Awareness of Stroke Risk Factors and Warning Symptoms amongst Hypertensive Patients in Benin City

Odiase Francis Ehidiamen* and Ogbemudia Judith Ehinwenma

Department of Medicine, College of Medical Sciences, University of Benin, Nigeria

Corresponding author:
Odiase Francis Ehidiamen,
Department of Medicine, College of
Medical Sciences, University of Benin,
Nigeria,
Tel: 08023544232;
E-mail: francisodiase2000@hotmail.com

Abstract

Background: Hypertension is the most important modifiable risk factor for stroke. Satisfactory participation in stroke preventive measures depends on stroke knowledge. The aim of this study was to determine the level of stroke awareness amongst hypertensive patients. **Methods:** A cross-sectional study with one hundred and forty-four hypertensive patients consecutively recruited and interviewed for stroke awareness. Six variables, age, gender, educational status, marital status, socio-economic status, and blood pressure recording were included in three multiple logistic regression models. The dependent variables were knowledge of organ affected, knowledge of risk factors and warning symptoms of stroke. **Results:** The male sex and increased educational status were predictive of good stroke awareness, while increasing age and poor blood pressure control are predictive of poor stroke awareness. **Conclusion:** The older hypertensive patient whose blood pressure is uncontrolled is at significant risk for stroke, but unfortunately has poor awareness of stroke. This group should be a target for stroke knowledge campaign.

Keywords: Hypertension; Stroke; Risk factor; Warning symptoms

Introduction

Stroke is the third commonest cause of death world- wide [1,2] and the single largest cause of adult disability. [3] Over 15 milliom persons suffer a stroke world-wide every year and of these, 6million die and 5million are left permanently disabled. [4,5] 85% of global deaths from stroke occur in the developing countries. [6,7] Hypertension is the single most important risk factor for stroke. [8,9] The World Health Organization reports that 62% of strokes are related to poor blood pressure control, [10] while adequate treatment of hypertension is associated with 35% to 40% reduction in stroke incidence. [11] Satisfactory participation in primary stroke prevention measures and timely appropriate response in the event of a stroke depends largely on the individual's knowledge and perception of stroke. [5,9,10,12,13] Studies have shown that knowledge about stroke and stroke risk factors was poorest among groups at highest risk of having a stroke. [12,14,15]. Studies done in Nigeria regarding stroke knowledge were among the general public, university students and health workers. [16-18] We are not aware of any study done in South-south region of Nigeria among hypertensive patients enquiring about knowledge of risks factors of stroke and warning symptoms of stroke. The purpose of this study was to determine the level of awareness of stroke risk factors and warning symptoms of stroke among individuals with hypertension.

Methods

This was a cross-sectional study done at the medical out-patient department in our teaching hospital from June 2015 to August 2016. Individuals older than 18 yrs. who volunteered a history of been diagnosed hypertensive and are on treatment for hypertension and those identified as hypertensive from the record files were included in the study. Individuals excluded

from the study included any health worker (doctors, nurses, pharmacists, laboratory scientists, physiotherapists, record staff, etc.), a person who have had a stroke and a person whose family member had suffered a stroke. One hundred and forty four persons were consecutively sampled for the study.

The questionnaire was prepared especially for this study and it was based on a review of the literature of previous studies concerning the general public's knowledge about stroke. [12,15,16,19,20] We tested the questionnaire in a pilot study with a sample of twenty persons and some changes were made in the wording of questions based on the result of the pilot study. Open-ended questions (by open-ended respondent has to provide the answer without any choices) were used to test knowledge of stroke and the data was later recoded for analysis in logical categories. Socio-demographic characteristics were collected including sex, age, ethnicity, religion, educational status, occupation/income marital status and to self-report any other condition they are treated for. Each participant through a face-to-face interview was asked the following by the authors and four residents in medicine department. 1. To mention the organ affected in stroke. 2. To mention any risk factors for stroke. 3. To mention any symptoms of stroke. According to our definition a participant had good knowledge of stroke if the following are meant.1. Mentioning the brain as the organ affected in stroke (good knowledge of organ affected) 2. Mention of at least one

