NUTRITIONAL STATUSAND PREVALENCE OF TYPE II DIABETES MELLITUS AMONG ELDERLY RESIDING IN ILARO, OGUN STATE, NIGERIA

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ABSTRACT

Diabetes mellitus is a public health problem and a global health threat which scientific evidence has indicated individual's nutritional status as one of its contributing factors. Critical assessment of this contributing factor will help in reducing its prevalence. The study assessed the nutritional status and prevalence of diabetes among the elderly residing in Ilaro. It was descriptive and cross-sectional in design involving two hundred and fifty (250) elderly people. A semi-structured and interviewer administered questionnaire was used to obtained data on socio-demographic characteristics. Anthropometric measurements {weight (kg) and height (m)} were taken, body mass index {BMI (kg/m^2)} was calculated and nutritional status indices were classified using World Health Organization (WHO) standards. Blood glucose test was carried out using Glucometer. Data were analyzed using SPSS. V.20.0. Majority of the respondents were females (59.6%), between 60-64years (42.4%), practice Christian religion (64.8%) and belong to Yoruba ethnic group (94.8%). Anthropometric measurement shows that 56.8% of the respondents have normal BMI while 22.8%, 10.0% and 10.4% were overweight, obese and underweight respectively. Random blood glucose test reveals that 8.0% were diabetic, 3.0% were pre-diabetic while 16.0% and 73.0% have low and normal blood glucose levels respectively. Significant association $(p< 0.05)$ was observed between nutritional status and some of the socio-demographic characteristics of the respondents. Also, blood glucose range was found to be significantly associated $(p< 0.05)$ with the nutritional status of the respondents. In conclusion high prevalence of diabetes mellitus as well as overweight which co-exist with underweight was observed among the elderly sampled, thus nutrition intervention targeted at the care of the elderly is recommended.

Keywords: Diabetes mellitus, Nutritional status, Prevalence, Elderly.

1.0   INTRODUCTION

The United Nations defined elderly as people between age 60 years and above (WHO, 2003). This group of people are usually referred to as vulnerable group because they have been found to be vulnerable to health related predicaments associated with factors like aging, poor socio-economic status, poor eating pattern, under nutrition, over-nutrition, chronic illness and diseases (WFP, 2009). The aged appears to be more vulnerable than the younger age groups due to problems relating to ignorance on appropriate food choices, loneliness, social isolation which often times lead to depression, apathy, lack of appetite, physical disabilities, cardiovascular problems and poverty among others.

Malnutrition among this group of people is a great hazard and this has been attributed to their vulnerability. Though the etiology of type 2 diabetes mellitus complications is poorly understood, but nutritional status and dietary pattern have been identified as one of the major lifestyle factors that may play an important role in preventing and managing this condition (ADA, 2002, Mirmiran *et al.*, 2014).

According to America Diabetes Association (ADA, 2008), diabetes is a disease caused by diminished insulin excretion or diminished insulin action, or both. It is a metabolic disease characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both due to destruction and loss of the β-cells of the pancreas or abnormalities arising from resistance to insulin (ADA, 2014). Diabetes mellitus is a non-communicable disease associated with long term complications to the brain, kidney, and the heart. Its major symptoms include polydipsia, polyphagia polyuria, blurred vision, weight loss, neuropathy, retinopathy, etc. Life threatening consequences of uncontrolled diabetes mellitus include diabetes-ketoacidosis, lactic acidosis and hyper-osmolar non-ketotic state (Diabetes Care, 2006). Diabetes mellitus is recognized as an important cause of premature death and disability; it is one of four priority non-communicable diseases targeted by world leaders (WHO, 2014). The burden of diabetes mellitus is higher among the older population and associated with more clinical complications than in younger people.

