Are Rural-Dwelling Nigerian Adults Aware of Stroke Risk Factors and Warning Signs? A Cross-Sectional Study

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ABSTRACT

Introduction: Evaluation of public's knowledge or awareness of stroke risk factors and warning signs is key to preventive approach on reducing the incidence of stroke, however, there is still limited information needed for policy and actions among rural dwellers. This study assessed awareness and knowledge of stroke risk factors and warning signs among Nigerian rural community dwellers.

Materials and Methods: This cross-sectional survey involved 322 community dwelling adults purposively selected from Ipetumodu, Osun State, Southwestern Nigeria. Systematic sampling technique was used to select every second house. A validated four-section questionnaire was used to collect data on stroke risk factors and warning signs awareness. Also, the socio-demographic information on the respondents was obtained. Descriptive statistics of frequency and percentage; and inferential statistics of Kruskal-Wallis test and logistic regression were used to analyze data. Alpha level was set at $p<0.05$.

Result: A total of 322 respondents (176 males and 146 females) consented for this survey. Majorities were in the 18-40 years age group (69.5%) and had tertiary/postgraduate education (57.7%). Rate of correct identification of 'at least two risk factors and warning signs of stroke' (i.e. awareness) were 79.5% and 61.2%. The rates of identification of 'more than 50% of' stroke risk factors and warning signs (i.e. knowledge) were 80.4% and 13.7%. Family histories of stroke and lack of exercises were significant predictors of awareness of risk factors (OR= 0.436 and 0.376 respectively at $p<0.05$), and warning signs (OR=0.638 and 0.579 respectively at $p<0.01$). Male gender, family history of stroke, lack of exercise (OR=0.391, 0.436 and 0.376 respectively at $p<0.01$) and past smoker (OR= 3.616, $p<0.05$) were significant predictors of knowledge of stroke risk factors and warning signs respectively.

Conclusion: There is high level of awareness of stroke risk factors and low level of knowledge of warning signs among Nigerian rural community dwellers.

Keywords: Stroke; Awareness; Knowledge; Rural community; Nigeria

Introduction

Stroke is one of the most disabling adult chronic diseases, the second leading cause of death and a major cause of disability worldwide [1,2]. It has an annual mortality rate of about 5.5 million [1,2] with developing countries accounting for nearly 85% of global deaths from stroke [3]. Stroke severity and mortality is on the decline in developed countries due to increased use of preventive measures such as adequate blood pressure control and lifestyle modification [4,5]. Unfortunately, this contrasts rising stroke incidence in black Africans and other low- and middle-income countries where adoption of western lifestyle has led to increasing cardiovascular risk factors [6]. Stroke burden lays mainly in the high morbidity which results in up to 50% of survivors suffering from chronic disabilities. Thus stroke is a disease of high public health concern with serious economic and social consequences [2]. The public health burden is projected to rise over future decades because of demographic transitions of populations, particularly in developing countries [2]. In Nigeria, stroke is responsible for 0.9%-4% of total hospital admissions and 5%-45% of neurological admissions [7]. Stroke prevalence varies in different parts of Nigeria. It was put at 1.14/1000, with 30-day case fatality rate as high as 40% by Wahab et al., [8], while Enwereji et al. [9] reported the crude prevalence of stroke in rural Nigeria to be 1.63/1000 of the population. Consequently, stroke prevention becomes a critical, better, and strongly preferred option.

The success of primary preventive measures and timely medical attention immediately after a stroke is influenced by the public's knowledge and perception of stroke and its risk factors [10,11]. Knowledge of stroke risk factors and warning signs in the general population has been found to be relatively poor in groups with and those without risk factors [12,13]. In the management of stroke, time of presentation to the hospital is important and better outcome can be achieved in the phase of time from symptom recognition to the decision to seek health-care [14,15]. Delay in time of presentation has however, been reported in a retrospective study among Nigerians [8] in contrast to another study [16]. This could be due to poor awareness of stroke warning signs by the victims and relatives. Studies on awareness of stroke risk factors and warning signs revealed high awareness in hospital-based and urban populations [17-19] while low awareness was reported by some others [8,20].

