



ORIGINAL ARTICLE

Awareness and risk burden of diabetes mellitus in a rural community of Ekiti State, South-Western Nigeria

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Keywords

Awareness • Knowledge • Risk-factors • Diabetes • Rural community

Summary

Objective. In recent times, Diabetes Mellitus (DM) has had a rapid increase in developing countries as a result of changing lifestyles among the people. This study was therefore aimed to investigate the level of awareness of DM and its associated risk factors in Afao: a rural community located in Irepodun/Ifelodun Local Government Ekiti State, Nigeria.

Design. The study was descriptive cross-sectional in design. A multi-stage sampling technique was applied to recruit respondents who are residents in the community. Two hundred and one individuals were involved in this community-based study. Information was obtained using a modified WHO STEPwise approach to chronic disease risk surveillance. The questionnaire included questions that assessed socio-demographic characteristics, diabetic risk factors and anthropometric measures of respondents.

Result. Of the 134 (66.7%) respondents aware of DM, only an average of 43.9% had knowledge of its risk factors. Respondent's body mass index was significantly associated ($P < 0.01$)

with knowledge of overweight/obesity as overweight (52.9%), grade 1 obese (62.5%) and morbid obese (100%) respondents had no knowledge of their status as risk factors for DM. Also, respondent's blood pressure status showed a significant association ($P = 0.099$) with respondent's knowledge of high blood pressure, 62.5% of those unaware of their blood pressure status had no knowledge of high blood pressure as a diabetes risk factor. Respondent's age ($P = 0.024$) and diet; daily vegetable servings ($P = 0.015$) and cooking oil ($P = 0.05$) showed significant association with the occurrence of the disease in 14.4% respondents previously diagnosed.

Conclusion. This study shows a need to improve on the level of awareness of diabetes risk factors in Afao. Routine measurement of blood glucose levels for adults, community health education and enlightenment strategies through the ministry of health on the awareness of diabetes are highly recommended for the Afao community.

Introduction

Diabetes Mellitus (DM), a non-communicable disease, is one of the core universal health problems. Over the past four decades, there has been so much talk about this disease and knowledge about it has increased in many regions of the world. However, in many developing countries, especially the rural areas, the level of awareness of diabetes and its risk factors is still very low. Statistically, about 50% of people with diabetes remain undiagnosed and approximately 20-30% patients usually have already developed complications before being diagnosed [1]. Moreover, it has been documented that 75% of people with diabetes reside in low-and middle-income countries [2]. Records from the World Health Organization (WHO) reveal that Nigeria; the most populous black Nation in the world, has the greatest number of persons living with diabetes in Africa [3] The prevalence of diabetes in Nigeria varies from 0.65% in the rural (North) to 11% in the urban (South.) [4].

In a recent study of a rural community in southern Nigeria, a prevalence of 8% and two major risk factors were observed; misuse of alcohol and physical inactivity. "The major risk-factors identified point to a likely

change from an active lifestyle that was characteristic of rural farming communities to a less active lifestyle characteristic of urban populations which have been exposed to westernization" [5].

Hence, the main objective of this study is to assess the level of awareness of diabetes mellitus in Afao: a rural community in South Western Nigeria. The specific objectives are:

- to assess the respondents knowledge of diabetes risk factors;
- to determine those with previously diagnosed diabetes in the study population;
- to find out the risk factors which significantly associates with knowledge and occurrence of the disease among the respondents.

Methods

STUDY LOCATION

The study was conducted in Afao, a small rural community located in Irepodun/Ifelodun Local Government Area of Ekiti State. It is about 19.4 km from Ado-Ekiti (the State capital) and 3.4 km to Are-Ekiti by road. At

the time of conducting the study, the human population of Afao was estimated at 10,879 [6]. Afao comprises of ten settlements namely: Odo-Ode, Kajola, Oke-Uro, Temidire, Olorunfemi, Aba-Igbira, Ikefun, Aba-Fulani, Ogbon-Aarin and Olorunredo. The community has fairly developed basic infrastructure e.g. primary schools, secondary schools, a private hospital and a Government Health centre. Afao is inhabited by the Yoruba speaking people of South-western Nigeria.

STUDY POPULATION

Inclusion criteria: any adult (irrespective of sex and previous diagnosis of diabetes) who lives in the area was eligible to participate.

Exclusion criteria: pregnant women, breast-feeding mothers, and non-consenting adults were excluded from the study.

STUDY DESIGN

The study was descriptive cross-sectional in design.

