Awareness of stroke among patients attending primary healthcare services in Abha, Southwestern Saudi Arabia

Adel A. Alhazzani, MD, FRCP. Ahmed A. Mahfouz, MPH, DrPH, Ahmed Y. Abolyazid, MSc, PhD, Nabil J. Awadalla, MSc, MD, Razia A. Ahmed, MD, MRCGP, Aesha F. Siddiqui, MD, DFM, Shamsun N. Khalil, MSc, PhD

214 Neurosciences 2019; Vol. 24 (3): 214-220
doi: 10.17712/nsj.2019.3.20180041

From the Neurology Section (Alhazzani), Department of Medicine, College of Medicine, King Saud University, Riyadh, the Department of Family and Community Medicine (Mahfouz, Abolyazid, Awadalla, Ahmed, Siddiqui, Khalil), College of Medicine, King Khalid University, Abha, Kingdom of Saudi Arabia, from the Department of Epidemiology (Mahfouz), High Institute of Public Health, Alexandria University, and from the Department of Community Medicine (Abolyazid, Awadalla), College of Medicine, Mansoura University, Alexandria, Egypt.

Received 30th December 2018. Accepted 5th March 2019.

Address correspondence and reprint request to: Dr. Ahmed A. Mahfouz, Department of Family and Community Medicine, College of Medicine, King Khalid University, Abha, Kingdom of Saudi Arabia. E-mail: mabfouz2005@gmail.com

ORCID ID: orcid.org/0000-0002-4974-6431

ABSTRACT

Objectives: To examine the awareness about major symptoms, risk factors, and response to stroke among the population in Abha, Southwestern Kingdom of Saudi Arabia. Improving stroke-related knowledge may advance stroke prevention and reduce pretreatment delay and disabilities.

Methods: We conducted a cross-sectional study among a representative sample of primary healthcare adult patients between January-May 2016 and used

a validated Arabic questionnaire to evaluate the participants’ awareness about stroke.

Results: The study involved 1472 adults. Only 63.6% and 43.7% of participants correctly recognized thrombosis and hemorrhage as types of stroke. Commonly identified risk factors were hypertension (55.8%), dyslipidemia (45.8%), and smoking (41.9%). Sudden severe headache (54.1%), dizziness (51.0%), and difficulty in speaking (44.3%) were the most frequently recognized symptoms. The most frequently reported correct responses to stroke were contacting a doctor (73.0%), going to the hospital (67.2%), and calling an ambulance (52.4%). Improper responses to stroke (ignoring the condition or self-prescription) were noted in 18.8% of participants. Logistic regression revealed that physicians, nurses, friends and relatives as a source of knowledge were significantly associated with a lower insufficient knowledge of stroke symptoms and risk factors. On the other hand, women, persons above 40 years old, and married persons were significantly more prone to have insufficient knowledge about a proper response to stroke.

Conclusion: Our study revealed a notable deficit of knowledge about warning symptoms, risk factors, and proper response to stroke. Health education strategies to improve stroke awareness are required and could potentially prevent and improve the outcome of stroke.
Stroke is a significant public health issue globally.\textsuperscript{1} The incidence of stroke is increasing in Asia, particularly in the Middle Eastern region. This region faces a high burden of stroke due to the growing rates of non-communicable diseases.\textsuperscript{2} In the Kingdom of Saudi Arabia, stroke is a rapidly growing problem and a major cause of illness and death.\textsuperscript{3} This increasing incidence is due to the changing lifestyle in the country and high prevalence of diabetes mellitus, obesity, dyslipidemia, and hypertension, which are considered to be important risk factors for stroke.\textsuperscript{4}