The rate of occurrence and reoccurrences of stroke among rural community dwellers is high with poor access to medical services, information and poor control of stroke risk factors contributing to the rising incidence [20-23]. Studies assessing public awareness of stroke in Nigeria are few and mainly hospital based [8,24,25] and in urban communities [18,19]. Spiritual and traditional beliefs retain a major place in stroke rehabilitation in sub-Saharan Africa, thus holistic approach with a spiritual component has been recommended for its rehabilitation, prevention and treatment [25,26]. The previous community based studies on stroke awareness in Nigeria were in urban communities [18,19] and the results cannot be generalized to semi-urban/ rural population. Assessment of public awareness of the disease among rural populace in a country with such high stroke burden like Nigeria would hopefully help provide the bearing of the relevant health education on stroke prevention. Hence, this study was aimed at assessing awareness and knowledge of stroke risk factors and warning signs among Nigerian rural community dwelling adults in Southwest Nigeria.

Materials and Methods

This cross-sectional survey was conducted from house to house in Ipetumodu town, the headquarters of Ife North Local Government Area, Osun state, Southwest Nigeria. It has a population of 211,100 (by 2016 population projection of NPC, 2006). Ipetumodu was purposively selected being the rural community with 800 census enumerated areas (CEA) of the National Population Commission, the highest out of the three CEAs in the area. The other two communities are Edunabon and Moro with 340 and 130 CEAs respectively [27] (NPC, 2006). Ethical approval was obtained from the Ethics and Research committee, Institute of Public Health, Obafemi Awolowo University, Ile-Ife with Protocol number IPHOAU/12/1393. A written informed consent was obtained from each participant before the survey.

Three hundred and twenty two adults aged 18 years and older who were residents of Ipetumodu participated in this survey, after obtaining their written informed consent.

Sample size of this study was calculated using Cochran's formula

$$n_{o = z}{}^2 pq/e^2$$

Where n_o=sample size), z=95% confidence level, it is 1.96 on z table and e=desired level of precision (i. e error margin estimated at 0.05), p= 0.3 the estimated proportion of the population which has the attribute in question, i. e aged 18 years and older); q is 1-p

$$n_o = Z^2 pq/e^2$$

n_o =1.96²(0.3)(0.7)/0.05²
n_o =0.806/0.0025
n_o = 322

The calculated sample size (n_o) is 322.
0.3 is the estimated proportion of the population who were aged 18 years and older.

A systematic sampling technique was used to select every second house. Every consenting member of each house aged 18 years and older responded to the questionnaire. Information on awareness of stroke risk factors and warning signs was obtained with a validated four-section structured questionnaire developed by Obembe et al. [18]. The questionnaire was self-administered by all respondents who could read and understand the English language and in Yoruba translated version by those who are not literate in English. Yoruba is the indigenous language of the people of southwestern Nigeria. All questionnaires were collected immediately after completion, giving a 100% response rate. Section one of the questionnaire assessed socio-demographic information on gender, age, educational status (primary, secondary, tertiary, postgraduate), history of smoking (past smoker, current smoker), family history of heart disease/hypertension, and history of previous stroke. In section two, respondents were asked to indicate if they recognize any of the seven warning signs and any of the eleven risk factors of stroke provided in the questionnaire. Scoring was based on number of correct response provided by each respondent. Awareness was defined as reporting at least two correct responses of risk factor and warning signs [18,19] while knowledge was defined as recognizing at least six correct options from the risk factors and at least four correct options from the warning signs [19]. This constitutes 50% of all the factors. Section three asked the respondents what they would do first, if someone was having a stroke near them while section four asked for the sources of information on stroke [18].

Statistical Analysis

Descriptive statistics of frequencies and percentages were used to summarize the data. Categorical variables were compared using the Chi-square test. Mann Whitney U test was used to compare differences between two groups while Kruskal-Wallis test was used to compare differences among three or more groups. Odds ratio analysis was used to determine the predictor(s) of awareness (at least two) and knowledge (more than half) of the risk factors and warning signs. Alpha level was set at 0.05. All statistical procedures were performed with the Statistical Package for Social Sciences (IBM) 16.0.

Results

Socio-demographic characteristics of respondents

A total of 322 respondents comprising 176 males (55%) and 146 (45%) females were involved in this survey. Majority of the respondents (69.5%) were between 18 and 40 years and had tertiary/postgraduate education (57.7%). The distributions of other characteristics of the respondents are presented in Table 1.