stroke risk factor (good risk factor knowledge). 3. Mention of at least one warning symptom of stroke (good knowledge of stroke symptoms). The blood pressure of each participant was measured twice, at the outset and the end of the interview and the mean blood pressure recorded. We created three groups for blood pressure recordings < 130/80 mmHg, 130/80 to 139/89 mmHg, ≥ 140/90 mmHg. The occupation of the patient was used to classify socioeconomic/income status into three categories, low, middle, high according to the Nigerian Bureau of Statistics guidelines. [21] Consent was sort from participants who gave their permission to participate. The study was approved by the ethics committee of the hospital.

All statistical analysis was performed using IBM SPSS version 20 (SPSS Inc, Chicago Illinois). Descriptive statistics of Mean, standard deviation, median, interquartile range, for continuous variables, while frequency and percentages for categorical variables were used to summarize data on socio-demographic and other response variables. The student-t- test, Chi-square or fisher's exact test were used to compare groups or asses associations between variables. Variables previously shown to be associated with stroke awareness were included in the Multiple Logistic regression model as independent variables. [12,14,15,21-29,30-34] These included; age, gender, educational status, income status, living in company (marital status), mean blood pressure, to determine predictors of the dependent variables. We had three dependent variables; knowing the organ involved in a stroke, knowledge of stroke risk factors and knowledge of stroke warning symptoms. All test of hypothesis were two tailed with a<0.05 level of significance. We had done a pilot study which had revealed an estimated population proportion of good knowledge of stroke symptom of 0.60. With a desired confidence interval width of 0.16, an accuracy of 0.08 at a 95% confidence level, 144 hypertensive individuals were needed for the study.

Results

One hundred and forty-four hypertensive patients were recruited for the study. 53.5% (77/144) were men, and the mean age (SD) of participants was 58.5(8.9) years. 45.1% (65/144) had at least primary education, 37.4% (55/144) are of the low income category while 71.5% (103/144) were married. 72.2% (104/144) of the participants had mean blood pressure on the day of assessment of <140/90 mm/Hg [Table 1].

Majority, 56.3% (81/144) did correctly mention the brain as the organ affected in stroke while 13.9% (20/144) mentioned the heart as the organ affected in stroke. In the multiple logistic regression analysis which assessed the effects of the patients demographics on knowledge of organ affected in stroke after controlling for the effects of other characteristics the following were found to be significant predictors. Male gender (0R 14.4, 95% CI, 4.12 to 50.2, P<0.001) and higher educational level (OR 14.8, 95% CI, 3.39 to 64.4, P<0.001) were significant for good knowledge. Increasing age was a significant predictor of poor knowledge of the organ affected in stroke (OR 0.91, 95% CI 0.86 to 0.98, P=0.01). Increasing blood pressure of patients was also a significant predictor of poor knowledge of brain as organ affected in stroke (OR 0.08, 95%CI 0.02 to 0.04, P=0.001). Income and marital status were not predictive of organ affected

in stroke [Tables 1 and 2]. 55.8% (82/144) of participant mentioned correctly at least one risk factor for stroke. The most common identified factor was stress, 41% (59/144) and family challenges, 38.2% (55/144) this was followed by hypertension, 35.4%, (51/144). Increased cholesterol, heart diseases, lack of exercises and obesity were not mentioned as risk factors for stroke. In the multiple logistic regression analysis, male gender (OR 10.7, 95% CI 3.32 to 34.3, P<0.001), higher educational level (OR 11.3, 95% CI, 2.88 to 44.6, P<0.001), were found to be significant predictors of good knowledge of stroke risk factors while increasing age was a significant predictor of a poor knowledge of stroke risk factors (OR 0.093, 95% CI 0.88 to 0.99, P=0.03). Increasing blood pressure was also a predictor of poor knowledge of risk factors (OR 0.065, 95%CI 0.014 to 0.30 P<0.001) [Tables 1 and 2]. 45.1% (64/144) of participants knew no symptom of stroke. Weakness of the body, 36.1% (52/144) and loss of speech, 28.5% (41/144) were the main symptoms mentioned. 16.7% (24/144) of the participants mentioned two or more symptom of stroke. Headaches, loss of balance, numbness and loss of vision were not mentioned at all as symptoms of stroke. In the multiple logistic regression analysis, male gender (OR 3.28, 95% CI 1.31 to 8.19, P=0.01), higher educational status (OR 5.95, 95% CI 2.03 to 17.4, P=0.001) were found to be significantly predictive of knowledge of stroke symptoms. With increasing age (OR 0.95, 95%CI 0.89 to 0.99, P=0.04), and increasing blood pressure (OR 0.27, 95% CI 0.08 to O.96, P=0.04) the participants were less likely to recall stroke symptoms. There was no statistically significant association between patient's income, marital status and knowledge of stroke symptom [Tables 1 and 2].

