of diabetics and behavior-related factors will help influence compliance with recommended health actions. This study therefore determined the knowledge and factors associated with treatment compliance among Diabetes Mellitus Patients in Selected Hospitals in Ibadan, Oyo State, Nigeria.

## 2. METHODOLOGY

### 2.1 Study Design

A descriptive cross-sectional study design was used to assess knowledge and factors

associated with treatment compliance among diabetic patients in Ibadan, Nigeria.

## 2.2 Study Area

The study site for this study was University College Hospital, Ring road State Hospital and OluyoroOke Offa Catholic Hospital. The University College Hospital (UCH) was the first teaching hospital in Nigeria which was established in 1952. It is located at Oritamefa in Ibadan North Local Government Area. The diabetic clinic runs every Monday and the number of patients that visit the clinic ranges from 65 to 70 patients. Ring-Road State Hospital is one of the largest Oyo State owned hospitals founded in 1971. It is located in Ibadan South West Local Government Area. The diabetic clinic runs every Wednesday and the number of patients seen on every clinic day ranges from 30-50 patients. Oluyoro Catholic Hospital is the biggest private hospital in Ibadan founded in 1959. It is run by the Catholic Arch-dioceses of Ibadan and located in Ibadan North East Local Government. Oke-offa Catholic Hospital is among the private missionary hospitals with the largest population of diabetic patients in Ibadan. The diabetic clinic in the hospital runs five days in a week with 10-20 patients being attended to daily.

## 2.3 Study Population

The study population consisted of diabetic patients of the out-patient clinic of University College Hospital, Ring-Road State Hospital, and Oluyoro Oke –Offa Catholic Hospital in Ibadan. Registered patients of diverse socio-demographic characteristics that were already on diabetes management were the target population.

## 2.4 Sample Size Determination

The sample size was calculated using Lwanga and Lemeshow [14] formula for sample size determination in health studies:

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

Where n = sample size; z = the standard normal deviation which corresponds to the 95% confidence level (1.96); p = estimate of key proportion (41% or 0.41). This prevalence is derived from a similar study; q = 1-p (1- 0.41 = 0.59); d = degree of accuracy desired (0.05).

Consider

$$n = \frac{1.96^2 x\ 0.41 x (100-0.41)}{5^2}$$

$$= \frac{1.96^2 x\ 0.41 x\ 0.59}{25} = 372$$

n = 372

The calculated sample size was increased to 600 so as to make provision for non-response and generalization of findings.

## 2.5 Sampling Procedure

A multi-stage sampling technique involving – two stages was used in selecting respondents for the study. A review of records was conducted to document the population of the diabetic patients registered at the Outpatient departments in UCH, Ring road and Oluyoro hospitals. The results of the diagnosis showed that there were about 1,825, 135, and 155 diabetic patients receiving care at the UCH, Ring road and Oluyoro hospitals respectively. Systematic random sampling was also used in selecting respondents who chose to participate in the study using the list of males and females in the hospital register who were at the clinic on the day of interview as sampling frames.

## 2.6 Method for Data Collection

Quantitative method of data collection was used for data collection. An interviewer administered semi-structured questionnaire was used to obtain the necessary information from the respondents. The questionnaire was developed by the researchers based on literature review together with input from health promotion specialists in the Faculty of Public Health, University of Ibadan. The questionnaire was administered by the research assistants.

## 2.7 Instrument for Data Collection

The questionnaire developed for the study was divided into sections labeled A, B, and C. Section A contained questions on socio-demographic characteristics of respondents while Section B focused on knowledge of Diabetes Mellitus, and Section C was used to document information relating to factors influencing treatment

compliance of Diabetes Mellitus. The questionnaire comprises of open ended, close ended, and multiple response questions. The questionnaires were administered on diabetic clinic days and respondents consented to be interviewed after being duly informed about the study.

### 2.8 Data Collection Process

Four (male= 3, female = 1) trained research assistants who are Master of Public Health Students at the University of Ibadan, Nigeria, were recruited and assisted the researchers in collecting data for the study. The research team discussed the instrument used for the study to ensure that that all involved in data collection understood and were acquainted with the instrument. The instrument was revised based on the issues identified by the team. The actual data collection were conducted in the local language commonly spoken in the area (Yoruba).

### 2.9 Data Management and Analysis

The completed copies of the questionnaire were serially numbered for control and recall purposes. Data collected was checked for completeness and accuracy immediately on the field. Administered questionnaires were edited and coded by one of the investigators with the use of a coding guide. The data in each questionnaire was entered into a computer for analysis using the Statistical Package for Social Sciences (SPSS). The data was analyzed using both descriptive and inferential statistics, Chi-square, t-test, ANOVA and logistic regression. A 45-point knowledge scale was used to measure the respondents' knowledge. A correct knowledge attracted one point while a wrong knowledge was zero. A score of ≤ 20 points, 21-35 points and 36-45 points were considered poor, fair and good knowledge respectively.

