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Original Paper

Knowledge of Stroke among Hypertensive-Diabetic Patients at the National Diabetes Management and Research Centre of Korle-Bu Teaching Hospital in Ghana

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ABSTRACT

Background: Achieving the requisite knowledge of stroke is still a challenge globally. Lack of knowledge about stroke, its risk factors, and warning signs results in late reporting of patients to the hospital. It appears knowledge of stroke in Ghana is seemingly poor, thus the need to investigate further.

Objective: To determine the knowledge of stroke among hypertensive-diabetic patients.

Methodology: A cross-sectional survey, involving 208 individuals recruited from the National Diabetes Management and Research Centre of Korle-Bu Teaching Hospital, diagnosed of hypertension and diabetes was undertaken in 2010. Participants completed a questionnaire after signing a consent form. Data was analysed using SPSS version 16.0 and the relationship between variables was determined at a significance level of 5%.

Results: The mean age was 57.3 (SD ± 11.1) and most (58.7%) participants were female. The overall knowledge of stroke among participants was high (79.18%), while marital status (*p-value* = 0.041), educational level (*p - value* = 0.001) and employment status (*p – value* = 0.043) had a significant relationship with overall knowledge. Friends and family accounted for the greatest source of knowledge (43%) followed by health professionals and health education programs (36%).

Conclusion: The overall knowledge of stroke among hypertensive-diabetic patients in Korle-Bu Teaching Hospital with respect to general knowledge of stroke, knowledge of risk factors, and knowledge of the warning signs was high. Marital status, educational level and employment status were predictors of the level of knowledge among the hypertensive-diabetic patients.

Recommendations: Health professionals like physiotherapists should take a keen interest in educating high-risk individuals to help reduce the prevalence of stroke in Ghana. An intervention to facilitate the reduction of modifiable risk factors of stroke effectively to reach all facets of society by health institutions in collaboration with policy makers should be implemented.

Key words: Stroke, Knowledge, Hypertensive-diabetic, Health Professionals, Ghana

1. Introduction

Stroke is described as a rapidly developing loss of brain function(s) due to disturbance in blood supply to the brain resulting from ischemia or a haemorrhage [1]. Stroke has been documented as a significant cause of long-term disability globally; with features such as considerable impairment in sensation, motor, mental, perceptual and language deficits [2]. The global burden emanating from stroke in terms of disability adjusted life years (DALYs), poses both short term and long-term consequences including a socio-economic burden on nations [3]. It is the most common serious neurological disorder in the United States, comprising half of all patients admitted to the hospital for neurological diseases [4].

Research evidence suggests that cases of fatality in those who develop stroke are more in Sub-Saharan Africa than in developed countries [5,6]; one of the main reasons for the rise in stroke as a cause of death is patients' lack of knowledge of the risk factors involved [2]. Furthermore, factors such as immediate and adequate medical attention, and poor patient participation in the management of stroke have also been well documented [7]. Patients' active participation in stroke management demands motivation, knowledge, and compliance from the patient since it is a complex lifetime regime that needs to be followed [7].

Patients who do not have a general knowledge of stroke especially the factors that puts them at risk of developing a stroke are less likely to engage in stroke prevention practices like controlling their blood pressure and behavioural pattern change including smoking cessation, and following a low-salt diet [8]. In Sub-Saharan African countries, there is seemingly an extensive lack of knowledge pertaining to stroke within the population in general and among the medical staff especially on how to rehabilitate people affected by a stroke [6,9]. Poor knowledge leads to low compliance in making use of prevention programmes, thus patients are less likely to attend stroke management programmes [10]. Studies from United States [11], and Europe [12] suggest that patients baseline knowledge about stroke among the public was poor; furthermore, they found that the less educated and low-income residents were the least knowledgeable about stroke and those at a high risk of getting a stroke. A comparative study conducted in South Africa by Fritz and others [13], among groups of patients with hypertension, diabetes, and stroke revealed that knowledge of stroke risk factors amongst all the groups was inadequate.

It is very important for at-risk patients to know the risk factors of stroke, failure to which they may not engage in prevention practices such as proper adherence to medication regimes, regular medical check-up, and lifestyle changes [14]. Unless patients are made aware of the signs and symptoms of stroke, they may postpone early hospital presentation, which decreases recovery chances; these patients may also not willingly engage in post stroke rehabilitation programs. Reduction in the risk of stroke and increase in the speed of hospital presentation after an onset both depend on the level of knowledge of stroke in the general population [2].

Hypertension is the strongest risk factor compared to other modifiable risk factors especially in middle and late adult life in both males and females while diabetes also poses a high risk of stroke among individuals. Studies show that most patients with diabetes have hypertension in addition to evidence that there is a metabolic link between hypertension and diabetes due to a resistance in the way the body reacts to insulin [15,16]. The major issue with diabetes and hypertension is that both are major risk factors for the development of atherosclerosis, therefore the risk of cardiac arrests and stroke are all heightened compared to having either alone; about 73% of adults with diabetes mellitus have hypertension [17]; in view of renewed concern to educate hypertensive-diabetic patients on stroke, this study was designed to determine the knowledge of stroke among these patients, at the National Diabetes Management and Research Center (NDMRC), Korle-bu Teaching Hospital (KBTH), Ghana. The aim of the study was to determine the knowledge of stroke among hypertensive-diabetic patients in the NDMRC of KBTH.

2. Methodology

This study was conducted in 2010 at the NDMRC of KBTH, a major referral hospital in Ghana. The study design was a cross-sectional survey with a convenience sampling method being adopted. Both male and female individuals diagnosed of both hypertension and diabetes and voluntarily accepted to participate in the study were utilized. Diabetic patients with induced hypertension such as due to pregnancy and those diagnosed with cognitive impairment were excluded from this study.

A structured researcher-administered questionnaire (Appendix I) with closed-ended questions was used for data collection. This questionnaire was structured from questionnaires used by Fritz and others [13], Wellwood, Denis, and Warlow, [18] and Yoon and others [19], which assess knowledge of stroke, planned response on noticing stroke warning signs, sources of knowledge of stroke, as well as knowledge of the risk factors. The percentage score for each section was calculated by adding all the points attained by a patient and dividing by the total points for that section, and then multiplied by 100. The overall scored percentage was calculated by adding the scores in all of the knowledge sections to obtain a grand total. The grand total was then divided by the maximum possible score and multiplied by 100 to obtain percentages. Thereafter, the percentages were categorized into low, moderate and high scores. (70 – 100 = high; 50 – 69 = moderate; 0 – 49 = low). Each correct answer attracted one (1) point and a wrong answer attracted zero (0) points.

