Research Article

KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS DIABETES MELLITUS AMONG APPARENTLY HEALTHY ADULTS IN A RURAL SETTING IN PORT HARCOURT, RIVERS STATE

1, * I.R.Daka, ²M.N.Amaewhule, ³C.Wekhe

[1]Department of Pharmacology, Rivers State University, Port Harcourt, Nigeria.
[2]Department of Internal Medicine, Rivers State University, Port Harcourt, Nigeria.
[3]Department of Radiology, Rivers State University, Port Harcourt, Nigeria.

ABSTRACT

Background: Diabetes mellitus (DM) is a metabolic disorder of chronic hyperglycemia characterized by disturbances to carbohydrate, protein, and fat metabolism resulting from absolute or relative insulin deficiency with dysfunction in organ systems. Diabetes Mellitus (DM) has been implicated as a risk factor for both cardiovascular and cerebrovascular diseases. The prevalence of Diabetes Mellitus has been on the increase in our environment. The objective of this study is to assess knowledge, attitude and practice of Diabetes Mellitus, which is important in the control of Diabetes Mellitus but little information is available from developing countries where new Diabetes Mellitus(DM) cases are increasingly diagnosed. **Method:** We examined KAP on Diabetes Mellitus amongst apparently healthy adult population. A cross-sectional study was conducted amongst 107 adults- 80 females and 27 males between the ages of 18 years and 80years for a period of 3 months using convenience sampling. KAP score about Diabetes mellitus was deduced from a set of KAP related questions/questionnaire. **Results:** This shows that 74.8% were females and 25.2% were males. About 46.7% of the respondents were self-employed followed by 17.8% unemployed and 6.5% were students. Overall , only 22.4% of the respondents had good knowledge of the case definition of diabetes Mellitus. 83.2% had positive attitude toward Diabetes Mellitus prevention. 46.7% of the respondents agree that diabetic complications can be prevented if blood glucose level is well controlled. **Conclusion:** The Knowledge of Diabetes Mellitus was quite poor in this study. This calls for more education of the populace and positive attitude and appropriate intervention towards addressing the relevant risk factors of Diabetes Mellitus thereby preventing future cardiovascular complications including metabolic syndrome in the general population.

Keywords: Mellitus, adult population, knowledge, attitude, practice.

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder of chronic hyperglycemia characterized by disturbances to carbohydrate, protein, and fat metabolism resulting from absolute or relative insulin deficiency with dysfunction in organ systems[1] . Diabetes mellitus (DM) is a chronic metabolic disease related to insulin and is one of the most significant worldwide health problem[2]. The defect in insulin action leads to the impaired suppression of glucose production by the liver and kidney and reduced glucose uptake and metabolism in insulin sensitive tissues i.e. muscle and adipose tissue. The relationship between impaired fasting glucose or impaired glucose tolerance (IGT) and insulin resistance is well supported by human, nonhuman primate and rodent studies[2]. To compensate for defects in insulin action, insulin secretion and/ or clearance must be modified to insulin euglycemia. Ultimately this compensatory mechanism fails, usually because of defects in insulin secretion resulting in progress from IFG and/ or IGT to diabetes mellitus.[2] Overall the risk for type 2 diabetes in patients with the metabolic syndrome is increased thrice to five- fold. In patients with the metabolic syndrome and type2 diabetes, euglycemic control may favorably modify fasting triglycerides and/ or HDL cholesterol. In the patients with IFG without a diagnosis of diabetes, a lifestyle intervention that includes weight reduction, dietary fat restriction and increased physical activity has been shown to reduce the incidence of type 2 Diabetes. Metformin has also been shown to reduce the incidence of diabetes, although the effect was less than that seen with lifestyle intervention[2].Insulin resistance is the primary path physiological mechanism for the metabolic syndrome. Both Met form in and Thiazolidinediones (TZDS)

enhance insulin action in the Liver and suppress endogenous glucose production. Thiazolidinediones (TZDS) but not Metformin also improve insulin-mediated glucose uptake in muscle and adipose tissues[2].This disease has shown a tremendous increase in prevalence with a demographic transition in its epidemiology in recent years. Populations previously unaffected or minimally affected by DM are now reporting soaring prevalence figures, which poses a real challenge to health financing by governments and nongovernmental organizations. prevalence and associated complications of Diabetes Mellitus are multi factorial like positive family history, presence of obesity, misdiagnosis,and inappropriate or insufficient therapy. In addition, Diabetes Mellitus is also associated and influenced by many genetic, hormonal, metabolic, neurologic and psychological factors. Diabetes Mellitus is also influenced by rapid urbanization, changes in socioeconomic conditions such as sedentary lifestyle, alcohol consumption[3], and increased stress and these factors are likely to increase in the future[3.] Besides lack of healthcare information and facilities, individual attitudes and other cultural behaviours affect healthcare seeking behaviour. The most important factors which play a role in the prevalence of Diabetes Mellitus are lack of knowledge, negative attitudes and malpractices which are also implicated in this case study. Therefore, KAP surveys have been widely used as public health research tools to evaluate health related KAP[4]. The latest prevalence figure published by the International Diabetes Federation (IDF) is 425 million persons living with DM worldwide, with nearly 50% of these undiagnosed[5] . The developing economies of Africa and Asia contribute a significant fraction of this figure. There is also a rising burden from the complications of DM alongside the ever-increasing prevalence of the disease[6]. We now see high rates of DM-related amputations, cerebrovascular disease, heart-related problems, and kidney disease in populations that were not previously known for these challenging health problems. In 2014, the WHO estimated that