Table 1: The demographic, clinical characteristics and response of 144 hypertensive participants.	
Variables	Mean (S.D), n (%)
Age, years	58.5 (8.9)
Male	77 (53.5%)
Marital status	
Married	103 (71.5%)
Single	41 (28.5%)
Educational status	
None/ Primary	65 (45.1%)
Secondary/tertiary	79 (54.9%)
Income	
Low	55 (37.4%)
Middle	47 (32.0%)
High	42 (28.6%)
Mean blood pressure check on research day	
SBP< 130/80 mmHg	52 (35.4%)
SBP 130/80 to 139/89 mmHg	52 (35.4%)
SBP ≥140/90 mmHg	40 (27.2%)
Most mentioned stroke risk factors recalled	
Hypertension	51 (35.4%)
Diabetes	32 (22.2%)
Smoking	23 (15.9%)
Alcohol	14 (9.7%)
Stress	59 (41%)
Family challenges	55 (38.2%)
Stroke symptom recalled	
Weakness of part of body	52 (36.1%)
Loss of speech	41 (28.5%)
Loss of consciousness	11 (7.6%)
Stroke knowledge summary indicators	
Correct answer of brain affected	81 (56.3%)
Good risk factor knowledge	82 (56.9%)
Good symptom knowledge	79 (54.9%)

	Brian involvement OR (95% CI)		Risk factor of stoke OR (95% CI)		Symptom of Stroke OR (95% CI)	
		P=value		P=value		P=value
Age	0.91 (0.86 to 0.98)	0.01	0.93 (0.88 to 0.99)	0.03	0.95 (0.89 t0 0.99)	0.04
Sex						
Female	1.00	<0.001	1.00	<0.001	1.00	0.01
Male	14.4 (4.13 to 50.2)		10.7 (3.32 to 34.3)		3.28 (1.31 to 8.19)	
Education						
No education/Primary	1.00	<0.001	1.00	0.001	1.00	0.001
Secondary/Tertiary	14.8 (3.39 to 64.4)		11.3 (2.88 to 44.6)		5.95 (2.03 to 17.4)	
Income						
Low	1.00	0.42	1.00	0.76	1.00	0.60
Middle	1.27 (0.29 to 6.71)		1.13 (0.23 to 5.68)		0.76 (0.21 to 2.83)	
High income	0.54 (0.12 to 2.4)		0.80 (0.20 to 3.27)		1.36 (0.43 to 4.37)	
Marital						
Single	1.00	0.96	1.00	0.79	1.00	0.56
Married	1.03 (0.33 to 3.16)		0.86 (0.29 to 2.55)		1.37 (0.52 to 3.33)	
BP						
< 130 mmHg	1.00	0.001	1.00	<0.001	1.00	0.04
130 to 139 mmHg	0.13 (0.03 to 0.52)		0.15 (0.04 to 0.57)		0.41 (0.15 to 1.13)	
> 140 mmHg	0.08 (0.02 to 0.36)		0.065 (0.014 to 0.30)		0.27 (0.08 to 0.96)	

Table 2: Multiple logistic regressions analysis of predictors of stroke knowledge about brain involvement, risk factor and symptom.