SAMPLE SIZE

The minimum sample size, for the study was determined using the formula [7] for a single population proportion. Z is normal deviant at the portion of 95% confidence level = 1.96, 2.3% is the prevalence of DM from a previous study in a rural community southern Nigeria [8], is margin of error acceptable = 3%. Non-response rate of 5% and a multiplication factor of 2 was further utilized to compensate for design effect. The minimum sample size obtained was 201.

SAMPLING TECHNIQUE

Multi-stage sampling technique was used to recruit adults who are residents in the community. Three stages were involved: Stage one: Simple Random Sampling (SRS) was used to select four out of the ten settlements; Stage two: two streets were then selected from each of the four settlements to give eight streets by systematic sampling; Stage 3: 201 respondents (1 per household) were finally selected from households within the 8 selected streets by cluster sampling.

DATA COLLECTION INSTRUMENT

Data collection was done using interviewer assisted questionnaire method and physical examination. The questionnaire was a modified WHO STEP wise approach to chronic disease surveillance. Using only STEP 1 and STEP 2 for low resource countries. STEP 1 gathered information on socio-demographic features and risk factors such as smoking, alcohol use, fruit/vegetable intake, physical activity etc. STEP 2 included objective data collection by physical measurements of physiological attributes of human body such as weight and height [9]. Measurements were taken with the aid of calibrated equipment using standard techniques. Subjects were weighed in kilograms to the nearest kg. Height was measured using a stadiometer as respondents stood on barefoot with minimal/essential dressing and the results

were recorded to the nearest 0.5 cm. Body mass index (BMI) was estimated as the ratio of weight in kilograms to the square of height in meters {weight (kg)/heights (m²)}. Waist circumference was measured by placing a plastic tape to the nearest centimeters (cm) horizontally, at the midpoint of the lower margin of the 12th rib and the upper margin of iliac crest along the midaxillary line.

DATA ANALYSIS

The data collected for the study were first of all checked for errors, cleaned and then analyzed using the Statistical Package for Social Sciences (SPSS), version 23. Descriptive analysis of socio-demographic variables, respondent's perception, risk practices and so on were presented in frequencies and percentages using tables. The Chi-square test was used to test for significance of association between the variables.

ETHICAL CONSIDERATION

Ethical clearance was obtained from the Research and Ethics committee of the Afe Babalola University Ado-Ekiti. With due respect to respondent's privacy, oral consent was obtained from each participant before data collection. In addition, respondents were informed of their right to voluntarily participate or withdraw from the study at any stage without adverse consequences. Confidentiality was also observed as the questionnaire bore no name of respondent or any identifying information.

Results

SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

A total of 201 respondents were interviewed out of which 44.3% were male while 55.7% were female, giving a male to female ratio of 0.8:1. The mean age was 36.9 ± 1.053 years, the median age was 33 years while the minimum and maximum ages were 17 and 93 years respectively. The respondents comprised largely of people in the age-group 17-40 years (70.7%). Majority of the respondents were; married (59.7%), of the Yoruba tribe (81.6%), Christians (85.6%) traders (67.2%). Also, most respondents (42.8%) had only primary education while a majority (54.7%) earned an average monthly income lesser than or equal to 15,000 Naira (39\$).

AWARENESS AND SOURCE OF INFORMATION ABOUT DIABETES MELLITUS

Participants were asked if they knew what diabetes mellitus was and were scored on their responses about the nature of DM. Most 134 (66.7%) of the participants thought that DM was a result of partial or complete reduction in insulin secretion. Respondents who had never heard of the disease and those that felt it was through excess eating of sweet foods were scored as 'not aware'. Majority (70.1%) of those aware of DM got to know about the disease from health care workers.

Tab. I. Respondents socio-demographic features.

Variables		Frequency	Percent
Sex	Male	89	44.3
	Female	112	55.7
Age	17-40	142	70.7
	41-60	41	20.4
	Above 60	18	9.0
Marital status	Married	120	59.7
	Divorced	-	-
	Widowed	15	7.5
	Separated	3	1.5
	Never married	59	29.4
	Cohabiting	4	1.9
Ethnicity	Yoruba	164	81.6
	Hausa	5	2.5
	Igbo	5	2.5
	Others	27	13.4
Religion	Christianity	172	85.6
	Islam	27	13.4
	Traditional	1	0.5
	Others	1	0.5
Occupation	Farming	23	11.4
	Artisan	17	8.5
	Commercial cyclist	11	5.5
	Taxi driver	9	4.5
	House-wife	6	3.0
	Trading	135	67.2
Highest education	Non-formal	65	32.3
	Primary	86	42.8
	Secondary	37	18.4
	Tertiary	13	6.5
Average monthly household income	< \$5	33	16.4
	\$5-\$13	26	12.9
	\$13-\$26	22	11.0
	\$26-39\$	29	14.4
	>\$39	91	45.3

Tab. II. Awareness and source of information about diabetes mellitus.