*Corresponding Author: I.R.Daka,
1Department of Pharmacology, Rivers State University, Port Harcourt, Nigeria.

globally 422million people were affected by diabetes mellitus, the number is expected to rise to 592 million by 2032.In **Nigeria**, the current **prevalence** of DM among adults aged 20–69 years is reported to be 1.7%[7] . It is widely perceived that **prevalence** figures reported by the IDF grossly under-report the true burden of DM in **Nigeria**, given that they are derived through the extrapolation of data from other countries. The co-existence of risk factors for cardiovascular disease (CVD) such as high blood pressure, dyslipidemia, hyperglycemia, and obesity, now known as metabolic syndrome (MS), has been recognized by researchers for decades. The importance of recognizing this syndrome lies in the fact that it is a risk factor for type 2 diabetes mellitus, coronary artery disease, stroke, and cancers and all-cause mortality. Unlike other definitions, the International Diabetes Federation (IDF), EGIR, AACE and WHO definitions included compulsory criteria. Finally, factors such as family history of type 2 diabetes, CVD or hypertension, sedentary lifestyle, advancing age, polycystic ovarian syndrome, and ethnic groups with high risk of type 2 diabetes and CVD were considered in the AACE criteria[8]. It is important for everyone to know their blood sugar levels, because if Diabetes Mellitus is detected early, it will minimize the risk of heart attack, stroke and other end organ damage that could be caused by Diabetes Mellitus. As with other non-communicable diseases, self-care can facilitate early detection of Diabetes mellitus. Therefore, adherence to medication and healthy life styles are key to good blood glucose control and management. The emergence of DM and other cardiovascular diseases as public health problems in these countries is strongly related to the ageing of the population, urbanization and socioeconomic changes favouring sedentary lifestyles, obesity, alcohol consumption among others. The effective use of healthcare services to control these emerging chronic diseases is particularly needed in developing countries because resources are limited and must be shared with the concurrent burden of persistent communicable diseases. In this context DM presents a major area of intervention because it is a frequent condition that can be controlled through non-pharmacological lifestyle modifications and pharmacological treatment. The pharmacological treatment of DM has been found effective in reducing blood glucose and subsequently cardiovascular events. The lifestyle modification measures required to control DM include, complete abstinence from alcohol and smoking, increase in physical activity and reduction of weight as well as dietary control as regards reduction of intake cholesterol containing foods. Non-pharmacological measures (lifestyle modifications) have brought about significant reductions of 14% in mortality caused by stroke, 9% in mortality caused by heart disease and 7% in all cause mortality[9]. However, it is important to determine the actual burden of DM in Nigeria to facilitate appropriate health resource allocation, advocacy, and planning. Thus, in the work reported in the present paper, the Aim of this research is to facilitate the visibility of these communities to policy makers. The Objectives of this study include highlighting the paucity of data as regards KAP of Diabetes Mellitus in our rural areas and contributing to academic discourse on Diabetes Mellitus. The KAP survey remains a useful tool in our environment where the level of health information and literacy remains low and unquantified. Moreover,kknowledge and practice towards diabetes Mellitus plays a significant role in controlling elevated blood glucose levels and in preventing its long term complications and co morbidity. Therefore, the need to generate useful scientific data in our environment necessitated this KAP study.

METHODOLOGY

The study was a cross-sectional descriptive study, and the study population were adults from age 18-80years in Amadi-ama and Fimie communities in Port Harcourt City local government area of Rivers State, Nigeria. The Ethics committee of the Rivers State Ministry of Health gave approval for this study. A Screening questionnaire was formulated to collect information from the selected respondents with no monetary inducement . Covid19 prevention protocols were strictly adhered to. The population was made up of 107 adults –27 males and - 80 females. The participants were recruited via convenience sampling. Prior sensitization was initially carried out by town criers and church announcements. Thereafter, willing participants that met the inclusion criteria were told to gather in Church halls for the study. The questionnaire consists of 32 items and it was formulated to collect information from the selected respondents. The data was first checked, scrutinized, cleaned and entered into the computer after which the data was edited to rule out double or wrong entry. The data was analysed using the IBM SSPS 23.0 version. All participants in the study were asked for their consent before data was collected and all had complete rights to withdraw from the study at any time without any threat or disadvantage.The requirements for participation will include being 18years of age and above with no previous history of Diabetes. Exclusion criteria included, pregnant women, lactating women, children and obviously sick people.