Prior to the distribution of the questionnaire, the initial draft-questionnaire was sent to physiotherapy educators (including clinicians) of University of Ghana Department of Physiotherapy (School of Biomedical and Allied Health Sciences) to identify any ambiguities. Following the identification of ambiguities by the physiotherapy educators, the reliability of the questionnaire was sought by administering it to ten hypertensive-diabetic patients at the NDMRC twice over a two-week period. The data was then entered in SPSS version 16.0 for which a Cronbach's alpha of 0.76 was obtained signifying that the questionnaire had a good reliability. The validated questionnaire was subsequently administered to each consenting participant who met the inclusion criteria. Ethics approval was sought and obtained from the Ethics and Protocol Review Committee of the School of Biomedical and Allied Health Sciences, University of Ghana.

Data was subsequently collected over a two-month period from February to March 2010. All data collected was computed and analysed with the SPSS version 16.0.

Descriptive statistics of means, standard deviations, frequencies, and percentages were used to summarize data obtained. Pearson's product moment correlation coefficient was used to measure the strength of relationship between variables. The level of significance was set at $P<0.05$.

3. Results

Socio-demographic characteristics of the participants

Two hundred and eight (N= 208) participants were recruited for this study. They comprised of 122 (58.7%) females and 86 (41.3%) males (Table 1). The mean age of participants was 57.3 years (SD ± 11.1), with ages ranging from 25 to 89 years. Approximately 47% of the participants had a secondary school level of education (n= 98; 47%).

Participants' general knowledge of stroke

The results revealed that 142 (68.3%) of participants knew stroke as a condition that occurs in the brain. One hundred and seven (75.5%) defined stroke as weakness of a part of the body, followed by those who said stroke was due to a spiritual attack (n= 75; 36.1%). More than 88% indicated that stroke is a condition from hypertension (n= 185). Approximately 38% of the participants responded that stroke is the same as heart attack (n= 78) as illustrated in Table 2.

Participants' knowledge of the risk factors of stroke

Hypertension was the most recognized risk factor for stroke with 180 (87%) participants identifying it, followed by alcohol (n = 164, 79%), diabetes (n=160; 76.9%), high cholesterol (n= 158; 76%) and stress (n= 158; 76%), inactivity (n= 153; 74%) and diet (n = 148; 71%), (Figure 1). "Yes" responses on the other risks were below 70%. The decoy risk factors, activity (n= 16; 7.7%), low blood pressure (n= 115; 55.3%) were included to assess and account for the possibility that participants would answer "yes" to all items.

Participants' knowledge of the warning signs of stroke

Overall, "yes" responses were above 20% for the warning signs of stroke, except coughing (n = 38; 18.7%) (Figure 2). Blurred and double vision, loss of vision in one eye, and chest pain were mentioned by patients as other signs of stroke.

Participants' reactions to warning signs of stroke

More than 60% of the participants indicated they will go to a community health facility on observation of the various stroke symptoms indicated, about 10% will go to a traditional healer, prayer camp or observe symptoms to see if they will subside, as illustrated in Table 3.

Participants' sources of knowledge of stroke

Slightly less than half of the participants (42%) obtained their knowledge of stroke from friends, while 36% from health professionals and health education programmes. Health professionals comprised physiotherapists, doctors, nurses and other health professionals. Other sources as illustrated in Figure 3 included churches, mosques, herbalists, keep fit programmes and personal experience of affected people.

Participants' overall level of knowledge of stroke

Table 4 illustrates the participants' scores and percentages on each variable while Figure 4 summarizes the overall knowledge of stroke. The overall average of level of knowledge of stroke showed that out of all the 208 participants, 8.97% scored low, 11.88% scored moderate and 79.18% scored high.

General knowledge of stroke in relation to socio-demographic characteristics

Majority (75.48%) of the participants had a high score on general knowledge of stroke. There was a significant relationship between general knowledge of stroke and marital status (p-value= 0.018). Employment status also showed a significant relationship with general knowledge of stroke (p-value= 0.009) (Table 5).

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Knowledge of risk factors of stroke in relation to socio-demographic characteristics

Table 6 represents participants' scores for knowledge on risk factors of stroke in relation to socio-demographic characteristics of participants; furthermore, a significant relationship was not established between knowledge of risk factors of stroke and each of the socio-demographic characteristics.

Knowledge of the warning signs of stroke in relation to socio-demographic characteristics

Table 7 represents the knowledge of the warning signs of stroke in relation with socio-demographic characteristics of participants. There was a significant relationship between knowledge of the warning signs of stroke and participants' employment status (p-value= 0.033) and marital status (p-value= 0.022).

Table 1: Summary of socio-demographic characteristics of participants

VARIABLE	FREQUENCY	PERCENTAGE %
SEX		
female	122	58.65
male	86	41.35
TOTAL	208	100.00
AGE GROUP		
20-29	2	0.96
30-39	13	6.25
40-49	31	14.90
50-59	71	34.13
60-69	63	30.29
≥ 70	28	13.46
TOTAL	208	100.00
MARITAL STATUS		
divorced	29	13.94
married	132	63.46
single	17	8.17
widowed	30	14.42
TOTAL	208	100.00
EDUCATIONAL LEVEL		
never attended school	30	14.42
primary	34	16.35
secondary	98	47.12
tertiary	46	22.12
TOTAL	208	100.00
EMPLOYMENT STATUS		
employed	94	45.19
unemployed	114	54.81
TOTAL	208	100.00

Table 2: Summary of participants' general knowledge of stroke

VARIABLE	FREQUENCY	PERCENTAGE %
STROKE IS A:		
DISEASE OF THE BRAIN		
don't know	39	18.75
no	27	12.98
yes	142	68.27
TOTAL	208	100.00
DISEASE RESULTING IN WEAKNESS OF A PART OF THE BODY		
don't know	20	9.62
no	31	14.90
yes	157	75.48
TOTAL	208	100.00
SPIRITUAL ATTACK		
don't know	27	12.98
no	106	50.96
yes	75	36.06
TOTAL	208	100.00
DISEASE RESULTING FROM HIGH BLOOD PRESSURE		
don't know	13	6.25
no	10	4.81
yes	185	88.94
TOTAL	208	100.00
WHICH STRUCTURES DOES STROKE MANIFEST IN?		
arm and mouth	16	7.69
arm, leg and mouth	154	74.04
don't know	20	9.62
nerves	18	8.65
TOTAL	208	100.00
DOES STROKE OOCCUR IN THE HEART?		
don't know	67	32.21
no	63	30.29
yes	78	37.50
TOTAL	208	100.00
IS STROKE THE SAME AS HEART ATTACK?		
don't know	45	21.63
no	85	40.87
yes	78	37.50
TOTAL	208	100.00
IS STROKE PREVENTABLE?		
don't know	19	9.13
no	18	8.65
yes	171	82.21
TOTAL	208	100.00
IS STROKE TREATABLE?		
don't know	23	11.06
no	21	10.10
yes	164	78.85
TOTAL	208	100.00