Awareness of Diabetes	Frequency	Percent
Aware	134	66.7
Not aware	67	33.3
Total	201	100.0
Source of information		
Media	93	69.4
Healthcare worker	94	70.1
Friends/Relatives	83	61.9
Books, Lectures, Flyers	51	38.1

Tab. III. Respondents' knowledge about risk factors of diabetes mellitus (N = 134).

Risk factors	Yes	
	Frequency	Percent
Smoking	44	32.8
Stress	56	41.8
Lack of exercise	62	46.3
Poor diet	72	53.7
Overweight/obesity	59	44.0
Alcohol misuse	62	46.3
High blood pressure	57	42.5

RESPONDENTS' KNOWLEDGE ABOUT RISK FACTORS OF DIABETES MELLITUS (N = 134)

Of the 134 respondents who were aware of diabetes, most (53.7%) perceived poor diet as the major diabetes

risk factor followed by lack of exercise and alcohol misuse (46.3%). Smoking (32.8%) was the least perceived diabetes risk factor. On the average, only 43.9% had knowledge of diabetes mellitus risk factors.

Tab. IV. Risk practices of diabetes mellitus among all respondents.

Risk practices	Frequency	Percent
Currently smoke tobacco	26	12.9
Currently use smokeless tobacco	13	6.5
Total	39	19.4
Duration of smoking		
< 1 year	4	10.3
2-4 years	10	25.6
≥ 5 years	25	64.1
Currently consumes alcohol daily	46	22.9
Average bottles taken per day		
1 bottle	12	26.1
2-5 bottles	27	58.7
6 bottles	2	4.3
> 6 bottles	5	10.9
Consumed alcohol in the past	64	31.8
If yes, how long did you stop?		
1 year or less	6	9.4
2-4 years	12	18.8
5 years	16	25
No response	30	46.9
Daily fruit servings		
None	25	12.4
1-2 servings	91	45.3
3-4 servings	50	24.9
5 servings	35	17.4
Daily vegetable servings		
None	8	4
1-2 servings	114	56.7
3-4 servings	49	24.4
5 servings	30	14.9
Oil mostly used for cooking		
Palm oil	170	84.6
Vegetable oil	22	10.9
Coconut oil	3	1.5
Others	6	3
Weekly walk/bicycle ride(30 mins)		
None	51	25.4
2-4 days	39	19.4
5-6 days	11	5.5
Everyday	100	49.7
Sports (30 mins. minimum daily)		
Yes	75	37.3

RISK PRACTICES OF DIABETES MELLITUS AMONG ALL RESPONDENTS

Smoking/Alcohol intake: Most (64.1%) of the 39 smokers had been smoking for over 5 years. Majority (58.7%) of the 46 who took alcohol drank an average of 2-5 bottles daily. Of the 31.8% respondents who used alcohol in the past, 25% had stopped drinking over 5 years earlier. **Fruits/vegetables consumption:** 12.4% of the respondents did not take any kind of fruits while only 17.4% took about 5 servings daily. More than half of the study group took only 1-2 servings of vegetables daily. **Oil used for cooking:** More than four-fifth (84.6%) of the participants use saturated fat (palm oil) for cooking.

Tab. V. Previous measurements among all respondents.

Previous Measurements	Yes	
	Frequency	Percent
Measured blood pressure	105	52.2
Measured blood sugar	60	29.9
Previously diagnosed with high blood pressure	17	8.5
Previously diagnosed with diabetes mellitus	29	14.4

Exercise/Sport (Weeklywalk/Bicycle ride): While over a quarter (25.4%) of the respondents do not engage in exercise which includes at least a 30 minutes daily walk or bicycle ride 62.7% do not engage themselves in any sporting activity.

PREVIOUS MEASUREMENTS AMONG ALL RESPONDENTS

About 52.2% of the study population had gotten their blood pressure measured while 8.5% had been previously diagnosed with high blood pressure. About 60 (29.9%) respondents had gotten their blood sugar level measured while only 29 (14.4%) had been previously diagnosed with diabetes mellitus.

ANTHROPOMETRIC MEASUREMENTS AMONG ALL RESPONDENTS

With respect to body mass index of the respondents, most (40.3%) were overweight while 32 (15.9%) were obese. Furthermore, 81.1% of the total respondents had a normal waist circumference while 18.9% had an abnormal waist circumference.