Study duration: 3months

Sample size : Since participants were volunteers, only 107 people volunteered to be part of the study**.**

Method: Measurements were performed in a dedicated room, with optimum temperature and lightning while respecting privacy.Blood measurements- Blood sugar was assessed using a glucometer and strip, after the participant's thumb is pricked in order to get a drop of blood on the strip.

Operational Definitions

DM was diagnosed based on the 1999 WHO diagnostic criteria for DM or the ADA 2010 diagnostic criteria for DM. According to the 1999 WHO diagnostic criteria, the cut-off plasma glucose values for diagnosing DM are as follows:

- Fasting plasma glucose ≥ 7.0 mmol/L
- Random plasma glucose ≥ 11.1 mmol/L
- Plasma glucose 2-h post-glucose load (75 g) ≥ 11.1 mmol/L

The 2010 ADA diagnostic criteria[10] for DM states that a glycated hemoglobin (HbA1c) value of ≥ 6.5% is diagnostic of DM if the assay technique is based on high-performance liquid chromatography (HPLC). The HPLC assay technique potentially adjusts for hemoglobinopathies and provides information on hemoglobin variants.

Lifestyle modification: Some form of education on life style modification was also given to the participants accordingly.

RESULTS

Socio-demographic characteristics

A total of 107 respondents were interviewed, 80 (74.8%) were females and more than half 63 (58.9%) were married. Their age ranged between 23 and 80 years, but most 40 (37.4%) were between 41 and 50 years. The mean age was 49.4 years and the standard deviation was 13.7 years. Forty-three (40.2%) of the respondents had tertiary education, 50 (46.7%) were self-employed and 67 (62.6%) earned less than N100,000 as monthly income, which is considered low (table 1).

Table 1: Socio-demographic Characteristics

	Frequency (n=107)	Percent
Age		
21-30 years	9	8.4
31-40 years	19	17.8
41-50 years	40	37.4
51-60 years	15	14.0
Over 60 years	24	22.4
Mean Age (SD)	49.4 (13.7)	
Sex		
Male	27	25.2
Female	80	74.8
Marital Status		
Single	20	18.7
Married	63	58.9
Separated	3	2.8
Widowed	20	18.7
Divorced	1	0.9
Level of Education		
Primary	27	25.2
Secondary	32	29.9
Tertiary	43	40.2
Non-formal	5	4.7
Occupation		
Self-employed	50	46.7
Unemployed	19	17.8
Student	7	6.5
Others	24	22.4
Civil Servant	5	4.7
Retired	2	1.9
Monthly Income		
Low	67	62.6
Medium	20	18.7
High	20	18.7

SD=Standard deviation

Life style characteristics/Medical history

Only 11 (10.3%) of the respondents smoke tobacco and were all previous smokers, 28 (26.2%) currently drink alcohol, 84 (78.5) do not consume adequate amount of fruits and vegetables, 16 (15.0%) add extra salt to their meal and 51 (47.7%) do not engage in physical activities. Thirty-five (32.7%) of the respondents reported history of hypertension while 43 (40.2%) reported family history of hypertension, similarly, 14 (13.1%) reported history of diabetes while 19 (17.8%) reported family history of diabetes (table 2).

Table 2: Life style characteristics/medical history

	Frequency (n=107)	Percent
Tobacco Use		
Never Smoked	96	89.7
Previous Smoker	11	10.3

	Frequency	Percent
Alcohol Consumption		
Current Drinker	28	26.2
Previous Drinker	31	29.0
Never Drank	48	44.9
Fruit and Vegetable Consumption		
Adequate	23	21.5
Inadequate	84	78.5
Salt Consumption		
Add extra salt to meal	16	15.0
Do not add extra salt to meal	91	85.0
Engage in Physical Activity		
Yes	56	52.3
No	51	47.7
History of Hypertension		
Yes	35	32.7
No	72	67.3
Family History of Hypertension		
Yes	43	40.2
No	64	59.8
History of Diabetes		
Yes	14	13.1
No	93	86.9
Family History of Diabetes		
Yes	19	17.8
No	88	82.2

KNOWLEDGE ABOUT DIABETES

Knowledge of case definition of diabetes

Twenty (18.7%) of the respondents were aware that diabetes is a condition of insufficient insulin production, 22 (20.6%) were aware that diabetes is a condition of body not responding to insulin, 25 (23.4%) were aware that it is a condition of high blood sugar level, 32 (29.9%) were aware that it is an incurable disease, while 30 (28.0%) were aware that it affects any body part. Overall, only 24 (22.4%) of respondents had good knowledge of case definition of diabetes (table 3).