Globally, the prevalence of diabetes mellitus (DM) is steadily increasing most especially in the world's low and middle-income countries (WHO, 2016). World Health Organization estimates that, 422 million adults were living with DM in 2014, and projects that DM will be the seventh leading cause of death in 2030 (WHO, 2016) due to population growth, ageing, unhealthy diets, obesity and sedentary lifestyles. In Africa, over 5 million people suffer from the disease and the number is expected to skyrocket to 15 million by 2025 (IDF, 2006), this will undoubtedly pose serious health and economic problems on the African community. In Nigeria, Akinkugbe *et al.* (2007) found that the National prevalence of diabetes was 2.2%, with a male: female ratio of 1:1, and a significant increase in prevalence with age. This was found to increase to 5.0% in 2013 by International Diabetes Federation (IDF, 2013). In south east Nigerian, Chris *et al.* (2012) reported that the overall prevalence of diabetes was 10.51%. Olatunbosun et al. (1996) reported a prevalence of 0.8% of diabetes mellitus and 2.2% of Impaired Glucose Intolerance in Ibadan with a slight increase to 2.8% as reported by Owoaje *et al.* (2007) who reported a prevalence of 2.8% in an adult population in Ibadan. In Port Harcourt, the prevalence was 6.8%, with the male-female ratio of 1.4:1 (Ebenezer *et al.*, 2003).

As a result of poor economic situation of Nigeria, poverty, as well as lack of adequate access to health care, many cases of diabetes are undiagnosed (Rasaki *et al.*, 2017) and give credence to rule of Halves (Hart, 1992) which states that: half of the people living with diabetes have been diagnosed, half of those diagnosed received professional care and of those receiving care, only half achieve their treatment goals. Of those achieving treatment targets, half are free from diabetes complications.

Ilaro in Yewa South Local Government area of Ogun state has a dietary and a socio-cultural identity. They are known to consume a lot of carbohydrate (cassava and maize based food; fufu, lafun, eba, eko, kokoro etc.) diet which predisposed them and make them prone to having diabetes mellitus. There is no record of prevalence of DM and pre-diabetes in the area, even though, the disease is common among the people which necessitate the need for this study. This study was designed to access the dietary pattern and prevalence of diabetes and pre-diabetes in Ilaro community, Yewa South Local Government, Ogun state.

2.0   MATERIALS AND METHOD

The study area

The study was conducted in Ilaro town; the capital of Yewa South Local Government, Ogun state, Nigeria. Ilaro town is about 50 km from Abeokuta, the Ogun State capital and about 100 km from Ikeja, the capital city of Lagos State. Ilaro is situated on the rich cocoa belt of South Western region of Nigeria and endowed naturally with an expanse of land measuring about 168,750 hectares and a population of 168,850 according to the 2006 provisional census. The inhabitants of Yewa South are mainly Yoruba speaking with various dialects like Yewa, Anago, and Egun, while the three main religions are Christianity, Islam and Traditional.

Study design

The study was cross-sectional and descriptive in nature. It involves 250 apparently healthy, free- living and non-institutionalized elderly residing in the selected communities in Ilaro.

Sample technique

Multi-stage sampling procedure was used in selecting the respondents, which involves purposive selection. Ilaro is made up of three wards, which are Ilaro I, Ilaro II and Ilaro III; each of the wards is made up of more than ten communities. Five communities were randomly selected from each ward. Household listing was done for all the household with at least one elderly male or female and the respondents were selected systematically using a regular interval. Simple balloting was used in selecting respondents from the household with more than one elderly.

Ethical clearance and consent

Letter of introduction was obtained from the Department of Nutrition and Dietetics, Federal Polytechnic of Ilaro, Ogun State and addressed to the Nutritionist of Yewa South Local Government. An ethical approval was obtained from the Medical Officer of Health (MOH) of the Local Government. Subjects were duly informed and written consent was also obtained from the participants before taking part in the study. Caregiver, children or relatives of the illiterate subjects were also informed before data collection.