### 2.10 Ethical Considerations

Approval for the study was sought from the University College Hospital Ethical Review Committee where a registration number NHREC/05/01/2008a and an assigned number UI/EC/10/0201 were issued for the study. Verbal information was provided to the respondents to make informed choices on whether to participate in the study or not. No identifier was written on the questionnaire and no incentives were provided to the respondents as a way of motivating them to participate in the study. All the participants were assured of confidentiality. Respondents agreed to participate in the study and signed a consent form.

### 2.11 Limitation of the Study

The study focused on knowledge and compliance to diabetes management which are personal and sensitive. Some respondents were not willing to give all the information required by the research team because of the fear of being penalized. Efforts were however made to reduce this problem by assuring them of the confidentiality of all information provided. It is assumed therefore, that all responses were made in honesty.

## 3. RESULTS

### 3.1 Respondents Demographic Characteristics

Mean age of respondents was 63.9 ± 8.6 years and 76.5% were in the age group 60-74 years. Some (36.2%) of the respondents had at least Primary Education, and 33.3% had no formal education. More than half (56.7%) of the respondents were Muslims and 88.7% were Yoruba's. Most (75.3%) of the respondents were currently married and (23.2%) are widowed (Table 1).

### 3.2 Knowledge of Diabetes Mellitus

The overall mean knowledge score of the respondents was 36.5± 5.8 and only 65.0% had good knowledge of DM. Majority (96.7%) of the respondents knew that too much sugar intake, alcohol consumption, sedentary lifestyle, pancreas disorder, and old age could lead to DM and identified doctors and nurses as service providers. The majority (93.3%) also knew that hypertension, leg ulcer (90.3%) and coma (88.3%) are some of the possible complications of DM and they identified tiredness (93.7%), frequent urination (93.5%) and excessive thirst (92.2%) as the signs and symptoms of DM. Although some respondents' correctly stated that diabetics should take special foods while a few said they can take all kinds of food but in small amount. All of the participants also reported regular hospital check-up, avoidance of too much carbohydrate and sugar consumption as some of the ways of controlling DM. Other methods of ascertaining the presence of DM reported by the

patient includes blood sugar and urine test (Table 2).

**Table 1. Socio-demographic characteristics of respondents**

| Characteristics | No | % |
|---|---|---|
| **Age*(in years)** | | |
| 35-44 | 10 | 1.7 |
| 45-54 | 73 | 12.2 |
| 55-64 | 229 | 38.2 |
| 65-74 | 230 | 38.3 |
| 75-84 | 56 | 9.3 |
| 85-94 | 2 | 0.3 |
| **Sex** | | |
| Male | 224 | 37.3 |
| Female | 376 | 62.7 |
| **Religion** | | |
| Christianity | 254 | 42.3 |
| Islam | 340 | 56.7 |
| Traditional religion | 6 | 1.0 |
| **Marital status** | | |
| Single | 2 | 0.3 |
| Married | 452 | 75.3 |
| Widowed | 139 | 23.2 |
| Divorced | 7 | 1.2 |
| **Highest level of education** | | |
| No formal education | 200 | 33.3 |
| Primary education | 217 | 36.3 |
| Secondary education | 124 | 20.7 |
| OND/NCE | 16 | 2.7 |
| HND/BSC | 37 | 6.2 |
| Postgraduate | 6 | 1.0 |
| **Ethnicity** | | |
| Hausa | 9 | 1.5 |
| Igbo | 58 | 9.7 |
| Yoruba | 528 | 88.7 |
| Niger Delta | 5 | 0.8 |
| **Occupation** | | |
| Civil servant | 64 | 10.7 |
| Trading | 415 | 69.2 |
| Retired | 79 | 13.2 |
| Housewife | 26 | 4.3 |
| Driving | 4 | 0.7 |
| Farming | 3 | 0.5 |
| Clergy | 7 | 1.2 |
| Carpentering | 1 | 0 .2 |
| Lawyer | 1 | 0 .2 |

** Mean age = 63.93 ± 8.62 years; Median age; Age range =35-92 years*

### 3.3 Factors Associated with Treatment Compliance

Respondents perceived factors associated with treatment compliance of DM were inability to take drugs due to lack of funds (23.7%), taking too much food which ought to be taken in small amount (42.9%) and failing to go to the clinic for check-up. Other influencing factors were forgetting to take recommended drugs (68.9%) and not participating in physical exercises (52.7%).