Table 3: Knowledge of case definition of diabetes

	Frequency (n=107)	Percent
Condition of insufficient insulin production		
Yes	20	18.7
No	19	17.8
Do not know	68	63.6
Condition of body not responding to insulin		
Yes	22	20.6
No	16	15
Do not know	69	64.5
Condition of high blood sugar level		
Yes	25	23.4
No	45	42.1

Do not know	37	34.6
Incurable disease		
Yes	32	29.9
No	33	30.8
Do not know	42	39.3
Disease that affects any part of the body		
Yes	30	28
No	33	30.8
Do not know	44	41.1
Overall knowledge of diabetes case definition		
Poor	83	77.6
Good	24	22.4

Knowledge of risk factors for diabetes

Thirty (28.0%) of respondents were aware that old age is a risk factor for diabetes, 34 (31.8%) were aware that genetics and family history of diabetes is a risk factor for diabetes, 34 (31.8%) were aware that being overweight or obese is a risk factor for diabetes, 34 (31.8%) were aware that pregnancy is a risk factor for diabetes, 29 (27.1%) were aware that sedentary life style is a risk factor for diabetes, and 29 (27.1%) were aware that not getting enough exercise is also a risk factors for diabetes. Overall, only 32 (29.9%) of respondents had good knowledge of risk factors for diabetes (table 4).

Table 4: Knowledge of risk factors for diabetes

	Frequency (n=107)	Percent
Old age		
Yes	30	28
No	31	29
Do not know	46	43
Genetics and family history		
Yes	34	31.8
No	43	40.2
Do not know	30	28
Being overweight or obese		
Yes	34	31.8
No	36	33.6
Do not know	37	34.6
Pregnancy		
Yes	34	31.8
No	25	23.4
Do not know	48	44.9
Sedentary life style		
Yes	29	27.1
No	34	31.8
Do not know	44	41.1
Not getting enough exercise		
Yes	29	27.1
No	40	37.4

Do not know	38	35.5
Overall knowledge of risk factors for diabetes		
Poor	75	70.1
Good	32	29.9

Knowledge of symptoms of diabetes

Thirty-three (30.8%) of respondents were aware that frequent urination is a symptom of diabetes, 28 (26.2%) were aware that excessive thirst is a symptom of diabetes, 32 (29.9%) were aware that excessive hunger is a symptom of diabetes, 34 (31.8%) were aware that weight loss is a symptom of diabetes, 33 (30.8%) were aware that blurred vision is symptom of diabetes, 33 (30.8%) were aware that slow wound healing is a symptom of diabetes, and 29 (27.1%) were aware that regular feeling of weakness of the body is also a symptom of diabetes. Overall, 28 (26.2%) had good knowledge of symptoms of diabetes (table 5).

Table 5: Knowledge of symptoms of diabetes

	Frequency (n=107)	Percent
Frequent urination		
Yes	33	30.8
No	60	56.1
Do not know	14	13.1
Excessive thirst		
Yes	28	26.2
No	42	39.3
Do not know	37	34.6
Excessive hunger		
Yes	32	29.9
No	32	29.9
Do not know	43	40.2
Weight loss		
Yes	34	31.8
No	46	43
Do not know	27	25.2
Blurred vision		
Yes	33	30.8
No	44	41.1
Do not know	30	28
Slow wound healing		
Yes	33	30.8
No	52	48.6
Do not know	22	20.6
Weakness		
Yes	29	27.1
No	55	51.4
Do not know	23	21.5
Overall knowledge of symptoms of diabetes		
Poor	79	73.8
Good	28	26.2

Knowledge of management of diabetes

Twenty (18.7%) of respondents were aware that insulin injection is useful in the management of diabetes, 27 (25.2%) were aware that tablets and capsules are useful in the management of diabetes, 30 (28.0%) were aware that regular exercise is useful in the management of diabetes, 31 (29.0%) were aware that diet therapy is useful in the management of diabetes, 26 (24.3) were aware that medical eye check is useful in the management of diabetes, 24 (22.4%) were aware that foot care is useful in the management of diabetes, and 25 (23.4%) were aware that weight reduction is useful in the management of diabetes. Overall, only 27 (25.2%) of respondents had good knowledge of management of diabetes (table 6).

Table 6: Knowledge of management of diabetes

	Frequency (n=107)	Percent
Insulin injection		
Yes	20	18.7
No	42	39.3
Do not know	45	42.1
Tablets and capsules		
Yes	27	25.2
No	45	42.1
Do not know	35	32.7
Regular exercise		
Yes	30	28
No	47	43.9
Do not know	30	28
Healthy diet		
Yes	31	29
No	52	48.6
Do not know	24	22.4
Medical eye check		
Yes	26	24.3
No	54	50.5
Do not know	27	25.2
Foot care		
Yes	24	22.4
No	50	46.7
Do not know	33	30.8
Weight reduction		
Yes	25	23.4
No	48	44.9
Do not know	34	31.8
Overall knowledge of management of diabetes		
Poor	80	74.8
Good	27	25.2

Knowledge of complications of diabetes

Twenty-eight (26.2%) of respondents were aware that eye problem/blindness is a complication of diabetes, 28 (26.2%) were aware that kidney failure is a complication of diabetes, another 28

(26.2%) were aware that heart failure is a complication of diabetes, 29 (27.1%) were aware that stroke is a complication of diabetes, and 26 (24.3%) were aware that amputation is a complication of diabetes. Overall, only 29 (27.1%) of respondents had good knowledge of complications of diabetes (table 7).