Data collection

A semi-structured and interviewer-administered questionnaire was used in assessing the socio-economic and demographic characteristics of the respondents. The nutritional status was assessed using anthropometric measurement method (height and weight). The weight was measured while standing with both arms by the side and with only light clothing. The pointer of the weighing scale was adjusted to zero before each weighing and recorded to the nearest kilogram. In measuring the height of the respondents, a locally constructed but standardized height meter was placed behind the heels of each subject and the height was measured while standing with the head fixed against the height meter and the level just above the hair marked and recorded to the nearest meter. Using their weight and height, body mass index (BMI) was calculated and nutritional status indices were classified using World Health Organization (WHO) standards.

Blood glucose level measurement
The Random Blood Glucose (RBG) level of the respondents was determined using a glucometer and the values obtained were classified as Normal (79- 1509mg/dL, i.e. 4.4-8.9mmol/l), Pre-diabetes (160-200mg/dL i.e. 8.9 mmol/L - 11.1mmol/L), Hypoglycemia and Diabetes $\geq$200mg/dl) (ADA. 2014.).

3.0 DATA ANALYSIS
Data obtained from the study was subjected to both descriptive and inferential statistics. Descriptive statistics like; Percentage, Frequency and Standard deviation was used while inferential statistics; chi-square test and analysis of variance (ANOVA) and Pearson correlation was also used to test for significant relationship and differences between the variables respectively. Data were analyzed using statistical packages for social sciences (SPSS version 20.0 software computer program).

4.0 RESULTS AND DISCUSSIONS

4.1 Results

Table 1 shows the socio-demographic characteristics of the respondents. More than half of the respondents (59.6%) were male while 40.4% were female. The age assessment determined chronologically reveals that majority of the respondents (42.4%) were between the age brackets of 60-64, 20.8% were between 65-69 years, 17.2% were between 70-74 years, 4.4% were between 75-79 years, 8.0% were between 80-84 years, 2.0% were between 85- 86 and 5.2% were above 90 years. Majority of the subjects (94.8%) were Yoruba while others were Igbo (2.0%), Hausa (1.2%), French (0.4%) and Egun (1.6%). More than half of the respondents practice Christian religion (64.8%), while 33.6% practices Islamic religion and 1.6% practices traditional religion. About 53% of the respondents were still living with their spouse, while almost half of the respondents were single, either as a result of divorce (8.0%) or death of spouse, widow (31.2), widower (7.2%) and few (0.8%) of the respondents were never married before. Also, almost half (45.2%) of the respondents were not educated, i.e. have no formal education and engage in personal business and earn less than ₦10,000 monthly.

Table 1: Socio-demographic characteristics of the respondents

Variable	Frequency	Percentage
Sex		
Male	101	40.4
Female	149	59.6
Age		
60-64	106	42.4
65-69	52	20.8
70-74	43	17.2
75-79	11	4.4
80-84	20	8.0
85-89	5	2.0
90 and above	13	5.2
Ethnic group		
Yoruba	237	94.8

Igbo	5	2.0
Hausa	3	1.2
French	1	0.4
Egun	4	1.6
Religion		
Christianity	162	64.8
Islam	84	33.6
Traditional	4	1.6
Marital status		
Single	2	0.8
Married	132	52.8
Divorced	20	8.0
Widow	78	31.2
Widower	18	7.2
Educational level		
No education	113	45.2
Primary education	74	29.6
Secondary education	29	11.6
NCE/OND	20	8.0
HND/B.Sc.	13	5.2
Standard six	1	0.4
Present occupation		
Retired	48	19.2
Self employed	26	10.4
Farming	29	11.6
Civil servant	8	3.2
Petty trading	54	21.6
Employee of private organization	15	6.0
Personal business	56	22.4
Can no longer work for money	13	5.2
Prophet	1	0.4
Previous occupation		
Self employed	30	12.0
Farming	31	12.4
Civil servant	44	17.6
Petty trading	52	20.8
Employee of private organization	21	8.4
Personal business	72	28.8
Estimated monthly income		
Less than 10,000	125	50.0
11,000-30,000	79	31.6
31,000-50,000	19	7.6
51,000-70,000	14	5.6
71,000 and above	13	5.2