Respondents' Awareness of Risk Factors and Warning Signs of Stroke

A total of 256 (79.5%) and 199 (61.2%) respondents identified at least 2 risk factors and warning signs respectively. Whereas 259 (80.4%) and 44 (13.7%) of respondents identified more than 50% of stroke risk factors and warning signs of respectively. Hypertension (44.4%) was the most commonly identified risk factor, while numbness (46.9%) was the most commonly identified warning sign (Table 2). There were significant differences in the awareness of some risk factors and warning signs between male and female respondents (p<0.05) (Table 2).

Variables	Overall	Male	Female	
	N=322 n (%)	n=176 n (%)	n=146 n (%)	p-value
Age (years)				
18-40	224 (69.5)	122 (38.2)	102 (31.3)	0.100
41 and older	98 (30.5)	54 (16.8)	37 (11.5)	
EDUCATION				
Nil/Primary	42 (13.0)	22 (6.8)	20 (6.0)	0.007*
Secondary	94 (29.2)	56 (17.4)	38(11.8)	
Tertiary/PG	186 (57.7)	98 (30.4)	88 (27.3)	
SMOKING HISTORY				
Past smokers	72 (22.4)	57(17.7)	15 (4.7)	0.001*
Current smokers	75 (23.3)	54 (17.1)	21 (6.2)	0.001*
MEDICAL HISTORY				
History of heart disease/hypertension	83 (25.8)	58 (18)	25(7.8)	0.001*
History of prior stroke	62 (19.3)	42 (13)	20 (6.3)	0.021*
Family history of stroke	85 (26.4)	40(12.7)	45(13.7)	0.509

*p<0.05

Table 1: Characteristics of Respondents

Factors n=322	Overall N=322 n (%)	Male n=176 n (%)	Female N=146 N (%)	p-value
Risk factors				
Age	86 (26.7)	43 (13.3)	43(13.4)	0.001*
Hypertension**	143(44.4)	68 (21.1)	75 (23.3)	0.042**
Stress	117 (36.3)	61 (18.9)	56 (17.4)	0.001*
Cholesterol	106 (32.9)	56 (17.4)	50 (15.5)	0.001*
Smoking	115 (35.7)	65 (20.2)	50 (15.5)	0.956
Obesity	60 (18.6)	32 (9.9)	28 (8.7)	0.115
Lack of exercise	38 (11.8)	13 (4.0)	25 (7.8)	0.001*
Family history of stroke	85 (26.4)	41 (12.7)	44 (13.7)	0.582
Diabetes	120 (37.3)	64 (19.9)	56 (17.4)	0.867
Alcohol use	106 (32.9)	45 (14.0)	61(18.9)	0.008*
Diet**	77 (23.9)	44 (13.7)	33(10.2)	0.040**
Warning signs				
Slurred speech	57 (17.7)	28 (8.7)	29 (9.0)	0.038
Dizziness	106 (32.9)	60 (18.6)	46 (14.3)	0.142
Numbness	151 (46.9)	84 (26.1)	67 (20.8)	0.603
Weakness	132 (41.0)	78(24.2)	54 (16.8)	0.492
Headache	62 (19.3)	35 (10.9)	27 (8.4)	0.080
Vision problem	78 (24.2)	35 (10.9)	43 (13.3)	0.008**
Difficulty understanding	79 (24.5)	37 (11.5)	42 (13.0)	0.013**
Number of risk factors identified				
0-1	63 (19.6)	44 (13.7)	19 (5.9)	
At least 2	256(79.5)	132 (41.0)	124 (38.5)	0.028*
Over 50%	259(80.4)	132 (41.0)	127 (39.4)	0.006*
All	1 (0.3)	1 (0.3)	-	0.362
Number of warning signs identified				
0-1	125 (38.8)	68 (21.1)	57(17.7)	
At least 2	199(61.8)	109 (33.9)	90 (27.9)	0.958
Over 50 %	44 (13.7)	23 (7.1)	21(6.5)	0.078
All	8 (2.4)	4 (1.2)	4 (1.2)	0.789

*Chi square test is significant at p<0.05

**Mann Whitney U test is significant at p<0.05

Table 2: Awareness of risk factors and warning signs of stroke by gender

The risk factors and warning signs were identified majorly by respondents in the 18-40 years age group (Table 3). This age group significantly identified age, hypertension, stress, alcohol use and diet (p<0.05) as the risk factors as well as headache, vision problems and difficulty understanding (p<0.05) as warning signs of stroke. This age group is significantly (p< 0.05) aware of more than 50% of all the warning signs of stroke (Table 3).