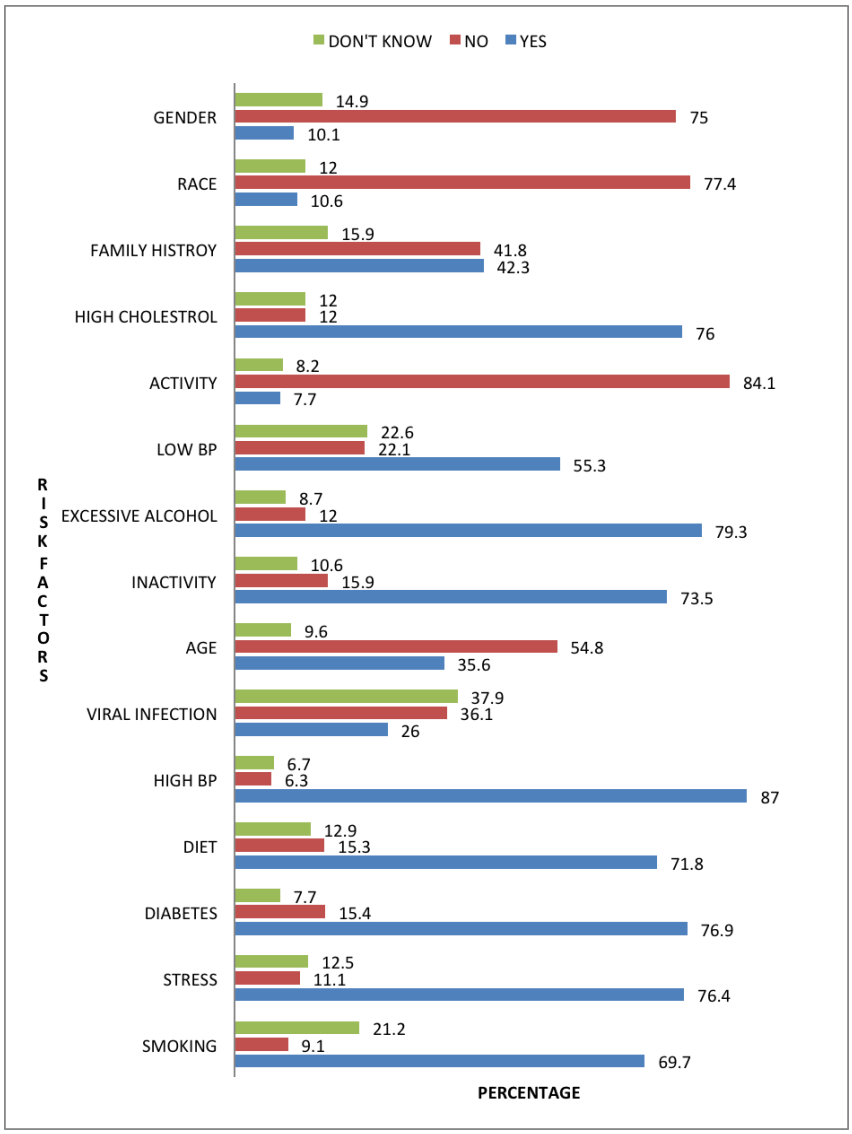

Figure 1: Participants' knowledge of risk factors of stroke

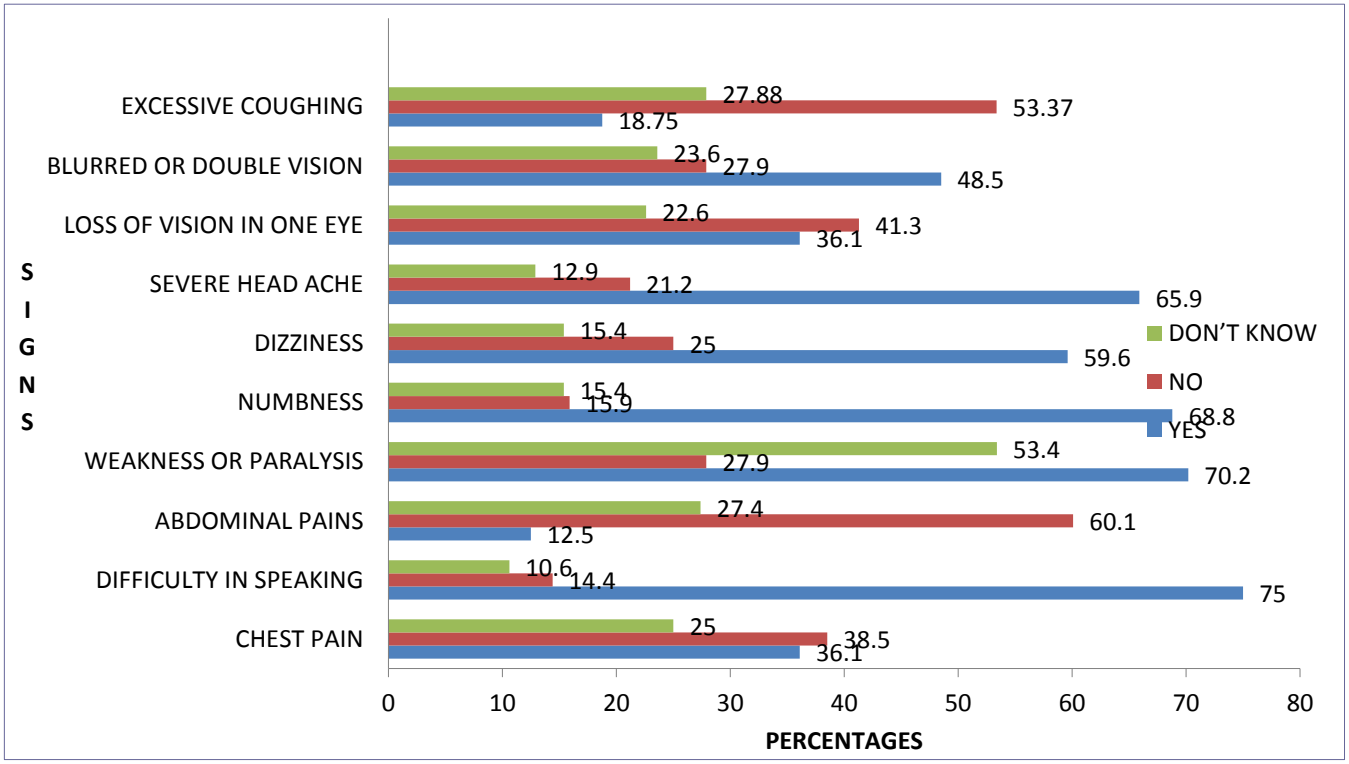

Figure 2: Participants' knowledge of warning signs of stroke

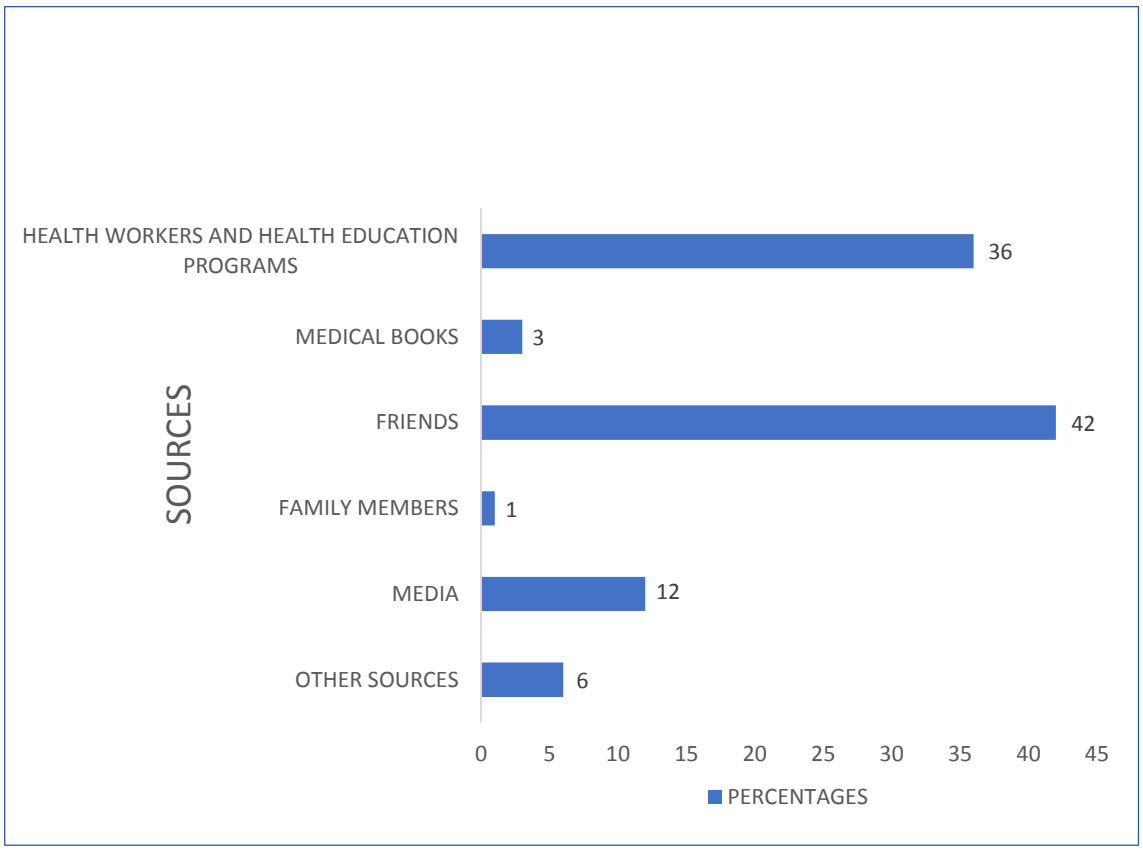

Figure 3: Participants' sources of knowledge of stroke

Table 3: Summary of participants' reactions to stroke warning signs

	Warning Sign					
	Severe Headache	Difficulty in Speaking	Blurred Vision	Weakness or Paralysis	Numbness	Dizziness
Reaction						
Go to the community health facility	62.5	75.5	72.6	73.5	74.5	65.4
Go to the community pharmacy	27.4	12.5	15.4	14.9	18.3	17.3
Visit the traditional healer	1.4	2.9	3.4	3.4	1.9	0.5
Visit prayer camp, faith healer or pastor	0	1.0	2.9	0.5	1.0	0.5
Wait and observe symptoms to see if they subside	6.3	5.8	3.8	5.3	2.9	14.9
Don't know	2.4	2.3	1.9	2.4	1.4	1.4
Total %	**100**	**100**	**100**	**100**	**100**	**100**