Table 7: Knowledge of complications of diabetes

	Frequency (n=107)	Percent
Eye problem and blindness		
Yes	28	26.2
No	50	46.7
Do not know	29	27.1
Kidney failure		
Yes	28	26.2
No	46	43
Do not know	33	30.8
Heart failure		
Yes	28	26.2
No	46	43
Do not know	33	30.8
Stroke		
Yes	29	27.1
No	46	43
Do not know	32	29.9
Amputation		
Yes	26	24.3
No	41	38.3
Do not know	40	37.4
Overall knowledge of complications of diabetes		
Poor	78	72.9
Good	29	27.1

Overall knowledge about diabetes

Overall, only 28 (26.2%) of respondents had good knowledge about diabetes; including knowledge of definition, risk factors, symptoms, management and complications (table 8).

Table 8: Overall knowledge about diabetes

	Frequency (n=107)	Percent
Knowledge of diabetes definition		
Poor	83	77.6
Good	24	22.4
Knowledge of risk factors of diabetes		
	75	70.1
	32	29.9
Knowledge of symptoms of diabetes		
Poor	79	73.8
Good	28	26.2
Poor		
Good	80	74.8

Good	27	25.2
Knowledge of complications of diabetes		
Poor	78	72.9
Good	29	27.1
Overall knowledge about diabetes		
Poor	79	73.8
Good	28	26.2

Attitude towards diabetes control

Most 38 (35.5%) of the respondents strongly agreed that they do not mind if others know they are diabetic, most 60 (56.1%) strongly agreed that they should be examined for diabetes, most 45 (42.1%) strongly agreed that their family member should be screened for diabetes, most 52 (48.6%) strongly agreed that support from family and friends is important in dealing with diabetes, most 58 (54.2%) strongly agree that consumption of too much sugar should be avoided, most 42 (39.3%) strongly agree that physical activity prevents risk of diabetes, most 50 (46.7%) agree that maintaining a healthy weight is important in managing diabetes, and most 50 (46.7%) agree that diabetes complications can be prevented if blood glucose level is well controlled. Overall, 89 (83.2%) of the respondents had positive attitude towards diabetes prevention (table 9).

Table 9: Attitude towards diabetes control

	Frequency (n=107)	Percent
Do not mind if others know I am diabetic		
Strongly agree	38	35.5
Agree	35	32.7
Neutral	14	13.1
Disagree	6	5.6
Strongly disagree	14	13.1
Mean (SD)	2.28 (1.35)	
Think you should be examined for diabetes		
Strongly agree	60	56.1
Agree	39	36.4
Neutral	2	1.9
Disagree	2	1.9
Strongly disagree	4	3.7
Mean (SD)	1.61 (0.92)	
Think your family members should be screened for diabetes		
Strongly agree	45	42.1
Agree	40	37.4
Neutral	15	14
Disagree	3	2.8
Strongly disagree	4	3.7
Mean (SD)	1.89 (1.00)	
Think support from family and friends is important in dealing with diabetes		
Strongly agree	52	48.6
Agree	39	36.4
Neutral	7	6.5
Disagree	4	3.7
Strongly disagree	5	4.7
Mean (SD)	1.79 (1.04)	
Think we should avoid consuming too much sugar		
Strongly agree	58	54.2
Agree	30	28
Neutral	9	8.4
Disagree	1	0.9
Strongly disagree	9	8.4
Mean (SD)	1.81 (1.18)	
Think physical activity prevents risk of diabetes		
Strongly agree	42	39.3
Agree	34	31.8
Neutral	24	22.4
Disagree	4	3.7
Strongly disagree	3	2.8
Mean (SD)	1.99 (1.01)	
Think maintaining a healthy weight is important in managing diabetes		
Strongly agree	32	29.9
Agree	50	46.7
Neutral	20	18.7
Disagree	2	1.9
Strongly disagree	3	2.8
Mean (SD)	2.01 (0.91)	
Diabetes complications can be prevented if blood glucose level is well controlled		
Strongly agree	37	34.6
Agree	50	46.7
Neutral	14	13.1
Disagree	2	1.9
Strongly disagree	4	3.7
Mean (SD)	1.93 (0.94)	
Overall attitude towards diabetes prevention		
Positive	89	83.2
Negative	18	16.8
Overall mean (SD)	1.91 (0.72)	