	Overall N (%)	18-40 years n (%)	41years and older n (%)	p-value
Risk factors				
Age **	86 (26.7)	50 (15.5)	36 (11.1)	0.006**
Hypertension**	143 (44.4)	93 (28.9)	50 (15.5)	0.003**
Stress**	117 (36.3)	80 (24.9)	37 (11.5)	0.048**
Cholesterol	106 (32.9)	71 (22.0)	35 (10.9)	0.037*
Smoking	115 (35.7)	83 (25.7)	32 (9.9)	0.232
Obesity	60 (18.6)	47 (14.6)	13 (4.0)	0.024*
Lack of exercise	38 (11.8)	30 (9.3)	8 (2.5)	0.616
Family history of stroke	85 (26.4)	59 (18.3)	26 (8.1)	0.056
Diabetes	120 (37.3)	82 (28.4)	38 (11.8)	0.839
Alcohol use**	106 (32.9)	68 (21.1)	38 (11.8)	0.001**
Diet**	77(23.9)	53 (16.4)	24 (7.4)	0.045**
Warning signs				
Slurred speech	57 (17.7)	43 (13.3)	14 (4.3)	0.15
Dizziness	106 (32.9)	70 (21.8)	36 (11.1)	0.322
Numbness	151 (46.9)	104 (31.3)	47 (14.6)	0.155
Weakness	132 (41.0)	93 (28.9)	39 (12.1)	0.006*
Headache**	62 (19.3)	38 (11.8)	24 (7.4)	0.022**
Vision problem**	78 (24.2)	51 (15.8)	27 (8.4)	0.002**
Difficulty understanding**	79 (24.5)	50 (15.5)	29 (9.0)	0.006**
Number of risk factors identified				
0-1	63 (19.6)	48(14.9)	15 (4.7)	
At least 2	258(80.1)	175 (54.3)	83 (25.8)	0.301
Over 50%	259 (80.4)	176 (54.6)	83 (25.8)	0.085
All	1(0.3)	1(0.3)	0 (0.0)	0.914
Number of warning signs identified				
0-1	125 (38.8)	86(26.7)	39 (12.1)	
At least 2	197 (61.2)	138 (42.8)	59 (18.3)	0.128
Over 50%	44(13.7)	26 (8.1)	18 (5.6)	0.001*
All	8 (2.4)	2(0.6)	6 (1.8)	0.001*

*Chi square test is significant at p<0.05
**Kruskal Wallis test is significant at p<0.05
Table 3: Awareness of risk factors and warning signs of stroke by age group

Respondents with tertiary level education formed the significant (p< 0.05) proportion who identified each of the risk factors and most of the warning signs. This group are more aware of eight out of eleven risk factors (Kruskal Wallis test is significant at p<0.05) (Table 4). Hypertension, the most identified risk factor was identified by 18.6% of respondents who had secondary education whereas lack of exercise, the least identified risk factor was identified by 6.8% of respondents with tertiary education (Table 4).