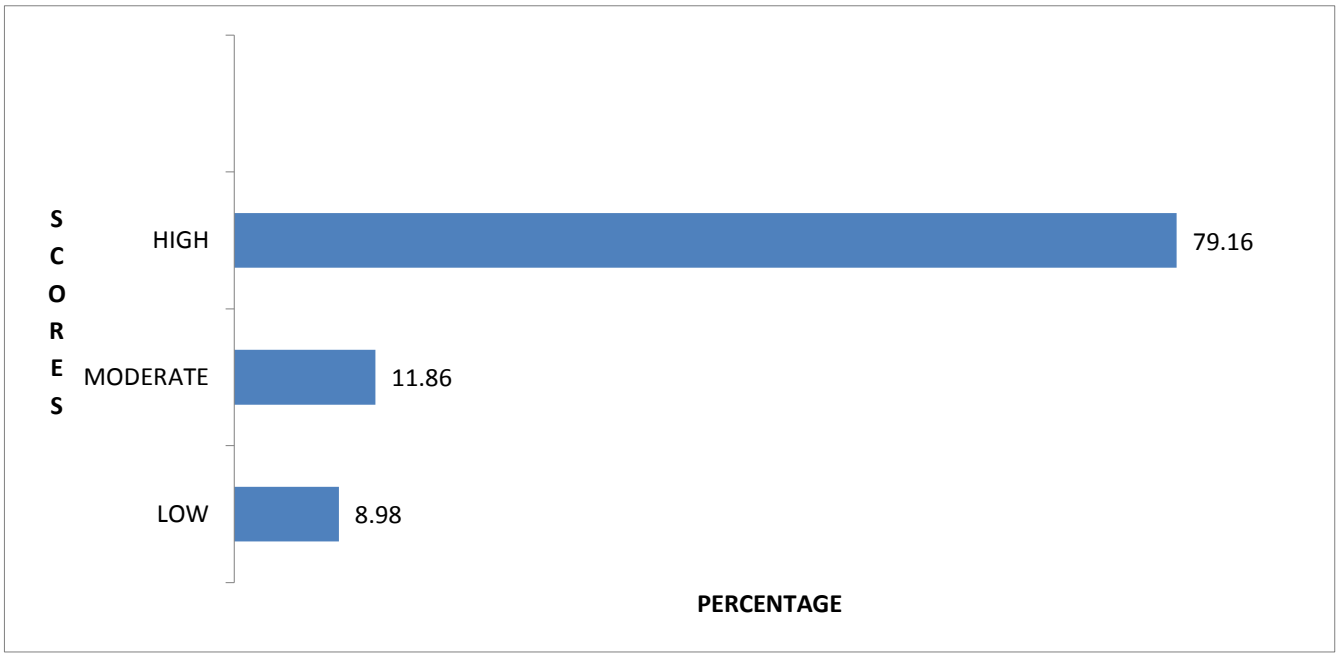

Figure 4: Participants' overall knowledge of stroke

Table 4: Summary of participants' scores on overall knowledge of stroke

VARIABLE	FREQUENCY	PERCENTAGE %
GENERAL KNOWLEDGE ON STROKE		
high	157	75.48
moderate	31	14.90
low	20	9.62
TOTAL	208	100.00
KNOWLEDGE ON RISK FACTORS OF STROKE		
high	181	87.02
moderate	13	6.25
low	14	6.73
TOTAL	208	100.00
KNOWLEDGE OF WARNING SIGNS OF STROKE		
high	156	75.00
moderate	30	14.42
low	22	10.58
TOTAL	208	100.00

Table 5: Summary of general knowledge of stroke in relation to socio-demographic characteristics

SOCIO-DEMOGRAPHIC CHARACTERISTICS	**SCORES**				**P-VALUE**
	HIGH	MODERATE	LOW	TOTAL	
AGE GROUP					
25-50	34(70.8)	6(12.5)	8(16.7)	48(100.0)	
51-75	116(75.8)	25(16.3)	12(7.8)	153(100.0)	0.215
>75	7(100.0)	0(0.0)	0(0.0)	7(100.0)	
TOTAL	157(75.5)	31(14.9)	20(9.6)	208(100.0)	
SEX					
female	90(73.8)	18(14.8)	14(11.5)	122(100.0)	
male	67(77.9)	13(15.1)	6(7.0)	86(100.0)	0.554
TOTAL	157(75.5)	31(14.9)	20(9.6)	208(100.0)	
MARITAL STATUS					
divorced	19(65.5)	8(27.6)	2(6.9)	29(100.0)	
married	108(81.8)	14(10.6)	10(7.6)	132(100.0)	
single	12(70.6)	4(23.5)	1(5.9)	17(100.0)	0.018*
widowed	18(60.0)	5(16.7)	7(23.3)	30(100.0)	
TOTAL	157(75.5)	31(14.9)	20(9.6)	208(100.0)	
EDUCATIONAL LEVEL					
never attended school	20(66.7)	5(16.7)	5(16.7)	30(100.0)	
primary	24(70.6)	5(14.7)	5(14.7)	34(100.0)	
secondary	76(77.6)	15(15.3)	7(7.1)	98(100.0)	0.629
tertiary	37(80.4)	6(13.0)	3(6.5)	46(100.0)	
TOTAL	157(75.5)	31(14.9)	20(9.6)	208(100.0)	
EMPLOYMENT STATUS					
employed	80(85.1)	7(7.4)	7(7.4)	94(100.0)	
unemployed	77(67.5)	24(21.1)	13(11.4)	114(100.0)	0.009*
TOTAL	157(75.5)	31(14.9)	20(9.6)	208(100.0)	

***Significant at 5%**

Table 6: Summary of knowledge of risk factors of stroke in relation to socio-demographic characteristics

SOCIO-DEMOGRAPHIC CHARACTERISTICS	SCORES				P-VALUE
	HIGH	MODERATE	LOW	TOTAL	
AGE GROUP					
25-50	41(85.4)	5(10.4)	2(4.2)	48(100.0)	
51-75	133(86.9)	8(5.2)	12(7.8)	153(100.0)	0.494
>75	7(100.0)	0(0.0)	0(0.0)	7(100.0)	
TOTAL	181(87.0)	13(6.2)	14(6.7)	208(100.0)	
SEX					
female	105(86.1)	7(5.7)	10(8.2)	122(100.0)	
male	76(88.4)	6(7.0)	4(4.7)	86(100.0)	0.578
TOTAL	181(87.0)	13(6.2)	14(6.7)	208(100.0)	
MARITAL STATUS					
divorced	26(89.7)	2(6.9)	1(3.4)	29(100.0)	
married	115(87.1)	9(6.8)	8(6.1)	132(100.0)	
single	13(76.5)	2(11.8)	2(11.8)	17(100.0)	0.682
widowed	27(90.0)	0(0.0)	3(10.0)	30(100.0)	
TOTAL	181(87.0)	13(6.2)	14(6.7)	208(100.0)	
EDUCATIONAL LEVEL					
never attended school	27(90.0)	1(3.3)	2(6.7)	30(100.0)	
primary	31(91.2)	2(5.9)	1(2.9)	34(100.0)	
secondary	82(83.7)	8(8.2)	8(8.2)	98(100.0)	0.865
tertiary	41(89.1)	2(4.3)	3(6.5)	46(100.0)	
TOTAL	181(87.0)	13(6.2)	14(6.7)	208(100.0)	
EMPLOYMENT STATUS					
employed	86(91.5)	2(2.1)	6(6.4)	94(100.0)	
unemployed	95(83.3)	11(9.6)	8(7.0)	114(100.0)	0.079
TOTAL	181(87.0)	13(6.2)	14(6.7)	208(100.0)	

Table 7: Summary of knowledge of the warning signs of stroke in relation to socio-demographic characteristics

SOCIO-DEMOGRAPHIC CHARACTERISTICS	SCORES				P-VALUE
	HIGH	MODERATE	LOW	TOTAL	
AGE GROUP					
25-50	30(62.5)	8(16.7)	10(20.8)	48(100.0)	
51-75	121(79.1)	20(13.1)	12(7.8)	153(100.0)	0.054
>75	5(71.4)	2(28.6)	0(0.0)	7(100.0)	
TOTAL	156(75.0)	30(14.4)	22(10.6)	208(100.0)	
SEX					
female	85(69.7)	20(16.4)	12(7.8)	122(100.0)	
male	71(82.6)	10(11.6)	0(0.0)	86(100.0)	0.080
TOTAL	156(75.0)	30(14.4)	22(10.6)	208(100.0)	
MARITAL STATUS					
divorced	21(72.4)	8(27.6)	0(0.0)	29(100.0)	
married	105(79.5)	1(9.8)	14(0.6)	132(100.0)	
single	10(58.8)	5(29.4)	2(11.8)	17(100.0)	0.022*
widowed	22(73.3)	3(12.0)	5(16.7)	30(100.0)	
TOTAL	156(75.0)	30(14.4)	22(10.6)	208(100.0)	
EDUCATIONAL LEVEL					
never attended school	24(80.0)	2(6.7)	4(13.3)	30(100.0)	
primary	26(76.5)	4(11.8)	4(11.8)	34(100.0)	
secondary	68(69.4)	18(18.4)	12(12.2)	98(100.0)	0.467
tertiary	38(82.6)	6(13.0)	2(4.3)	46(100.0)	
TOTAL	156(75.0)	30(14.4)	22(0.6)	208(100.0)	
EMPLOYMENT STATUS					
employed	78(83.0)	11(11.7)	5(5.3)	94(100.0)	
unemployed	78(68.4)	19(16.7)	17(14.9)	114(100.0)	0.033*
TOTAL	156(75.0)	30(4.4)	22(10.6)	208(100.0)	