SD=Standard deviation

DISCUSSION

Diabetes Mellitus is a cause of mortality especially in our environment (developing countries). Prevention they say is better than cure but it is difficult because of poor knowledge, attitude and practices in our environment. This study reveals that 37.4%,22.4%,17.8%,14.0% and 8.4% of the respondents were 41-50years, >60years, 31-40years,51-

60years and 21-30years respectively.The study agrees that until recently,type2 diabetes was seen only in adults(8.5% of adults aged 18 years and above in 2014 had diabetes). In this study, we had more self-employed people(46.7%).The prevalence of Diabetes Mellitus increases in low and middle income country like Nigeria. Although, there were more married people (58.9%) in the case study, less than half of the total respondents (22.4%) had proper knowledge on case definition of DM. About (27.1%) had good knowledge of complications of Diabetes Mellitus .There is urgent need to conduct surveillance of Diabetes and its risk factors and develop norms and standards for diabetes diagnosis and care in the rural settings. The attitude of respondents towards tobacco and alcohol consumption is commendable as shown in this study, 96.1% never took tobacco while 51.4% never took alcohol.This is because Smoking increases the risk of Diabetes and Cardiovascular disease. Concerning weight reduction, the attitude of respondents are as follows, 27.1% never checked their weight, 7.5% frequently checked while 65.4% occasionally checked. Therefore, it is necessary that health care providers educate patients on the importance of life style modification in the prevention and control of DM and its complications.They should.achieve and maintain a healthy body weight with moderate intensity activity on most days and A study on the prevalence and risk factors for DM in Nigeria by Uloka A. et al found urban dwelling, physical inactivity, advancing age, and an unhealthy diet to be the leading risk factors for DM among Nigerians. This study agrees with these findings as 54.2% of our respondents strongly agree that consumption of too much sugar should be avoided, 39.3% strongly agree that physical activity prevents risk of diabetes, 46.7% agree that maintaining a healthy weight is important in managing diabetes, and 46.7% agree that diabetes complications can be prevented if blood glucose level is well controlled. Overall, 83.2% of the respondents had positive attitude towards diabetes prevention. It has been demonstrated that sub-Saharan Africa has one of the fastest annual rates of change in the number of urban dwellers in the world[11]. Studies have reported a two- to fivefold increase in the risk of diabetes and pre-diabetes in association with urban residence[12,13]. Urbanization is also associated with decreased physical activity energy expenditure (PAEE), an independent risk factor for metabolic syndrome[14]. The modest improvement in living standards witnessed over the past few years in Nigeria has resulted in the aging of its populace. Insulin resistance tends to worsen with advancing age[15-22]. This, coupled with decreased physical activity among the aged, increases the risk of type 2 diabetes. Among the risk factors for DM found in our study, unhealthy dietary habits was the most prevalent, which is not surprising considering the proliferation of fast food outlets in many cities across the country. An unhealthy diet consisting mainly of high-fat, energy-dense foods contributes to the development of obesity and Diabetes Mellitus(DM)[23-42].

CONCLUSION

Knowledge about diabetes mellitus is a prerequisite for individuals and communities to take action to control the disease. However, research to assess knowledge deficiencies and their relation to health-seeking behavior is lacking in most developing countries. Diabetes education, with consequent improvements in knowledge, attitudes and skills, will lead to better control of the disease, and is widely accepted to be an integral part of comprehensive diabetes care. the study revealed lapses in knowledge, attitude and behavioural practices as regards DM.Majority of respondents had poor knowledge and positive attitude towards DM but low level of practice. Appropriate health education is therefore necessary to improve this low level of practice in the populace.

ABBREVIATION USED AACE: American Association of Clinical Endocrinologists; EGIR: European Group for the study of Insulin resistance; IDF: International Diabetes Federation; NCEP-ATP III: The National Cholesterol Education Program - Adult Treatment Panel III; WHO: World health organization; MS: Metabolic syndrome; CVD: Cardiovascular disease; FPG: Fasting Plasma Glucose; HDL: High density lipoprotein; LDL: Low density lipoprotein; TG: Triglyceride; TC: Total cholesterol; BMI: Body mass index; WC: Waist circumference; HC: Hip circumference; WHR: Waist to hip ratio; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure.

Limitations:

The data was obtained from a convenience survey limiting the ability to follow up participants with undiagnosed high blood glucose levels.There was uunwillingness of participants to give proper information. Language was a barrier during data collection since some neither speak nor understand English. The small sample size in this study is a major limitation factor. The findings, therefore should be confirmed with a much larger sample size.

Conflict of Interest:

The authors declare no conflict of interest.