Factors	Overall	Level of education			
	N (%)	Nil/Primary n (%)	Secondary n(%)	Tertiary/PG n (%)	p-value
Risk factors					
Age**	86 (26.7)	14(4.4)	26 (8.1)	46 (14.3)	0.042**
Hypertension**	143(44.4)	36 (11.2)	60 (18.6)	47 (14.6)	0.001**
Stress**	117(36.3)	27 (8.4)	33 (10.2)	57 (17.7)	0.001**
Cholesterol**	106 (32.9)	19 (5.9)	29 (9.0)	58 (18.0)	0.006**
Smoking	115 (35.7)	18 (5.6)	40 (12.2)	57 (17.7)	0.001*
Obesity**	60 (18.6)	0 (0.0)	17 (5.3)	43 (13.3)	0.003**
Lack of exercise**	38 (11.8)	7 (2.1)	9 (2.8)	22 (6.8)	0.001**
Family history of stroke**	85 (26.4)	19 (5.9)	25 (7.8)	41 (12.7)	0.003**
Diabetes**	120 (37.3)	19 (5.9)	39 (12.1)	62 (19.3)	0.048**
Alcohol use	106 (32.9)	15 (4.7)	35 (10.8)	56 (17.4)	0.001*
Diet	77 (23.9)	12 (3.7)	29 (9.0)	34 (10.5)	0.001*
Warning signs					
Slurred speech	57 (17.7)	9 (2.8)	18 (5.6)	30 (9.3)	0.001*
Dizziness**	106 (32.9)	22 (6.9)	31 (9.6)	53 (16.4)	0.015**
Numbness	151 (46.9)	19 (5.9)	38 (11.8)	94 (31.1)	0.012*
Weakness	132 (41)	19 (5.9)	38 (11.8)	75 (23.3)	0.042*
Headache**	62 (19.2)	16 (5.0)	36 (11.1)	10 (3.1)	0.001**
Vision problem	78 (24.2)	13 (4.0)	28 (8.7)	37 (11.4)	0.001*
Difficulty understanding	79 (24.5)	17(5.2)	19 (6.0)	43 (13.3)	0.004*
Number of risk factors identified					
0-1	63 (19.6)	1(0.3)	5(1.6)	7 (17.7)	0.001*
At least 2	258 (80.1)	41 (12.7)	89(27.6)	128 (39.7)	0.001*
Over 50%	259 (80.4)	121(37.5	127(39.4)	11 (3.4)	0.001*
All	1(0.3)	0 (0.0)	0 (0.0)	1(0.3)	0.942
Number of warning signs identified					
0-1	125 (38.8)	3 (0.9)	30 (9.3)	92 (28.6)	0.001*
At least 2	197 (61.2)	39 (12.1)	64(19.9)	94 (29.2)	0.001*
5-7	15 (4.6)	5 (1.5)	5(1.6)	5 (1.5)	0.001*
Over 50%	44(13.7)	16 (5.0)	23(7.1)	5 (1.5)	0.093
All	8(2.5)	3 (0.9)	0 (0.0)	5 (1.5)	0.001*

Nil- No formal education

PG-Postgraduate

*Chi square test is significant at p<0.05

**Kruskal-Wallis test is significant at p<0.05

Table 4: Awareness of risk factors and warning signs of stroke by level of education

Predictors of Awareness of Risk Factors and Warning Signs of Stroke

Male gender was an independent significant predictor of awareness of two or more risk factors of stroke while history of heart disease/hypertension and history of prior stroke were the two independent significant predictors of knowing two or more warning signs (Table 5). Being a past smoker is a significant predictor of knowing more than half of all the warning signs (Table 6).

Actions to Be Taken by Respondents

Majority 124 (38.5%) of respondents indicated that they would take the person to the hospital, while less than 5% indicated that they would do nothing if a stroke happens near them. Other actions are shown on Table 7.

Sources of Information about Stroke

Radio was the most selected common source of information by a total of 226 (70.2%) respondents while others 63 (19.6) were the least popular sources of information (Table 8).

Factor	OR	95% CI	p-value
Predictors of 2 or more risk factors			
Gender (ref=male)	0.391	0.181-0.847	0.017*
Family history of stroke (ref= present) absent	0.436	0.292-0.651	0.001*
Lack of exercise (ref= yes) no	0.376	0.243-0.582	0.001*
Predictors of 2 or more warning signs			
History of heart disease/hypertension (ref= present) absent	2.758	1.495-5.090	0.001*
History of prior stroke (ref= yes) no	2.252	1.128-4.495	0.021*
Family history of stroke (ref= yes) no	0.638	0.476-0.856	0.003*
Lack of exercise (ref= yes) no	0.579	0.408-0.823	0.002*
Predictor of all warning signs**			
Level of education (ref=Secondary education)	0.009	0.000-0.831	0.042**
Family history of stroke (ref= yes) no	0.048	0.003-0.767	0.032**

List of abbreviations: CI: Confidence interval; OR: odds ratio

* Significant predictors of knowing 2 or more risk factors or warning signs

** Significant predictor of knowing all the warning signs

Table 5: Binary Regression analysis of significant predictors of knowing 2 or more risk factors or warning signs of stroke

Factor	OR	95% CI	p- value
PREDICTORS OF RISK FACTORS			
Gender (ref=male) female	0.253	0.108-0.592	0.002*
Family history of stroke (ref=yes) no	0.428	0.280-0.655	0.001*
Lack of exercise (ref=yes) no	0.342	0.213-0.547	0.001*
WARNING SIGN			
Past smoker (ref=yes) no	3.616	1.061-12.317	0.040*