## 4. DISCUSSION

The respondents' mean age of 63.9 ± 8.6 years and the fact that most were between ages 60 to 74 years show that they were in their late adulthood and diabetes is more common among people in the late adulthood [15]. The age characteristic of the respondents is similar to what Nguma [15] and Kazeem et al. [16] noted in their studies. Majority of the respondents were females this could be because diabetes in women has been linked to an increased risk of a range of diseases including cardiovascular disease, certain cancers, depression and osteoporosis [17]. According to Espelt et al. [18] diabetes disproportionately affects groups with lower education. The educational status of respondents had some influence on the knowledge of compliance with treatment. This study showed that many of the respondents had a good knowledge of DM. The finding is therefore in line with the study by Ngwu [19] carried out among diabetic patients attending the University of Nigeria Teaching Hospital, Enugu. Majority of respondents in this study stated correctly some health related factors which can predispose people to diabetes mellitus; these include heredity, obesity, eating of too much sugar-containing food, lack of physical exercise and too much alcohol consumption.

Majority of the respondents were knowledgeable about the ways of preventing diabetic-related complications and these measures include complying with drug treatment, dietary regimen and adapting to simple health and self-care practices. This is also in accordance with a study conducted by Badruddia et al [20] at the University of Nigeria Teaching Hospital Enugu which showed that diabetic patients had good knowledge of preventive measures. In most diabetic clinics patients are usually provided with patient education in addition to the treatment given. This may have contributed to the good knowledge of the disease among participants in the study as well as those studied by Ngwu [19]. According to Simpson [21] health providers should aim at educating patients on a whole range of issues relating to diabetes mellitus within six to eight months of diagnosis because it

**Table 2. Knowledge of DM**

| Condition/factors | Responses | | |
|---|---|---|---|
| | Can lead to DM (%) | Cannot lead to DM (%) | Not sure/don't know (%) |
| Taking too much sugar** | 579 (96.5) | 3 (0.5) | 18 (3.0) |
| Too much alcohol consumption** | 557 (92.8) | 3 (0.5) | 40 (6.7) |
| Obesity ** | 526 (87.7) | 24 (4.0) | 50 (8.3) |
| Sedentary lifestyle** | 474 (79.0) | 29 (4.8) | 97 (16.2) |
| Heredity ** | 412(68.7) | 77(12.8) | 111(18.5) |
| Pancreas disorder** | 408(68.0) | 14(2.3) | 178(29.7) |
| Old age** | 317(52.8) | 137(22.8) | 146(24.4) |
| Malnutrition * | 136 (22.7) | 223 (37.1) | 241(40.2) |
| Supernatural forces* | 27 (4.5) | 343 (57.2) | 230 (38.3) |
| Curses invoked on someone * | 22 (3.7) | 339 (56.5) | 239 (39.8) |

***Can lead to DM, *Cannot lead to DM*

has been observed that knowledge about diabetes in sub-Saharan Africa is limited.

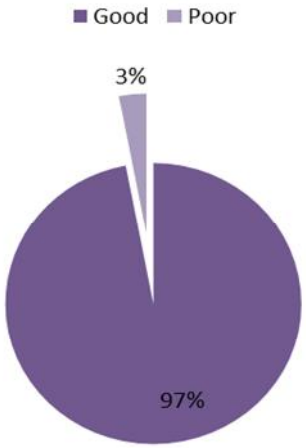


**Fig. 1. Respondents knowledge of DM**

Diet serves as the cornerstone in the treatment of diabetes mellitus. Most patients in this study found this area of self-management difficult and this led them to violating recommended dietary advice which have grave implications on their health. Compliance with drug therapy while failing to comply with recommended dietary guidelines is counterproductive and this practice worsens the health of diabetics as it adversely affects treatment outcome. Similarly, many patients often failed to see their dieticians. This is common in resource poor setting area such as Nigeria [22]. Some respondents also forgot to use their drugs due to one reason or the other. The previous studies have similarly revealed that forgetfulness is implicated in diabetic patient's failure to take their drugs [10,23-25]. Diabetes mellitus complication can be reduced by adequate education of the diabetic patients about foot care, re-emphasizing the same at subsequent visits to the clinic or in diabetes meetings, and ensuring that the diabetes care team include a comprehensive examination of the feet at least once a year for all persons with diabetes.

## 5. CONCLUSION

The patients' knowledge relating to diabetics is fairly high but despite the high level of knowledge, there were instances of non-compliance with drug and non-drug therapeutic interventions. The study also revealed some challenges faced by diabetic patients such as high cost of drugs, poly- pharmacy, distance to health care facilities, inadequate financial assistance and limited social support.

## 6. RECOMMENDATION

Given that diabetes mellitus pose a major health challenge both epidemiologically and economically in Africa, it is hereby recommended that effective control and prevention strategies based on sound educational programs should be defined and implemented. Also, the content and quality of diabetic education provided in the clinics should be made simple and comprehensive to patients varying levels of education. Affordable drugs, adequate financial assistance as well as proximity to health care facilities should be ensured so as to reduce the prevalence of mortality due to diabetes among individuals. Furthermore, training and empowering of health care providers to deliver adequate health messages to patients should be made certain and finally, education on chronic

non-communicable disease should be introduced in school curriculums.

## CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

## ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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