KNOWLEDGE OF RISK FACTOR AND ITS ASSOCIATED RISK AMONG RESPONDENTS (N = 134)

Tab. VII looks at the association between knowledge of diabetes risk factors (Tab. III) and the risk factors/practices of respondents aware of DM. Respondent's

Tab. VI. Anthropometric measurements among all respondents.

Body mass index		
Category*	Value (kg/m ²)*	Frequency (percent)
Underweight	<18.5	10 (5.0)
Normal	18.5-24.9	78 (38.8)
Overweight	25.0-29.9	81 (40.3)
Grade 1 obesity	30-34.9	23 (11.4)
Grade 2 obesity	35-39.9	6 (3)
Morbid obesity	≥ 40	3 (1.5)
Waist circumference		
Category*	Value (cm)*	Frequency (percent)
Normal male	< 102	86 (52.8)
Normal female	< 88	77 (47.2)
Total		163 (81.1)
Abnormal male	≥102	3 (7.9)
Abnormal female	≥ 88	35 (92.1)
Total		38 (18.9)

*Guidelines on overweight and obesity [10].

Tab. VII. Knowledge of risk factor and its associated risk among respondents (n = 134).

Risk factor	Knowledge of risk factor				p value
	No	Yes	Don't know	χ^2	
Have high blood pressure	High blood pressure				
No	53 (54.1)	42 (42.9)	3 (3.1)	7.816	0.099*
Yes	3 (25)	7 (58.3)	2 (16.7)		
Don't know	15 (62.5)	8 (33.3)	1 (4.2)		
Smoke tobacco	Smoking				
No	75 (64.1)	36 (30.8)	6 (5.1)	1.912	0.384
Yes	8 (47.1)	8 (47.1)	1 (5.9)		
Consume alcohol daily	Alcohol abuse			0.181	0.913
No	50 (49)	48 (47.1)	4 (3.9)		
Yes	17 (53.1)	14 (43.8)	1 (3.1)		
Daily fruit servings	Poor diet				
Less than 5	49 (45.4)	55 (50.9)	4 (3.7)	2.338	0.311
5 and above	9 (34.6)	17 (65.4)	0(0)		
Daily vegetable servings	Poor diet				
Less than 5	52 (45.6)	58 (50.9)	4 (3.5)	2.818	0.244
5 and above	6 (30)	14 (70)	0 (0)		
Cooking oil	Poor diet				
Unsaturated oil	10 (41.7)	14 (58.3)	0 (0)	1.006	0.605
Saturated oil	48 (43.6)	58 (52.7)	4 (3.6)		
Body mass index	Overweight/Obesity				
Underweight	3 (60)	2 (40)	0 (0)	33.221	< 0.01**
Normal	29 (50.9)	27 (47.4)	1 (1.8)		
Overweight	27 (52.9)	23 (45.1)	1 (2.0)		
Grade 1 obesity	10 (62.5)	6 (37.5)	0 (0)		
Grade 2 obesity	1 (25)	1 (25)	2 (50)		
Morbid obesity	1 (100)	0 (0)	0 (0)		
Sport	Lack of exercise				
No	35 (46.1)	38 (50)	3 (3.9)	0.566	0.754
Yes	27 (46.6)	30 (51.7)	1 (1.7)		
Weekly walk	Lack of exercise				
Everyday	34 (52.3)	30 (46.2)	1 (1.5)	4.158	0.655
2-4 days	13 (46.4)	14 (50)	1 (3.6)		
5-6 days	2 (28.6)	5 (71.4)	0 (0)		
None	19 (55.9)	13 (38.2)	2 (5.9)		

χ^2 : Chi-square test; *: p value < 0.1; **: p value < 0.01

blood pressure status showed a significant association ($P = 0.099$) with respondent's knowledge of high blood pressure as a risk factor of DM. Most (62.5%) of the participants who did not know their blood pressure status were not aware that high blood pressure is a risk factor of diabetes. Furthermore, a significant association ($P < 0.01$) was observed between respondent's body mass index and overweight/obesity as a risk factor of DM. Majority of the respondents who were overweight (52.9%), grade 1 obese (62.5%) and morbid obese (100%) were not aware of overweight/obesity as risk factors of diabetes mellitus.

ASSOCIATION BETWEEN RISK FACTORS AND PREVIOUS DIAGNOSIS OF DIABETES

Respondent's age ($P = 0.024$), daily vegetable servings ($P = 0.015$) and cooking oil ($P = 0.05$) showed significant association with previous diagnosis of diabetes. Furthermore, diabetes was more predominant in: age-

group 17-40 (62.1%), those who consume less than five daily vegetable servings (100%) and those who mostly used saturated oil for cooking (72.4%).