In assessing the nutritional status of the selected elderly, anthropometric (height and weight) measurement was done. Male respondents were found to be significantly taller ($p<0.05$) than the female respondents with the mean height 1.68±0.06 and 1.59±0.06 respectively. The mean weight of the male respondents (64.26±10.60) was also found to be greater than that of the female (62.91±14.67) respondents but the differences was not significant ($p>0.05$). On the contrary, the mean Body Mass Index{BMI (kg/m^2)}of the female respondents was found to higher than that of male respondents but the differences were not significant ($p>0.05$) as presented in table 2.

Table 2: Anthropometry measurement of the respondent

Sex	Height(m)	Weight(kg)	BMI(kg/m^2)
Male	1.68±0.06	64.26±10.60	22.96±3.56
Female	1.59±0.06	62.91±14.67	25.97±14.40

F	125.57	0.633	4.25
p-value	0.00*	0.43	0.40

Statistical significant at p ≤ 0.05

Furthermore, figure 1 shows the nutritional status of the respondents. Majority of the respondents (56.8%) i.e. 27.2% male and 29.6% female were normal, 10.6% were underweight (4.40% male and 6.0% female), 22.8% were overweight (7.60% male and 15.2% female) and 10% (1.2% male and 8.80 female) were obese. Prevalence of over nutrition and under-nutrition was more pronounced among the female respondents.
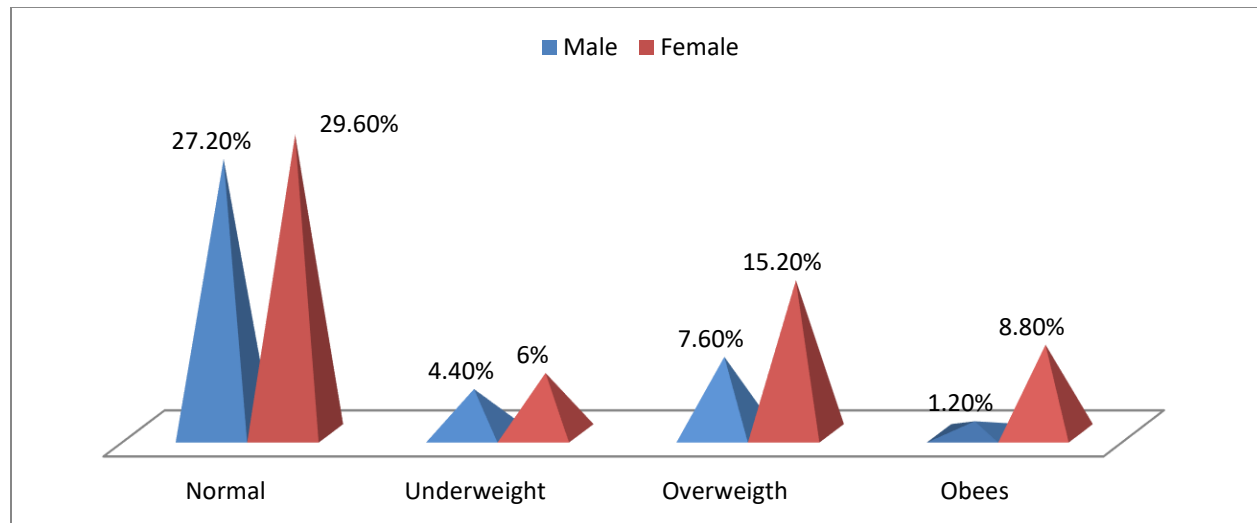
Figure 1: nutritional status of the respondents