REFERENCES

1. WHO. Definition, diagnosis and classification of diabetes mellitus and its complications, part 1. Geneva: WHO; 1999.
2. Longo et al (2012).Harrison's Principles of internal Medicine 18th edition
3. Dore G, Nagpol T. Urbanization in Mongolia: pursuing sustainability in a unique environment. Environment: Science and Policy for Sustainable Development: 2006(6): 10-24.
4. Aubert L, Bovet P, Gervasoni JP, et al. Knowledge, attitudes and practices on hypertension in a country in epidemiological transition. Hypertension1998: 31(5): 1136-1145. t
5. International Diabetes Federation. Diabetes atlas. 8th ed. Brussels: International Diabetes Federation; 2017.
6. Uloko AE, Ofoegbu EN, Chinenye S, Fasanmade OA, Fasanmade AA, Ogbera AO, et al. Profile of Nigerians with diabetes mellitus—Diabcare Nigeria study group (2008): results of a multicenter study. Indian J Endocrinol Metab. 2012;16(4):558–564. (ERRATUM IN: Indian J Endocrinol Metab. 2012;16(6):981). [PMC free article] [PubMed]
7. Gezawa ID, Puepet FH, Mubi BM, Uloko AE, Bakki B, Talle MA, et al. Socio-demographic and anthropometric risk factors for type 2 diabetes in Maiduguri, North-Eastern Nigeria. Sahel Med J. 2015;18(5):1–7.
8. kylin E. "Studien ueber das Hypertonie-Hyperglyca "mie-Hyperurika" miesyndrom," Zentralblatt fuer Innere Medizin, 1923;44:105–127.
9. Whelton PK, He J, Appel LI, Cutler JA, Hawas S, Kotchen TA. Primary prevention of hypertension: Clinical and public health advisory from the National high blood pressure Education program. JAMA.2012;288: 1882-1888.
10. American Diabetes Association Diagnosis and classification of diabetes: diabetes care. Diabetes Care. 2010;33 (Suppl 1):S62–S69. doi: 10.2337/dc10-S062. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
11. Hove M, Ngwerume ET, Muchemwa C. The urban crises in sub-Saharan Africa: a threat to human security and sustainable development. Stability. 2013;2(1):Art.7. 10.5334/sta.ap. [CrossRef]

12. Saquib N, Saquib J, Ahmed T, Khanam MA, Cullen MP. Cardiovascular diseases and type 2 diabetes in Bangladesh: a systematic review and meta-analysis of studies between 1995 and 2010. BMC Public Health. 2012;12:434. [PMC free article] [PubMed]

13. Chatterjee R, Narayan KM, Lipscomb J, Phillips LSS. Screening adults for pre-diabetes and diabetes may be cost-saving. Diabetes Care. 2010;33(7):1484–1490. doi: 10.2337/dc10-0054. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

14. Assah FK, Ekelund U, Brage S, Mbanya JC, Wareham NJ. Urbanization, physical activity, and metabolic health in sub Saharan Africa. Diabetes Care. 2011;34(2):491–6. [PMC free article] [PubMed]

15. Gerch JE. Contributions of insulin-resistance and insulin-secretory defects to the pathogenesis of type 2 diabetes mellitus. Mayo Clin Proc. 2003;78(4):447–456. doi: 10.4065/78.4.447. [PubMed] [CrossRef] [Google Scholar]

16. Kyari F, Tafida A, Sivasubramaniam S, Murthy GV, Peto T, Nigeria National Blindness and Visual Impairment Study Group. Prevalence and risk factors for diabetes and diabetic retinopathy: results from the Nigeria National Blindness and Visual Impairment survey. BMC Public Health. 2014;18(14):1299. 10.1186/1471-2458-14-1299. [PMC free article] [PubMed]

17. Omorogiuwa A, Oaikhena GA, Okioya P, Akubueze D, Owobu E. Diabetes mellitus: prevalence amongst university staff in Southern Nigeria and attitude towards routine glycemic/glucosuric checkup. Int J Biomed Health Sci. 2010;6(1):25–29.

18. Ekpenyong CE, Akpan UP, Ibu JO, Nyebuk DE. Gender and age specific prevalence and associated risk factors of type 2 diabetes mellitus in Uyo Metropolis, South Eastern Nigeria. Diabetologia Croatica 2012;41:17–23.

19. Oyegbade OO, Abioye-kuti EA, Kolawole BA, Ezeoma IT, Bello IS. Screening for diabetes mellitus in a Nigerian family practice population. SA Fam Prac. 2007;49(8):15. [Google Scholar]

20. Opeodu OI, Adeyemi BF. Undiagnosed diabetes mellitus: a survey of dental outpatients in a tertiary hospital. Afr J Med Med Sci. 2013;42(1):39–45. [PubMed] [Google Scholar]

21. Gabriel UP, Amadi AN, Ebirim CI. Type 2 diabetes mellitus in ambulatory adult Nigerians: prevalence and associated family biosocial factors in a primary care in Eastern Nigeria: a cross-sectional study. BJMMR. 2015;9(3):1–12.