Discussion

There have been substantial advances in the treatment of acute stroke, but it has been observed that reduction of the burden of stroke relies hugely on preventive measures. [35-38] Knowledge of stroke risk factors and symptoms would influence compliance to preventive measures and ensure prompt action in the event of a stroke. It has been suggested that individuals with established risk factors for stroke as in this study hypertensive patients are more likely aware of stroke and their risk for stroke, [27] however other studies suggests that amongst high risk populations stroke knowledge, and awareness is very poor. [15,19,28] Majority of respondents in our study identified the brain correctly as the organ affected in stroke, this finding is similar to a prospective study [32] in the UK were about 86% had identified the brain correctly, conversely a study from Indian showed a minority mentioning the brain as the organ affected in stroke. [39]

Respondents in our study indicated stress eminently as a risk factor for stroke which was a similar finding in other earlier studies. [25,30,39] There is minimal evidence that stress is a risk factor for stroke, [40] although there is a general perception among the populace that stress is a major contributor to stroke. 55.8%of respondents correctly listed one risk factor for stroke, although 68% was recorded in another study. [15] Hypertension was the most correctly identifiable risk factor for stroke in this study, with similar reports in other publication. [15,19,23] This finding was observed by Pancioli [15] who reported that respondent with particular risk factor for stroke are likely to mention that factor as a risk for stroke. Relevant risk factors for stroke such as age heart diseases, increased cholesterol, lack of exercise and obesity was never mentioned, while diabetes, alcohol and smoking was mentioned by a minority in this study this was also the findings in other works. [15,23-26] Although other studies had contrasting observation. [30,33] The differences in the number of identified risk factors in various studies may be explained by

the design of the questionnaire either as open or closed forms. Awareness of risk factors may be underestimated by the open formant, were respondents are required to recall these risk factors. While the closed formant could lead to overestimation were respondents are provided with a list of risk factors to select from. Weakness of one side of the body was the commonest symptom mentioned in this study. Pandian et al, [34] Kothari et al. [14] and others [15,22,24,28] had found weakness of the body as the main symptom identified in their studies similar to our finding. Our study had shown that increased levels of education are a predictor of stroke knowledge. Similar finding of education as a significant predictor of stroke knowledge have been found in other studies. [15,22-25] Kothari et al. [14] had found no significant influence of educational level on knowledge of stroke. Our study found that the male sex is a significant predictor of stroke knowledge and awareness. This finding is in contrast to other studies that found the female gender as more predictive of stroke knowledge. [15,22-25] While no effects of gender was reported by some other studies. [14,15,19,25,31] Socioeconomic status is a strong indicator of health outcomes but our study did not show that increasing income is a predictor of stroke knowledge, and awareness, contrasting findings have been reported in other studies. [15,22-25] Living in company with others has been found to be associated with a good knowledge of stroke and risk factors. [29] There was no effect of marital status which is a form of company on stroke knowledge in our study. Increasing age and poor blood pressure control are established risk factors for stroke; our study had revealed the worrisome findings that these categories of hypertensive patients are less likely to have good knowledge of stroke risk factors and warning signs. This has been the observation in other studies. [9,12,14,28,32] This study had limitations, especially since the survey questionnaire was an open-ended type. It was requiring much time for respondents to freely recall the options and sometimes explanations made by the examiner could influence response. These interviews were done by the authors and four assistants and interview variations

were minimized by ensuring all interviewers had the same training.

Conclusion

It is hoped that campaigns targeting specific groups for stroke knowledge, may be a most effective method of improving awareness amongst hypertensive patients. Hence the older hypertensive patients and those with poor blood pressure control who are less aware of stroke knowledge should be the focus of risk prevention and awareness strategies.

Conflict of Interest

All authors disclose that there was no conflict of interest.