List of abbreviations: CI: Confidence interval; OR: Odds ratio

*p < 0.05

Table 6: Binary Regression analysis of significant predictors of knowing more than 50% of stroke risk factors or warning signs

Action to be taken	Male n (%)	Female n (%)	Total N (%)
Call a doctor	49 (15.2)	35(11.1)	84 (26.1)
Call a hospital	28 (8.7)	27 (8.5)	55 (17.2)
Direct the person to a hospital	08 (2.5)	08 (2.5)	16 (5.0)
Take the person to a hospital	72 (22.4)	52 (16.1)	124 (38.5)
Call family/friends/ neighbors	06 (1.9)	07 (2.1)	13 (4.0)
Seek spiritual attention	08 (2.5)	08 (2.5)	16 (5.0)
Do nothing	05 (1.5)	09 (2.8)	14 (4.3)

Table 7: Emergency actions to be taken by respondents when a stroke occurs

Sources of information	N (%)
Television	221 (68.6)
Radio	226(70.2)
Literature	116 (36)
Health practitioner	156 (48.4)
Stroke campaigns	206 (64)
Internets	161 (50.3)
Public library	152 (47.2)
Relatives	162 (50.3)
Others	63 (19.6)

Table 8: Sources of information about stroke

Discussion

This rural community-based survey of Nigerians showed that a majority of the respondents were aware of stroke risk factors and warning signs; and knowledgeable about stroke risk factors. The level of awareness reported for stroke risk factors and warning signs in this study is comparable with those reported by Obembe et al. [18], higher than Nakibuuka et al. [20] but lower than Kayode-Iyasere and Odiase, [19]. Awareness in our study, Obembe et al.'s [18] and Nakibuuka et al.'s [20] study was defined by identification of at least 2 risk factors and 2 warning signs, whereas it is defined by one in Kayode-Iyasere and Odiase's [19] study, hence the higher level in that study. Only a few respondents in this study were knowledgeable of warning signs of stroke, similar to report of Abate et al, [28]. One out of every five and two out of every five respondents in this study were not aware (i.e identified no or only one) risk factors and warning signs of stroke respectively. Wahab et al [8] reported higher proportions of respondents who identified no stroke warning signs while Nakibuuka [20] reported that higher respondents among Ugandan population did not know any stroke risk factors and warning signs. The differences in the results of these studies may be because majority of the respondents in our study had tertiary education and might have had more exposure and access to information about stroke, whereas secondary level education was attained by respondents in the other studies [18,20]. Poor knowledge of preventable risk factors and poor recognition of early warning signs of stroke can lead to rising stroke incidence and increase the level of disability associated with stroke [29].

Hypertension, the most identified stroke risk factor, [29,30] was recognized by less than half of the respondents which comprised higher number of females than males. This proportion is similar to that reported by Joubert et al., [30] but lower than other previous reports [12,18,19,31,32]. The high level of awareness of risk factors and warning signs and high knowledge of risk factors by respondents in our study might be due to possible health consciousness or previous life experiences. The use of a closed-ended questionnaire may also be contributory to the observed level of awareness and knowledge. Previous studies reported similar findings [19] and opined that the use of a closed-ended questionnaire could lead to overrating of the level of knowledge and facilitating recognition of correct responses [33]. Open-ended questions exclude guess work and better reveal the knowledge base of respondents [25]. It however requires much time to recall the responses and can be influenced by explanations made by the inter-

viewer [34]. Higher proportion of females identifying hypertension could be attributed to the possibility of better health-seeking behaviour in the females than males who are often engaged in other commitments [10]. Communities need to be informed of the close relationship between hypertension and stroke in future stroke awareness campaigns and health education [10].

Despite high literacy rate, higher number of respondents with secondary education than those with tertiary education correctly identified hypertension as a risk factor for stroke. Our findings may also imply that age and level of education may not necessarily be an important factor for the awareness of stroke warning signs whereas, level of education may be important for awareness and good knowledge of risk factors of stroke, consistent with previous studies [18,25]. Significant differences in the awareness of some risk factors between groups as observed in our study were also reported by Obembe et al. [18]. Although age is not a significant predictor of awareness of stroke risk factors in this study, similar study by Obembe et al, [18] opined that younger age (<40 years) was a predictor of identifying all the risk factors of stroke, similar to an earlier report [35].