22. Dahiru T, Jibo A, Hassan AA, Mande AT. Prevalence of diabetes in a semi-urban community in Northern Nigeria. Niger J Med. 2008;17(4):414–6. [PubMed]

23. Anzaku AS, Musa J. Prevalence and associated risk factors for gestational diabetes in Jos, North-central, Nigeria. Arch Gynecol Obstet. 2013:287(5):859–63. [PubMed]

24. Adeniyi AF, Uloko AE, Musa NH. Prevalence of non-invasive risk factors of type 2 diabetes among higher education teachers in North-Western Nigeria. Sudan J Med Sci. 2010;5(2):137–143. [GoogleScholar]

25. Etukumana EA, FH Puepet FH, Obadofin MO. Prevalence of diabetes mellitus among adults in rural north central Nigeria. Highl Med Res J. 2013;13(2):98–100. ISSN: 1596-2407.

26. Nwafor A, Owhoji A. Prevalence of diabetes mellitus among Nigerians in Port Harcourt correlates with socio-economic status. J Appl Sci Environ Manag. 2001;5(1):75–7.

27. Sabir A, Ohwovoriole A, Isezuo S, Fasanmade O, Abubakar S, Iwuala S. Type 2 diabetes mellitus and its risk factors among the rural Fulanis of northern Nigeria. Ann Afr Med. 2013;12(4):21722. [PubMed]

28. Chukwunonso ECC, Nnamdi KU. Diabetes and pre-diabetes in adult Nigerians: prevalence, and correlations of blood glucose concentrations with measures of obesity. Afr J Biochem Res. 2015;9(3):55–60. doi: 10.5897/AJBR2015.0817. [CrossRef] [Google Scholar]

29. Bakari AG, Onyemelukwe GC, Sani BG, Aliyu TM, Hassan SS. Prevalence of diabetes in suburban northern Nigeria: results of a public health screening survey. Available from: http://www.abu.edu.ng/publications/2010-09-25043819_4407.pdf

30. Isara AR and Okundia PO. The burden of hypertension and diabetes mellitus in rural communities in southern Nigeria. Pan Afr Med J. 2015;20:103. 10.11604/pamj.2015.20.103.5619. [PMC free article] [PubMed]

31. Enang OE, Otu AA, Essien OE, Okpara H, Fasanmade OA, et al. Prevalence of dysglycemia in Calabar: a cross-sectional observational study among residents of Calabar, Nigeria. BMJ Open Diabetes Res Care. 2014;2(1):e000032. doi: 10.1136/bmjdrc-2014-000032. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

32. Ramalan MA. Glycated haemoglobin in the screening and diagnosis for type 2 diabetes mellitus in Nigeria. FMCP dissertation part 2. Lagos: National Postgraduate Medical College of Nigeria; 2016. In process.

33. Olamoyegun MA, Iwuala SO, Olamoyegun KD. Insulin-related knowledge of healthcare professionals in a Nigerian tertiary health institution. Int J Diabetes Dev Ctries. 2015;35:84. doi: 10.1007/s13410-014-0240-9. [CrossRef] [Google Scholar]

34. Albert K,G et al. zHarmonizing the metabolic syndrome. A joint interim statement of the International Diabetes Federation. Taskforce on Epidemiology and Prevention. National Heart, Lung and Blood Institute' American Heart Association. World Heart Federation. International Atherosclerosis Society. And International Association for the Study of Obesity.Circulation120-1640.2009

35. Cornier M.A et al. The Metabolic syndrome. Endocr Rev29-777,2008

36. Eckel RH et al, The Metabolic Syndrome ,Lancet 365-1415,2005

37. Ford E.S Prevalence of metabolic defined by the International Diabetes Federation among adults in the US Diabetes Care 28,2745,2005

38. Grundy SM et al. Diagnosis and management of the metabolic syndrome.An American Heart association/National Heart,lung and Blood Institute. Scientific statement.Circulation112:2735,2005

39. Metabolic Syndrome:Connecting and reconciling cardiovascular and diabetic worlds J Am collCadiol 47:1093,2006

40. Nyenwe EA, Odia OJ, Ihekwaba AE, Ojule A, Babatunde S. Type 2 diabetes in adult Nigerians: a study of its prevalence and risk factors in Port Harcourt, Nigeria. Diabetes Res Clin Pract. 2003;62(3):177–185. doi: 10.1016/j.diabres.2003.07.002. [PubMed] [CrossRef] [Google Scholar]

41. Puepet FH, Ohwovoriole AE. Prevalence of risk factors for diabetes mellitus in a non-diabetic population in Jos, Nigeria. Niger J Med. 2008;17(1):71–74. doi: 10.4314/njm.v17i1.37360. [PubMed] [CrossRef] [Google Scholar]

42. Sabir AA, Isezuo SA, Ohwovoriole AE. Dysglycaemia and its risk factors in an urban Fulani population of northern Nigeria. West Afr J Med. 2011;30(5):325–330. [PubMed] [Google Scholar]

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