As presented in table 3, significant association (p < 0.05) was observed between the nutritional status of the respondents and the socio-demographic and economic characteristics like; gender, present occupations and previous occupations. No significant association (p > 0.05) was observed between the nutritional status and other socio-demographic and economic characteristics of the respondents

The present study also sought to assess the prevalence of type II diabetes mellitus among the selected elderly. The Fasting Blood Glucose (FBG) level of the respondents was determined and the values obtained were classified as Normal (79- 1509mg/dL, i.e. 4.4-8.9mmol/l), Pre-diabetes (160-200mg/dL i.e. 8.9 mmol/L - 11.1mmol/L), Hypoglycemia and Diabetes ≥200mg/dl) (ADA, 2014). Less than one quarter (16%) of the respondents have low blood glucose level (hypoglycemia), 3% were pre-diabetic, majority (73%) have normal blood glucose level and 8% of the respondents were diabetic

Table 3: Socio-demographic characteristics and nutritional status

Variable	Nutritional status				χ^2	P-value
	Normal	**Underweight**	**Overweight**	**Obese**		
Sex						
Male	68(27.2)	11(4.4)	19(7.6)	3(1.2)	12.902	0.005*
Female	74(29.6)	15(6.0)	38(15.2)	22(8.8)		
Age						
60-64	56(22.4)	10(4.0)	25(10.0)	15(6.0)	27.95	0.063
65-69	35(14.0)	1(0.4)	13(5.2)	3(1.2)		
70-74	25(10.0)	2(0.8)	12(4.8)	4(1.6)		
75-79	5(2.0)	3(1.2)	2(0.8)	1(0.4)		
80-84	11(4.4)	4(1.6)	4(1.6)	1(0.4)		
85-89	3(1.2)	2(0.8)	0(0.0)	0(0.0)		

90 and above	7(2.8)	4(1.6)	1(0.4)	1(0.4)		
Ethnic group						
Yoruba	132(52.8)	26(10.4)	54(21.6)	25(10.0)	8.945	0.708
Igbo	4(1.6)	0(0.0)	1(0.4)	0(0.0)		
Hausa	1(0.4)	0(0.0)	2(0.8)	0(0.0)		
French	1(0.4)	0(0.0)	0(0.0)	0(0.0)		
Egun	4(1.6)	0(0.0)	0(0.0)	0(0.0)		
Religion						
Christianity	98(39.2)	17(6.8)	32(12.8)	15(6.0)	8.649	0.194
Islam	43(17.2)	9(3.6)	22(8.8)	10(4.0)		
Traditional	1(0.4)	0(0.0)	3(1.2)	0(0.0)		
Family structure						
Monogamy	82(32.8)	11(4.4)	23(9.2)	13(5.2)	5.937	0.115
Polygamy	60(24.0)	15(6.0)	34(13.6)	12(4.8)		
Marital status						
Single	1(0.4)	0(0.0)	1(0.4)	0(0.0)	5.754	0.928
Married	70(28.0)	15(6.0)	34(13.6)	13(5.2)		
Divorce	13(5.2)	1(0.4)	3(1.2)	39(1.2)		
Widow	47(18.8)	7(2.8)	16(6.4)	8(3.2)		
Widower	11(4.4)	3(1.2)	3(1.2)	1(0.4)		
Educational level						
No education	64(25.6)	15(6.0)	25(10.0)	9(3.6)	15.050	0.448
Primary education	43(17.2)	5(2.0)	16(6.4)	10(4.0)		
Secondary education	14(5.6)	3(1.2)	9(3.6)	3(1.2)		
NCE/OND	12(4.8)	2(0.8)	4(1.6)	2(0.8)		
HND/B.Sc.	9(3.6)	0(0.0)	3(1.2)	1(0.4)		
Standard six	0(0.0)	1(0.4)	0(0.0)	0(0.0)		
Present occupation						
Retired	27(10.8)	10(4.0)	8(3.2)	3(1.2)	41.728	0.014*
Self-employed	15(6.0)	3(1.2)	8(3.2)	0(0.0)		
Farming	22(8.8)	1(0.4)	3(1.2)	3(1.2)		
Civil servant	6(2.4)	0(0.0)	2(0.8)	0(0.0)		
Petty trading	22(8.8)	5(2.0)	17(6.8)	`10(4.0)		
Employee of private organization	6(2.4)	0(0.0)	6(2.4)	3(1.2)		
Personal business	37(14.8)	3(1.2)	12(4.8)	4(1.6)		
Can no longer work for money	6(2.4)	4(1.6)	1(0.4)	2(0.8)		
Prophet	1(0.4)	0(0.0)	0(0.0)	0(0.0)		
Previous occupation						
Self-employed	14(5.6)	2(0.8)	14(5.6)	0(0.0)	29.076	0.016*
Farming	23(9.2)	3(1.2)	3(1.2)	2(0.8)		
Civil servant	24(9.6)	7(2.8)	8(3.2)	5(2.0)		
Petty trading	22(8.8)	5(2.0)	14(5.6)	11(4.4)		