Male gender was reported as a significant predictor of good knowledge of stroke risk factors in a previous study [34], consistent with our study. Better level of awareness and knowledge of risk factors of stroke by male respondents may imply that men are better able to recognize the risk factors of stroke because they seek other sources of information compared to females. Family history of stroke might be responsible for overall level of knowledge of stroke risk factors from previous experiences and this could stimulate acquisition of vital knowledge on stroke and its risk factors such as smoking and lack of exercises [25]. Respondents with history of heart disease were more likely to know all risk factors of stroke considered [18]. We also found that respondents with family history of stroke, history of heart disease/hypertension, history of prior stroke and lack of exercises were more likely to be aware of stroke warning signs while those with family history of stroke and secondary education were more likely to have good knowledge of warning signs of stroke, consistent with other studies [28,30,31]. Awareness of all risk factors and all warning signs by 2.5% respondents in this study is far lower than 13.4 % and 12.4% reported by Obembe et al. [18]. This wide difference may be due to the settings, academic versus rural, surveyed in the two studies. Poor recognition of multiple risk factors of stroke has been reported in earlier studies [36,37]. This may imply a carefree attitude to health; or attributed to high level of poverty resulting from high rate of unemployment in the country even among those with tertiary education who are the majority in this study.

More often than not, weakness and numbness were used interchangeably in reporting stroke warning signs. Identification of numbness as a warning sign by 46.9% respondents in our study is comparable to 45% reported by Blades et al. [37] but lower than 66.2% and 62.3% respondents reported to identify weakness and numbness respectively by Obembe et al. [18]. The reason for this difference in the same geographical zone may be attributed to commoner public health enlightenment campaigns in the urban setting than in the semi-urban/rural area where our study was carried out. Other earlier studies [17,21,38,39] however suggested that weakness was the most recognized warning signs of stroke. This may be because sudden unilateral weakness was the most common manifestation of stroke that respondents have seen. Slurred speech as the least recognized warning sign in this study was considerably lower than reported by Obembe et al, [18]; but higher than Wahab et al's [8] report. The differences in the results of these studies may be attributed to respondents' level of exposure, the environment and access to information about stroke.

Five percent respondents chose to seek spiritual attention despite the spiritual place of stroke in African belief [24,40]. This is higher than 1% of participants who preferred traditional healers in the event of a stroke reported by Nakibuuka et al. [20]. Radio being the most common source of information among the respondents may be due to its high affordability and availability. The choice of radio as the major source of information by respondents in our study may be partly because it was carried out in a rural setting. The use of mass media for campaign to improve public awareness and knowledge of stroke, its warning signs, and risk factors has been established in previous studies [19,35,36]. Level of awareness of risk factors and warning signs of stroke in this study is high and comparable to previous community based studies in Nigeria. Notwithstanding, a general delay in arrival to the hospital following an acute stroke has been reported [19,41].

The major limitations of this community-based survey are that it was confined to a fairly limited geographic area and used close-ended questions. Future studies should survey larger and more widespread rural communities. The use of open ended questionnaires should also be considered, as the closed ended questionnaire used in this study might have overestimated the level of awareness and knowledge of stroke risk factors and warning signs among the study sample.

Conclusion

There is high level of awareness of stroke risk factors and warning signs, largely influenced by family history of stroke, secondary level education and lack of exercises. Also, there is a high and low level of knowledge of stroke risk factors and warning signs respectively among Nigerian rural community dwellers. Health education of the community could be achieved through a joint effort of health professionals in the hospitals and education through regular programs in the mass media, particularly on radio and television using the appropriate local language to ensure the message is understood by the entire population.

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Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Ethics and Research committee, Institute of Public Health, Obafemi Awolowo University, Ile-Ife with Protocol number IPHOAU/12/1393. A written informed consent was obtained from each participant before administering the questionnaires.

Consent for publication

Not Applicable

Availability of data and materials

The data to support the findings of this study are available from the corresponding author, MO upon reasonable request.

Disclosure statement

The authors report no competing interests.

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Authors' Contribution

MO conceived and coordinated the study, analyzed and interpreted the data, drafted the initial manuscript and prepared the final manuscript for publication. TG and NA participated in the design of methodology, data collection, entry and initial drafting of the manuscript. NA, CE, and AM were involved in data analysis, interpretation, initial drafting and proof reading of the manuscript. AO was involved in conception and design of the study, initial drafting and proof reading of the manuscript. All authors were involved in the review of initial manuscript for major intellectual content. All authors read and approved the final manuscript.

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