***Significant at 5%**

Table 8: Summary of overall knowledge of stroke in relation to socio-demographic characteristics

SOCIO-DEMOGRAPHIC CHARACTERISTICS	SCORES				P-VALUE
	HIGH	MODERATE	LOW	TOTAL	
AGE GROUP					
25-50	35(72.9)	6(12.5)	7(14.6)	48(100.0)	
51-75	120(78.4)	14(9.2)	19(12.4)	153(100.0)	0.074
>75	4(57.1)	3(42.9)	0(0.0)	7(100.0)	
TOTAL	159(76.4)	23(11.1)	26(12.5)	208(100.0)	
SEX					
female	88(72.1)	15(12.3)	19(15.6)	122(100.0)	
male	71(82.6)	8(9.3)	7(8.1)	86(100.0)	0.187
TOTAL	159(76.4)	23(11.1)	26(12.5)	208(100.0)	
MARITAL STATUS					
divorced	21(72.4)	5(17.2)	3(10.3)	29(100.0)	
married	109(82.6)	10(7.6)	13(9.8)	132(100.0)	
single	10(58.8)	4(23.5)	3(17.6)	17(100.0)	0.041*
widowed	19(63.3)	4(13.3)	7(23.3)	30(100.0)	
TOTAL	159(76.4)	23(11.1)	26(12.5)	208(100.0)	
EDUCATIONAL LEVEL					
never attended school	20(66.7)	7(23.3)	3(10.0)	30(100.0)	
primary	26(76.5)	4(11.8)	4(11.8)	34(100.0)	
secondary	69(70.4)	12(12.2)	17(17.3)	98(100.0)	0.001*
tertiary	44(95.7)	0(0.0)	2(4.3)	46(100.0)	
TOTAL	159(76.4)	23(11.1)	26(12.5)	208(100.0)	
EMPLOYMENT STATUS					
employed	79(84.0)	6(6.4)	9(9.6)	94(100.0)	
unemployed	80(70.2)	17(14.9)	17(14.9)	114(100.0)	0.043*
TOTAL	159(76.4)	23(11.1)	26(12.5)	208(100.0)	

***Significant at 5%**

4. Discussion

Socio-demographic characteristics of the participants

The study showed that there were more females than males conforming to previous studies by Harwell and collegues [20], Travis and others [21], and Zheng and collegues [22]. However, it differs from other hospital-based studies by Pandian and others [23]. The prevailing lifestyles of the females in the geographical area of this study could have accounted for the higher prevalence of hypertension and diabetes amongst the participants; most females are generally seen to be inactive where duties they mostly perform are household chores. The counter observation where prevalence among the male participants is lower than females could be attributed to the fact that in Ghana males are the breadwinners and so they engage in a lot of exercise as they go about working to earn for their families' upkeep.

Findings from the study are consistent with a study by Pandian and others [23], in India, a developing country where the age of most participants was less than 70 years; the study also revealed that age was a strong predictor of stroke. Majority of the patients had attained secondary school education, with a lower percentage attaining tertiary education and primary education. This is in conformity to the findings of similar studies in other geographical areas such as India [23], Australia [24] and United States of America [25]. The high level of education reported by patients in the study can be attributed to the fact that KBTH is one of the major teaching hospitals and a major referral point in Ghana; furthermore, it could be attributed to the fact that patients visiting KBTH are at a high socio-economic status thus can afford the expenses.

Participants' general knowledge of stroke

Although 68.27% of the participants indicated that stroke occurs in the brain, 37.50% responded that stroke is the same as heart attack. A study by Yoon and others [24], about the knowledge and perception about stroke among an Australian urban population. The study revealed participants' difficulty in differentiating between stroke and heart attack, as they perceived both conditions to be same.

There was no significant relationship between the levels of education of the participants and their general knowledge of stroke. A hospital-based study in India [23], found contrary results where patients' level of education was a predictor of general knowledge of stroke. Furthermore, employment

status was significantly associated with general knowledge. This finding corroborates a study by Ramírez-Moreno and colleagues [26]. There was a significant relationship between general knowledge of stroke and marital status, however, findings by Ehidiamen and others [27] revealed contrary evidence. The findings from this study is suggestive of the fact that educational level, marital status, and employment status are associated with persons who are generally enlightened and have positive health seeking behaviours.

Knowledge of the risk factors of stroke

Most of the patients recognized hypertension and diabetes as risk factors of stroke. Similar findings were reported in studies by Kothari and others [28], on public perception of stroke warning signs, and knowledge of potential risk factors and Walker and others [10], on knowledge of stroke. However, similar studies by Dokova and others [29] and Harwell and collegues [20], produced contrary results; these studies revealed that hypertension was identified as a risk factor by less than 50% of the participants. Hypertension and diabetes were identified as risk factors for stroke in this study by the majority of the patients probably because a larger percentage of stroke cases in KBTH are due to hypertension and diabetes.

There was no significant relationship between age and knowledge of risk factors of stroke (p-value=0.494). This is contrary to findings in a study by Harwell and others [20] where a significant relationship was established. The study also showed that there was no significant relationship between level of education and knowledge on risk factors of stroke (p-value= 0.865). This could have occurred due to the patient's high sensitivity to the fact that they fall within the at-risk group, thus their educational status didn't affect their knowledge.

Knowledge of warning signs of stroke

About 63.9% and 51.5% did not know that loss of vision in one eye and blurred or double vision respectively were warning signs of stroke. This is in contrast with a population based study in Australia [24], where blurred, double vision, and loss of vision in one eye were identified by respondents as the most common warning signs of stroke. Furthermore, findings reported in other hospital-based studies by Nighoghossian and others [30] and Pandian and others [23]; suggested that knowledge of warning signs of stroke was low among individuals.