Statistically significant (p ≤ 0.05), Figures in parenthesis denote percentages.

Table 4 shows the association between the nutritional status and the blood glucose level of the respondents. Significant association (p< 0.05) was observed between the nutritional status of the respondents and their blood glucose level. Highest (14%) prevalence of diabetes was found among the overweight respondents followed by obese respondents (12%)
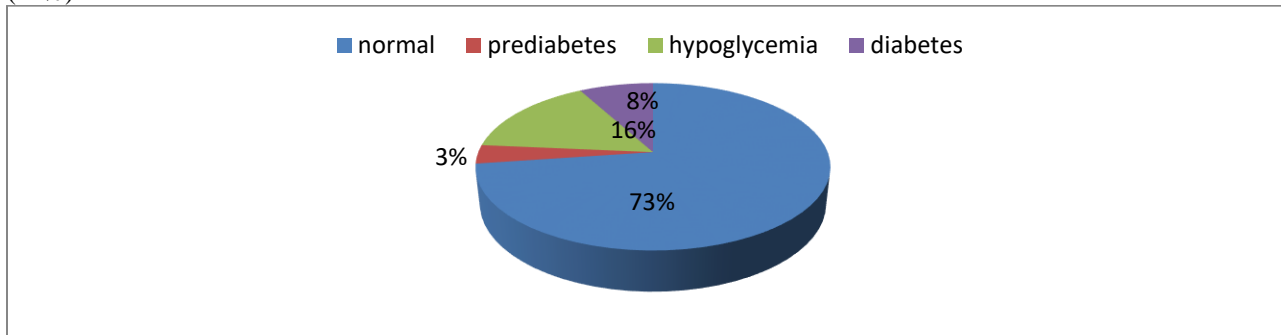

Figure 2: Percentage distribution of blood glucose level

Table 4: Nutritional status and blood glucose level of the respondents

Nutritional status	Blood glucose level categories				X^2	p-value
	Normal	Pre-diabetes	Hypoglycemia	Diabetes		
Normal	106(74.6)	4(2.8)	24(16.9)	8(5.6)	23.52	0.005*
Underweight	15(57.7)	0(0.0)	10(38.5)	1(3.8)		
Overweight	40(70.2)	4(7.0)	5(8.8)	8(14.0)		
Obese	21(84.0)	1(0.4)	0(0.0)	3(12.0)		

Statistically significant ($p \leq 0.05$), Figures in parenthesis denote percentage within the group.

Table 5 shows the association between age, blood glucose value and the weight of the respondents. A very week negative correlation was observed between the age and the blood glucose value of the respondents as well as age and height of the respondents. Also a positive correlation was observed between blood glucose value and the height of the respondents and a strong negative correlation was observed between the weight and age of the respondents. Lastly, a stronger and positive correlation was observed between the weight and blood glucose value of the respondents. This result thus seems to suggest that, the weight of an individual can positively affect the blood glucose level.