References

1. Lloyd-Jones D, Adams RJ, Brown TM, Carmethon M, Dai S, De simone G, et al. American Heart Association statistics committee and stroke statistics, subcommittee. Executive summary, heart disease and stroke statistics-2010 update, a report from the American Heart Association. Circulation 2010; 121: 948-954.

2. Feign VL, Forouzanfar MH, Krishnamurhi R, Mensah CA, Connor M, Bennet DA, et al. Global and regional burden of stroke during 1990-2010, finding from the global burden of disease study 2010. Lancet, 2010; 383: 245-254.

3. Feign VL, Laws CMM, Bennet DA, Barker-Collo SL, Parag V. Worldwide stroke incidence and early case fatality reported in 56 population-based studies. A systematic review. Lancet Neurology 2009; 8: 355-369

4. http.//www. World-Heart-Federation.org/cardiovascular health/ stroke/retrieved 20.8.2016.

5. World Health Report. Reducing risk, promoting health life, Geneva Switzerland. World Health Organization, 2012.

6. Feign VL, Lawes CMM, Bennett DA, Aderson CS. Stroke epidemiology; A review of population-based studies of incidence, prevalence, and case-fatality in the 20th century. Lancet Neurology, 2003; 2: 43-53.

7. Dalal PM, Malik S, Bhattacharjee M, Trivedi ND, Vairale J, Bhat P, et al. Population-based stroke survey in Mumbai, India; Incidence and 28-day case fatality. Neuroepidermiology, 2008; 31: 254-261.

8. Lopez AD, Methers CD, Ezzati M, Jamison DT, Murray CJ. Measuring the global burden of disease and risk factors 1990-2001. Global burden of diseases and risk factors. 2006.

9. Biffi A, Anderson CD, Battery TW, Ayres AM, Greenberg SM, Viswanathan AN, et al. Association between blood pressure control and risk of recurrent intracerebral hemorrhage. JAMA, 2015; 314: 904-912.

10. World Health Organization. Reducing the risks, promoting health life. Geneva, Switzerland. World Health Organization 2014.

11. Chobanian AV, Bakris GI, Cushman WC, Green LA. Izzo JL. Seventh report of the joint committee on prevention, detection, evaluation and treatment of high blood pressure. JAMA 2003; 289: 2560-2571.

12. Kothari R, Sancibeck L, Jaunch E, Broderick J, Brott T, Khory J, et al. Patient's awareness of stroke signs, symptoms and risk factors. Stroke 1997; 28: 1871-1875.

13. Albala BB, Quarles IW. International and new approaches to stroke prevention. Stroke 2013; 44: S48-S51.

14. Sokbrab O, Sokbrab A, Hassan EF. Awareness of stroke and knowledge of its warning signs and risk factors in a developing country. Neurology 2015; 82: 133.

15. Pancioli AM, Broderick J, Kothari R, Brott T, Tuchfurber A, Miller R, et al. Public perception of stroke warning signs and knowledge of potential risk factors, JAMA 1998; 279: 1288-1292.

16. Akinyemi RO, Ogah OS, Ogundipe RF, Oyesola OA, Oyadoke AA, Ogunlana MO et al. Knowledge and perception of stroke amongst hospital workers in an African community. European Journal of Neurology, 2009; 16: 998-1003.

17. Komolafe MA, Olaogun MB, Obembe AO, Adebiyi AM, Fawale MB, Adebowale AA. Stroke risk factors among participants of a world stroke day awareness programe in south western Nigeria. Nig J Clin Prac 2015; 18: 807-809.

18. Obembe AO, Olaogun MO, Komolafe MA, Odetunde MO. Awareness of risk factors and warning signs of stroke in a Nigerian university. J Stroke Cerebrovasc Dis 2014; 23: 749-758.

19. Sug Yoon S, Heller RF, Levi C, Wiggers J, Fitzgerald PE. Knowledge of stroke risk factors, warning signs and treatment among an Australian urban population. Stroke 2001; 32: 1926-1930.