Several reports have shown that the incidence of stroke and its outcome are notably affected by the level of stroke awareness in the community.\textsuperscript{5,6} Generally, the awareness of stroke is poor as reported in various studies across countries such as United States of America, Australia, South Korea, Iran, and Egypt.\textsuperscript{7-11} A Gulf Cooperation Council study reported that majority of the respondents in urban and semi-urban areas had not heard of the term ‘stroke’ and that stroke knowledge was found to be poorest among groups that were at the highest risk.\textsuperscript{5} Studies from Kingdom of Saudi Arabia also concluded that there is a notable deficit in the level of stroke awareness in the Saudi population.\textsuperscript{12,13}

Empirical evidence regarding stroke shows that improving stroke-related knowledge may advance its prevention and reduce pretreatment delay and disabilities.\textsuperscript{14,15} Therefore, it is crucial to evaluate the awareness of the public regarding stroke risk factors, warning signs, and timely seeking of medical care in order to identify the knowledge gaps for proper planning of educational campaigns.

The present study aimed to assess the knowledge of stroke among those who visited primary health care centers (PHCCs) in Abha, Southwestern Kingdom of Saudi Arabia.

Methods. A cross-sectional study was conducted in Abha city, the capital of Aseer region, which is located in the southwestern part of the Kingdom of Saudi Arabia during January-May 2016. The study targeted all urban PHCCs (namely, Al-Kabel, Al-Numais, Al-Manhal, Al-Azizia, Wasat Abha, Zera, and Al-Areen). Inclusion criteria was all patients attending the PHCCs for any reason and agreed to participate in the study. Those aged less than 18 years old were excluded.

Using the World Health Organization (WHO) manual for sample size determination in health studies, at a 95% confidence interval with a conservative estimate of the anticipated population proportion of 64%, and with an absolute precision of 3%, the minimal sample size required for the study was 984 persons.\textsuperscript{12,16} With an assumed response rate of 75%, a sample size around 1300 was planned to be recruited.

Consecutive persons attending the participating PHCCs on selected days during the study period were invited to participate. Those below 18 years were excluded. A representative sample was selected from each center and interviewed using a structured questionnaire.

Participants’ awareness about stroke was assessed using a validated Arabic questionnaire. The study questionnaire was based on a study conducted in Riyadh, Kingdom of Saudi Arabia.\textsuperscript{17} Expert judges in Epidemiology and Neurology constructed the questionnaire using the Delphi technique. We assessed the reliability of the tool by measuring internal consistency using Cronbach’s alpha test and it was found to be acceptable (\(p=0.792\)). The questionnaire contained items related to the participants’ demographic characteristics and awareness assessment items. These items included sources of knowledge, knowledge about risk factors, symptoms, response, and outcomes of stroke. Insufficient knowledge for symptoms or risk factors was considered if the participant identified less than 2 correct items.

We used the Statistical Package for Social Sciences Version 22 (IBM Crop., Armonk, NY, USA) for the analyses. Descriptive statistics for categorical data are presented as number and percentages. Univariate and multivariate analysis were used to study factors affecting knowledge. Binary logistic regression analysis was used to identify these factors. Crude odds ratios (cOR), adjusted odds ratios (aOR), and their respective 95% confidence intervals (CIs) were calculated. The study was approved by the research ethical committee of College of Medicine, King Khalid University, Abha, Kingdom of Saudi Arabia (REC# 2014-03-08).

Results. The present study included 1472 persons that visited urban PHCCs in Abha city, southwestern Kingdom of Saudi Arabia. Participants were attending the PHCCs for any reason including seeking care in different clinics. They also attended to accompany other family members for immunization, well-baby clinic, or antenatal care. They were interviewed regarding their
awareness of stroke. Most of the participants were 18-40 years old (n=1047; 71.1%), male (n=991; 67.3%), and married (n=846; 57.5%). Secondary (n=516; 35.1%) and tertiary education (n=713; 48.4%) were the most frequent levels of education. The least frequent were primary (n=59; 4.0%) and intermediate level of education (n=138; 9.4%).

Table 1 shows the awareness regarding stroke site, stroke types, and risk factors. Approximately 21.3% of the study subjects (n=313) were unable to correctly identify more than one risk factor for stroke. This group was regarded as having insufficient knowledge of risk factors.