Table 5: Association between age, blood glucose values and the weight of the respondents

	Age(year)	Blood glucose value (mg/dl)	Weight(kg)
Age(year)	1		
Blood glucose value (mg/dl)	-0.086	1	
p-value	0.177		
Height (m)	-0.121	0.093	
p-value	0.056	0.142	
Weight (kg)	-0.249	0.311	1
p-value	0.000**	0.000**	

*** Correlation is significant at the 0.01 level (2-tailed).*

4.2   DISCUSSION

The study aimed at assessing the nutritional status and prevalence of diabetes mellitus among the elderly residing in Ilaro community, Yewa South Local Government area, Ogun State. Majority of the subjects studied were female between the age bracket of 60 and 64 years with no formal education, engage in petty trading or self-employed and with estimated monthly income that is less than ₦10,000. The socio-demographic characteristics and economic status observed in this study is similar to that observed by Adepoju *et al.* (2018) in a similar study conducted in the same community as well as that of Olayiwola *et al.* (2006) and Afolabi *et al.* (2012) in a similar study conducted in Ibadan. This low socio economic status will greatly affect their quality of life as well as access to basic needs.

High prevalence of malnutrition -overweight and underweight- was discovered among almost half of the respondents; more than 10% of them were underweight, 22.8% were overweight and 10% were obese. This finding is in agreement with that of Nancy *et al.* (2008) in which prevalence of obesity was found to have increased in all ages and older adults are not exempted.This implies that elderly in the study community need nutritional based programme targeted at reducing the prevalence of malnutrition among them. Moreover, nutritional status was found to be significantly associated with some socio-demographic and economic characteristics like gender, present and previous occupation. This agrees with the study of Adepoju *et al.* (2018) and Olayiwola *et al.* (2006).

The present study also assessed the blood glucose level of the respondents. The prevalence of diabetes mellitus and pre-diabetes mellitus was found to be 8% and 3% respectively. These values is slightly higher than that of Rasaki *et al.* (2017) in a similar study conducted among the indigenes of Oke- Ogun geo-political zone of Oyo State as well as that of Lucia *et al.*(2012) and Sonny *et al.* (2011). The prevalence was higher than 0.6% reported by Chinenye *et al.,* (2012) in Port-Harcourt, 0.8% by Olatunbosun *et al.*, (1998) in Ibadan and 2.2% in Port-Harcourt by Nyewen *et al.,* (2003). The fact that this study was not a hospital based study; and also that it made use of random blood glucose level measurement in its diagnosis may explain the difference in the prevalence of diabetes mellitus compared with other studies. Though various methods have been used by various researchers in diagnosing diabetes mellitus, Akinkugbe *et al*. (1969) included presence of glycosuria in his diagnoses. Similarly, Johnson (1969) used urinalysis as the method of detection and diagnosis of diabetes mellitus, Erasmus study (1989) in Ilorin based his study on the WHO 1980 criteria and Ohwovoriole *et al.*, (1988) in Lagos made use of random blood sugar levels.

Moreover, significant association was observed between the blood glucose levels and the nutritional status of the respondents. Highest (14%) prevalence of diabetes was found among the overweight respondents followed by obese respondents (12%) and a stronger positive correlation was observed between the weight of the respondents and their blood glucose level. This affirmed the declaration of World Health Organization that an increase in body fat is generally associated with an increase in risk of metabolic diseases such as type 2 diabetes mellitus, hypertension and dyslipidaemia.

5.0   CONCLUSION AND RECOMMENDATIONS

High prevalence of diabetes mellitus as well as overweight which co-exist with underweight was observed among the elderly sampled, thus nutrition intervention targeted at the care of the elderly is recommended. Also, there is need to enlighten the people about diabetes and its attendant complications.

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