20. Hickey A, Holly D, Mcgee H, Conroy R, Shelley E. Knowledge of stroke risk factors and warning signs in Ireland, development and application of the stroke awareness questionnaire(SAQ). J stroke 2012; 7: 298-306

21. National Bureau of Statistics. Socioeconomic statistics, 2012.

22. Wahab KN, Kayode OO, Musa O. Knowledge of stroke risk factors among Nigerians at high risk. J Stroke Cerebrovascmdis 2015; 24: 125-129.

23. Stroebele N, Muller-Riemenschneider F, Nolte CH, Muller-Nordhorn J, Bockelbrunk A, Willich SN. Knowledge of risk factors and warning signs of stroke, a systematic review from a gender perspective. Int J Stroke 2011; 6: 60-66.

24. Jarou Z, Harris N, Gill I, Azizi M, Gabasha S, Labril R. Public stroke knowledge, those at risk least able to identify symptoms. MSRJ 2013; p: 3.

25. Lundelin K, Graciani A, Garcia-Puig J, Guallar-Castillow P, Taboabe JM, Rodringue-Artalejo F, et al. Knowledge of stroke warning symptoms and intended action in response to stroke in spain. A nationwide population survey. Cerebrovasc Dis 2012; 34: 161-168.

26. Hatzitolios A, Spanou M, Dambali R, Vraka K, Doumarapis E, Petratos K et al. Public awareness of stroke symptoms and risk factors and response to acute stroke in northern Greece. J Stroke Cerebrovasc 2014; 9:15.

27. Nicol MB, Thrift AG. Knowledge and risk factors and warning signs of stroke. Vasc Health Manag. 2005; 1: 137-147

28. Samsa G, Cohen S, Goldstein L, Bonito AJ, Duncan PN, Enarson C, et al. Knowledge of risk among patients at increased risk of stroke. Stroke 1997; 28: 916-921.

29. Muller-Nordhorn J, Nolte CH, Rossnagel K. Knowledge about risk factors for stroke. A population based survey of 28090 participants. Stroke 2006; 37: 946-950.

30. Kanisek S, Prlic N, Barac I. Perception of stroke among patients with increased risk of stroke. South Eastern European Health Science Journal. 2012; 2: 75-80

31. Greenlund KJ, Neff LJ, Zheng ZL, Keenan NL, Giles WH, Ayala CA, et al. Low public recognition of major stroke symptoms. Am J Prev Med 2003; 25: 315-319.

32. Gupta A, Thomas P. Knowledge of stroke among elderly patients at increased risk of stroke. J Am Geriatrics Soc 2000; 48: 576.

33. Anuar-Deen MK, Nik-Azlan NM, Mohd-Fairuz A, Zuraidah CM. Stroke community awareness among public, a crossectional study. Med, health 2014; 9: 33-34.

34. Pandian JD, Jaison A, Deepak SS, Kalra G, Shamsher S, Lincol DJ, et al. Public awareness of warning symptoms and risk factors and treatment of stroke in northwest India. Stroke 2005; 36: 644.

35. Ellis C, Barley J, Grubaugh A. Post-stroke knowledge and symptom awarenessma global issue for secondary stroke prevention. Cerebrovasc Dis 2013; 35: 572-581.

36. Kaddumukasa M, Ddumba E, Duncan P, Goldsteien I. Post-stroke hypertension in Africa. Stroke 2012; 43: 3402-3404.

37. Mellow I, Doyle F, Rohed D, Williams D, Hickey A. A stroke warn-

ing campaign, delivering better patients outcome?. A systematic review. A patient related outcome measures 2015; 6: 61-73.

38. Alshaikh SA, Quinn T, Dunn W, Walters M, Dawson J. Predictive factors of non-adherence to secondary preventive medication after stroke or transient ischemic attack a systemic review and meta-analysis. European Stroke J 2016; 1: 65-75.

39. Truelsen T, Nielsen N, Baysen G, Gronbek M. Self-reported stress and risk of stroke. The Copenhagen city heart study. Stroke 2003; 34: 856-862.

40. Truelsen T, Bonita R. Advances in ischemic stroke epidemiology. Adv Neurol 2008; 255: 465-479.