The most frequent source of information was the media (n=858; 58.3%), followed by friends and relatives (n=627; 42.6%). Only 20.6% (n=303) mentioned that physicians and nurses were their source of stroke knowledge.

Table 2 shows the awareness regarding symptoms, outcomes, and proper response to an attack of stroke. Sudden severe headache (n=796; 54.1%), dizziness (n=750; 51.0%), difficulty in speaking (n=657; 44.3%), and one-sided paralysis (n=518; 35.2%) were the most frequently recognized symptoms. Approximately 23.3% of the study subjects (n=347) were unable to correctly identify more than one symptom of stroke and were regarded as having insufficient knowledge of symptoms.

Regarding the awareness about proper response to stroke, contacting a doctor (n=1075; 73.0%), going to the hospital (n=989; 67.2%) and calling an ambulance (n=772; 52.4%) were the most frequently reported correct responses. The study noted improper responses to an occurrence of stroke (ignoring the condition or self-prescribed medications) in 18.8% (n=277) of the participants.

Regarding awareness of the outcome of stroke, death (n=931; 63.2%), paralysis (n=803; 54.6%), and speech difficulties (n=491; 33.4%) were the most frequently identified outcomes. However, most participants considered the disease as treatable (n=1085; 73.7%) and that early treatment improves the outcome (n=1224; 83.2%).

Binary logistic regression analysis of factors affecting insufficient knowledge of stroke symptoms (knowledge of less than 2 symptoms) showed that media as a source of knowledge was significantly associated with lower insufficient knowledge (aOR=0.43, 95% CI: 0.32-0.59) (Table 3). Similarly, physicians, nurses, friends and relatives as a source of knowledge were significantly associated with insufficient knowledge.

Table 2 - Knowledge of stroke symptoms, outcomes and responses to an attack among the study sample of primary healthcare attendants in Abha city, Southwestern Saudi Arabia (n=1472).

| Knowledge                  | Proper Knowledge No. (%) |
|----------------------------|--------------------------|
| **Symptoms**               |                          |
| Dizziness                  | 750 (51.0)               |
| Sudden severe headache     | 796 (54.1)               |
| Sudden confusion           | 263 (17.9)               |
| Disturbed vision           | 460 (31.3)               |
| Difficulty speaking        | 657 (44.6)               |
| Difficulty walking         | 228 (15.5)               |
| One side paralysis         | 518 (35.2)               |
| Face paralysis             | 289 (19.6)               |
| One side numbness          | 412 (28.0)               |
| **Number of correctly identified symptoms** |                      |
| Less than 2 symptoms       | 347 (23.6)               |
| 2 - 4 symptoms             | 856 (58.2)               |
| More than 4 symptoms       | 269 (18.3)               |
| **Response to attack**     |                          |
| Inform a family members and neighbors | 515 (35.0)   |
| Contact a doctor           | 1075 (73.0)              |
| Go to the hospital         | 989 (67.2)               |
| Call an ambulance          | 772 (52.4)               |
| Improper response (Ignore/self-prescribed medication) | 277 (18.8) |
| **Outcomes**               |                          |
| Paralysis                  | 803 (54.6)               |
| Speech problem             | 491 (33.4)               |
| Walking problem            | 476 (32.3)               |
| Visual problem             | 361 (24.5)               |
| Hearing problem            | 276 (18.8)               |
| Psychological problem      | 243 (16.5)               |
| Death                      | 931 (63.2)               |
associated with lower insufficient knowledge of symptoms.

Binary logistic regression analysis of factors affecting insufficient knowledge of risk factors (knowledge of less than 2 risk factors) revealed that sources of knowledge (media, physicians, nurses, friends and relatives) were significantly associated with lower knowledge of risk factors (Table 4).