There was no significant relationship between educational level and knowledge of the warning signs of stroke; however, there was a significant relationship between employment status and knowledge of the warning signs of stroke. This suggests that employment status was a predictor for participants' knowledge of the warning signs of stroke. Furthermore, there was a significant relationship between marital status and knowledge of the warning signs of stroke. This could probably be due to the fact that most of the married participants were in a high age range (50-70) which has been established as a high predictor of knowledge from this study.

Overall knowledge of stroke

The findings in the study show that most participants scored high in the overall level of knowledge of stroke. This was represented in a high level of knowledge about stroke warning signs, risk factors, and general knowledge of stroke. There was a significant relationship between the participants' socio-demographic characteristics (educational level, marital status and employment status) and their overall knowledge of stroke. The study revealed the overall knowledge of stroke among the males was higher than the females even though there were more females than males in the study; this could probably be due to the fact that the male participants were more cautious of their health than the female participants. These findings are contrary to a review of fifteen studies of which knowledge of stroke was low, with older people showing lower levels of knowledge compared with the younger ones [31].

Participants' reactions to stroke warning signs

Majority of the participants said their immediate response to the various stroke symptoms is to visit the community health facility. This suggests that their health seeking behaviour is seemingly high, which might have a positive effect on their health status. Furthermore, the setting for this study is a health seeking facility, thus it suffices to say that they are health conscious regardless of the condition. This study corroborates findings by Yoon and others [24], that although levels of knowledge were not generally high, their immediate reaction will be to visit a health facility.

Sources of knowledge of stroke

Most of the participants in the research reported friends as their primary source of knowledge of stroke followed by healthcare workers and health education programs. Healthcare workers involved in this study were mainly doctors, nurses, and physiotherapists. The findings which suggest that participants obtained more knowledge about stroke from friends should be a source of worry for health professionals. This is primarily because the participants of this study indicated that they visited a health facility and therefore gaining knowledge from the health facility would have been expected. Contrary to these finding Saengsuwan and others [32] reported that their participants' primary source of knowledge was healthcare providers. The present study therefore suggests that health professionals may need to increase their education campaign for their clients and the general public to ensure that the requisite information reaches them.

Conclusion

The findings of this study indicate that the overall knowledge of stroke among the hypertensive-diabetic patients who participated in the study was high. The participants had high scores relating to general knowledge of stroke, knowledge of risk factors and knowledge of warning signs of stroke. However, their friends formed their highest source of knowledge for stroke. Marital status, educational level, and employment status were predictors of the level of knowledge among the hypertensive-diabetic patients.

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Author contributions

PA and JQ contributed to the study design, collected and analysed the data. SK sourced and reviewed relevant literature. PA, JQ, and SK wrote and also reviewed the manuscript for important intellectual content. PA, JQ, and SK revised the final draft version and approved the final version of the manuscript for submission.

References

1. Sims NR, Muyderman H. Mitochondria, oxidative metabolism and cell death in stroke. Stroke. 2009;16:234–8.

2. Saengsuwan J, Suangpho P, Tiamkao S. Knowledge of Stroke Risk Factors and Warning Signs in Patients with Recurrent Stroke or Recurrent Transient Ischaemic Attack in Thailand. Neurol Res Int. 2017;2017:1–8.

3. Feigin VL, Roth GA, Naghavi M, Parmar P, Krishnamurthi R, Chugh S, et al. Global burden of stroke and risk factors in 188 countries , during 1990 – 2013 : a systematic analysis for the Global Burden of Disease Study 2013. Lancet Neurol [Internet]. 2016;15(9):913–24. Available from: http://dx.doi.org/10.1016/S1474-4422(16)30073-4

4. Mackay J, Mensah GA. The atlas of heart disease and stroke. Geneva; 2004.

5. Adeloye D. An Estimate of the Incidence and Prevalence of Stroke in Africa : A Systematic Review and Meta-Analysis. PLoS One. 2014;9(6):e100724.

6. Kelly PJ, Walker RW, Rolfe M, George MO, James OFW. Mortality and recovery after stroke in the Gambia. Am Hear Assoc. 2003;34:1604–9.

7. Steffen-Batey, L. Morgenstern LB, Smith MA, Moye LA. Barriers to acute stroke therapy and stroke prevention in Mexican Americans. Stroke. 2001;32:1360–1364.

8. Schneider AT, Khoury JC, Pancioli AM, Rademacher, E. Tuchfarber A, Miller R, Kissela B, et al. Trends in community knowledge of the warning signs and risk factors for stroke. J Am Med Assoc. 2003;15(289):343–6.

9. Kitange HM, Walker RW, Mclarty DG, Whiting D, Masuki G, Mtasiwa DM, et al. Stroke mortality in Urban and Rural Tanzania. Adult Morb Mortal Proj Lancet. 2000;355:1684–7.

10. Walker RW, Mclarty DG, Masuki G, Kitange HM, Whiting D, Moshi AF, et al. Age specific prevalence of impairment and disability relating to hemiplegic stroke in the Hai District of northern Tanzania. J Neurol Neurosurg Psychiatry. 1999;68:744–9.

11. Goodinga TD, Beckera KJ, Fruina MS, Tirschwella DL, Lovea PJ, Mankowskia TM. Community-Based Education Improves Stroke Knowledge. J Cerebrovasc Dis. 2011;11:34–43.

12. Castilloe J, Seguraa T, Vegab G, López S, Rubiod F. Public Perception of Stroke in Spain. J Cerebrovasc Dis. 2003;16:21–6.

13. Fritz V, Bogoshi G, Stewart A, Hale L. Knowledge of stroke risk factors amongst black diabetic, hypertensive and stroke patients. South African J Physiother. 2003;4(59):25–30.

14. Yoon SS, Byles J. Perceptions of stroke in the general public and patients with stroke: a qualitative study. Br Med J. 2002;324:1065–8.

15. Bensadoun E, Holm SW, Cunningham LL, Madsen MJ. Hypertension: Classification, Pathophysiology, and Management during Outpatient Sedation and Local Anesthesia. J Oral Maxillofac Surg. 2006;64:111–21.

16. Cubrilo-Turek M. Stroke risk factors: Recent evidence and new aspects. J Int Congr Ser. 2004;1262:466–9.

17. Centers for Disease Control and Prevention. National Diabetes Statistics Report: Estimates of Diabetes and Its Burden in the United States. Atlanta, GA: Centers for Disease Control and Prevention; 2014. US Dep Heal Hum Serv. 2017;(Cdc):2009–12.