Discussion

Evidence has shown over the years that attention be given to ensuring adequate knowledge of diabetes [11-13]. Of the 134 (66.7%) respondents aware of DM, only an average of 43.9% had knowledge of its risk factors. Lack of adequate knowledge of DM does not come as a surprise since Afao is a rural community with about 75.1% of the respondents having no formal education or a primary school education. Moreover, 70.1% of the respondents got information about the disease from community health care workers. Community health workers have shown to develop and support connections between the health care system and their own community through

Tab. VIII. Association between risk factors and previous diagnosis of diabetes.

Variable	DM Present n (%)	DM Absent n (%)	χ^2	p value
Age				
17-40	18 (62.1)	124 (72.1)	72.875	0.024*
41-60	9 (31)	32 (18.6)		
above 60	2 (6.9)	16 (9.3)		
Currently smoke tobacco				
no	27 (93.1)	148 (86.0)	1.097	0.295
yes	2 (6.9)	24 (14)		
Consume alcohol daily				
no	22 (75.9)	133 (77.3)	0.03	0.862
yes	7 (24.1)	39 (22.7)		
Daily vegetables servings				
less than 5	29 (100)	142 (82.6)	5.946	0.015*
5 and above	0 (0)	30 (17.4)		
Daily fruits servings				
less than 5	27 (93.1)	139 (80.8)	2.606	0.106
5 and above	2(6.9)	33 (19.2)		
Oil mostly used for cooking				
unsaturated fat	8 (27.6)	23 (13.4)	3.844	0.05*
saturated fat	21 (72.4)	149 (86.6)		
Weekly walk/bicycle ride				
Everyday	20 (69)	80 (46.5)	6.255	0.1
2-4 days	2 (6.9)	37 (21.5)		
5-6 days	2 (6.9)	9 (5.2)		
None	5 (17.2)	46 (26.7)		
Body mass index				
underweight	1 (3.4)	9 (5.2)	0.792	0.978
normal	12 (41.4)	66 (38.4)		
overweight	12 (41.4)	69 (40.1)		
grade 1 obesity	3 (10.3)	20 (11.6)		
grade 2 obesity	1 (3.4)	5 (2.9)		
morbid obesity	0 (0)	3 (1.7)		

χ^2 : Chi-square test; *: p value < 0.05

health-related awareness and education [14, 15]. Despite their merits, research has shown the need to develop diabetes competencies and evaluative tools as a way to standardize health workers diabetes trainings in local communities [16].

There is limited evidence on whether having risk factors for diabetes, ensures greater knowledge of risk factors important for motivating preventive behaviours [17]. This present study reveals that respondent's body mass index was significantly associated with knowledge of overweight/obesity as overweight (52.9%), grade 1 obese (62.5%) and morbid obese (100%) respondents had no knowledge of their status as risk factors for DM. These findings is in congruence with previous studies that have associated obese respondents with poor awareness [17, 18]. Also, most (62.5%) of the participants who were unaware of their blood pressure status had no knowledge of high blood pressure as a risk factor of DM. Routine blood pressure monitoring is very crucial and needful for adults. This is because high blood pressure has been associated with an increased risk of diabetes [19-22].

Also, in this study, two risk factors which significantly relates with the occurrence of the disease among previously diagnosed respondents have been documented by researchers who identified age [23-25] and poor diet [26-29] as risk factors for DM.

Conclusion

This study concludes that one-third of the study population were unaware of diabetes, more than half of those aware of the disease had no knowledge of its risk factors while well over a tenth had been previously diagnosed with the disease. Most overweight and obese respondents had no knowledge that they were at risk of having diabetes. Respondents unaware of their blood pressure status also had no knowledge of high blood pressure as a risk factor for diabetes. The risk factors which significantly relates with the disease occurrence among previously diagnosed respondents were age and poor diet, respectively. Thus, this study shows a need to improve on the level of awareness of DM and its risk factors in Afao. Routine

measurement of blood glucose levels for adults, community health education and enlightenment strategies through the Ministry of Health on the awareness of DM are highly recommended for the Afao community.

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Conflict of interest statement

The authors declare no conflict of interest.

Authors' contributions

ARD and AIOE contributed in the study design, training and supervision of data collectors. ARD designed the questionnaire. AIOE analyzed the data with the contribution of AEO. AIOE drafted the manuscript with the contribution of AEO, ARD and IOA. All authors reviewed and approved the final version of the manuscript.

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