18. Wellwood I, Denis MS, Warlow CP. Perceptions and knowledge of stroke among surviving patients with stroke and their cares. J Age Ageing [Internet]. 1994; Available from: http://www.findarticles.com/p/articles/mi_m2459/is_n4_v23/ai_15657850

19. Yoon SS, Heller RF, Levi C, Wiggers J, Fitzgerald PE. Knowledge of Stroke Risk Factors , Warning Symptoms , and Treatment Among an Australian Urban Population. Stroke. 2001;32:1926–31.

20. Harwell TS, Blades LL, Oser CS, Fogle CC, Helgerson SD, Gohdes D, et al. Rural Community Knowledge of Stroke Warning Signs and Risk Factors. J Prev Chronic Dis. 2005;2:1–8.

21. Travis LH, Flemming KD, Brown RD, Meissner I, Robyn L, McClelland R., et al. Awareness of stroke risk factors, symptoms, and treatment is poor in people at highest risk. J stroke Cerebrovasc Dis. 2003;12:221–7.

22. Zheng ZJ, Greenlund KJ, Neff LJ, Keenan NL, Giles WH, Ayala CA, et al. Low public recognition of major stroke symptoms. Am J Prev Med. 2003;25(4):315–319.

23. Pandian JD, Kalra G, Jaison A, Deepak S., Shamsher S, Singh Y, et al. Knowledge of stroke among stroke patients and their relatives in Northwest India. Nuerology India. 2006;54(2):152–6.

24. Yoon SS, Heller RF, Levi C, Wiggers J. Knowledge and perception about stroke among an Australian urban population. J Biol Med Cent Public Heal. 2001;1:14.

25. Cohen SJ, Goldstein LB, Samsa GP. Knowledge of risk among patients at increased risk of stroke. Stroke. 1997;28(5):916–21.

26. Ramírez-Moreno JM, Alonso-González R, Peral Pacheco D, Millán-Nunez ˜ MV, Roa-Montero A, Constantino-Silva AB, et al. Effect of socioeconomic level on knowledge of stroke in the general population: A social inequality gradient. Neurología. 2016; 31: 24—32

27. Ehidiamen OF, et al. Awareness of Stroke Risk Factors and Warning Symptoms amongst Hypertensive Patients in Benin City. Annals Medical and Health Sciences and Research. 2018; 8: 40-44

28. Kothari R, Pancioli AM, Broderick J, Brott T, Tuchfarber A, Miller R, et al. Public perception of stroke warning signs and knowledge of potential risk factors. J Am Med Assoc. 1998;279:1288–1292.

29. Dokova KG, Stoeva KJ, Kirov PI, Feschieva NG, Petrova S., Powles JW. Public understanding of the causes of high stroke risk in northeast Bulgaria. Eur J Public Health. 2005;15:313–6.

30. Nighoghossian DL, Adeleine P, Honnorat J, Trouillas P. Factors influencing early Admission in a French Stroke Unit. Stroke. 2002;33:153–159.

31. Nicol MB, Thrift AG. Knowledge of risk factors and warning signs of stroke. Vascular Health and Risk Management 2005:1(2) 137–147

32. Saengsuwan J, Suangpho P, and Tiamkao S, "Knowledge of Stroke Risk Factors and Warning Signs in Patients with Recurrent Stroke or Recurrent Transient Ischaemic Attack in Thailand," Neurology Research International, vol. 2017, Article ID 8215726, 7 pages.

APPENDIX I

QUESTIONNAIRE TO DETERMINE THE KNOWLEDGE OF STROKE AMONG HYPERTENSIVE-DIABETIC PATIENTS IN KORLE-BU TEACHING HOSPITAL

SECTION 1

Demographics

Please indicate (age) and tick as appropriate

1. Age (years)……..
2. Sex: (a) Male [ ] (b) Female [ ]
3. Marital status: (a) single [ ] (b) married [ ] (c) divorced [ ] (d) widow or widower [ ]
4. Education level: (a) primary [ ] (b) secondary [ ] (c) tertiary [ ] (d) never attended school [ ]
5. Employment status: (a) employed [ ] (b) unemployed [ ]

Section 2

Participants' general knowledge on stroke

Please tick as appropriate

1. Stroke is a;

a. A disease of the brain: Yes [ ] No [ ] Don't know [ ]

b. A disease resulting in weakness of a part of the body: Yes [ ] No [ ] Don 't know [ ]

c. A spiritual attack: Yes [ ] No [ ] Don't know [ ]

d. A disease resulting from high blood pressure Yes [ ] No [ ] Don't know [ ]

2. Which of these structures does stroke manifest in?

a. Arm, leg and mouth [ ]

b. Arm and mouth [ ]

c. Nerves [ ]

d. Don't know [ ]

3. Does stroke occur in the heart? Yes [ ] No [ ] Don't know [ ]
4. Is stroke the same as heart attack? Yes [ ] No [ ] Don't know [ ]
5. Is stroke preventable? Yes [ ] No [ ] Don't know [ ]
6. Is stroke treatable? Yes [ ] No [ ] Don't know [ ]

Section 3
Participants' knowledge on risk factors of stroke
Please tick as appropriate
Are any of the following a risk factor of stroke?
Smoking
Stress
Diabetes
Diet
High blood pressure
Viral infection
Age
Inactivity/lack of exercise
Excessive alcohol intake
Low blood pressure
Activity /regular exercise
High cholesterol
Family history of stroke
Race
Gender

Section 4
Participants' knowledge of warning signs of stroke
Please tick as appropriate
Which of the following would you consider a warning sign of stroke?
Blurred and double vision
Loss of vision in one eye
Headache
Dizziness
Numbness and tingling sensation of a part of the body

Excessive coughing			
Weakness or paralysis of a part of the body			
Abdominal pains			
Sudden difficulty in speaking and understanding speech			
Chest pain and chest tightness			

Section 5

Participants' reactions to stroke warning signs

What will you do in the event of noticing the following stroke warning signs?

1. Go to community health facility
2. Go to community pharmacy
3. Visit traditional healer
4. Visit prayer camp, faith healer or pastor
5. Wait and observe symptoms to see if they subside
6. Do not know

Warning sign: **Please write appropriate number (1-6)**

a. Dizziness ……

b. Numbness and tingling sensation ……

c. Weakness or para-paralysis ……

d. Blurred or double Vision ……..

e. Sudden difficulty in speaking and understanding speech……

f. Severe headache ……..

Section 6

Participants' sources of knowledge of stroke

a. Friends [ ]

b. Health educational programs [ ]

c. Medical books [ ]

d. Community health services e.g.; outreaches [ ]

e. Television [ ]

f. Newspapers [ ]

g. Doctors [ ]

h. Nurses [ ]

i. Other health workers [ ]

j. Family members [ ]

k. Radio [ ]

Other sources _____