Table 5 shows potential determinants of insufficient knowledge of proper response to an attack. In binary logistic regression analysis, women (aOR=1.70, 95% CI: 1.29-2.25), persons above 40 years old (aOR=1.84, 95% CI: 1.32-2.55), and married persons (aOR=1.36, 95% CI: 1.01-1.85) were significantly more prone to have an insufficient knowledge of a proper response to a stroke attack. Moreover, the study showed that sources of knowledge (media, physicians and nurses, friends and relatives) were significant associated factors for insufficient knowledge of a proper response to a stroke attack.

**Discussion.** Stroke is one of the most important causes of mortality and is the leading cause of acquired handicaps in adults worldwide. According to WHO, 6.2 million die from stroke each year.17

In the present study, although most of the participants correctly identified the brain as the site of stroke, only 63.6% and 43.7% correctly recognized thrombosis and hemorrhage as types of stroke. Similar results were noted in a study in Riyadh, Kingdom of Saudi Arabia, where 64% of the people were able to define stroke correctly.18

The time interval from the onset of cardiovascular stroke symptoms to emergency medical care is affected by the level of awareness about major stroke symptoms and methods of response among the general population.6 In the current study, sudden severe headache was the most frequently recognized symptom, while difficulty in speaking and one-sided weakness were the third and fourth most commonly identified symptoms. Paralysis, numbness, and difficulty in speaking have been identified as the most important stroke symptoms as they are often associated with acute stroke and alert the general population to activate emergency care.5,19,20 This should be regarded as low awareness about major stroke symptoms among the public.19 However, a Spanish study reported that sudden severe headache was associated with a proper response to stroke.6

In the present survey, 23.3% of the respondents were unable to correctly identify more than one symptom of stroke. This group was considered to have an insufficient knowledge of symptoms which may affect their proper response to stroke and lead to unfavorable outcomes.20 This result is consistent with other reports from studies in Riyadh, Kingdom of Saudi Arabia, the Gulf region, and other European countries.5,12,19,20

| Variables                  | Knowledge of symptoms |                | Uni-variate | Multivariate |
|----------------------------|-----------------------|----------------|-------------|--------------|
|                            |                       |                | cOR (95%CI) | aOR (95%CI)  |
|                            | Sufficient | Insufficient |              |              |
| Gender                     |                       |                |             |              |
| Male                       | 755 (67.1) | 236 (68.0) | 0.96 (0.74-1.24) | 0.96 (0.74-1.26) |
| Female                     | 370 (32.9) | 111 (32.0) | - | - |
| Education                  |                       |                |             |              |
| <secondary education       | 181 (16.1) | 62 (17.9) | - | - |
| ≥secondary education       | 944 (83.9) | 285 (82.1) | 0.88 (0.64-1.21) | 0.92 (0.64-1.33) |
| Age (years)                |                       |                |             |              |
| <40                        | 790 (70.2) | 257 (74.1) | - | - |
| ≥40                        | 335 (29.8) | 90 (25.9) | 0.83 (0.63-1.08) | 0.86 (0.62-1.20) |
| Marital status             |                       |                |             |              |
| Single                     | 470 (41.8) | 156 (45.0) | - | - |
| Married                    | 655 (58.2) | 191 (55.0) | 0.88 (0.69-1.12) | 0.97(0.74-1.28) |
| Sources of knowledge*      | Media* | Physician and nurses* | Friends and relatives* | | |
| Media*                     | 685 (60.9) | 173 (49.9) | 0.64 (0.50-0.81) | 0.43 (0.32-0.59)** |
| Physician and nurses*      | 253 (22.5) | 50 (14.4) | 0.58 (0.42-0.81) | 0.46 (0.32-0.66)** |
| Friends and relatives*     | 514 (45.7) | 113 (32.6) | 0.57 (0.45-0.74) | 0.40 (0.29-0.55)** |

cOR - crude odds ratio, CI - confidence interval, aOR - adjusted odds ratio for other studied variables,*Presence of each source of knowledge was compared to absence of this source,**Significant at p-value<0.05
Hypertension was the most frequently identified risk factor for stroke, followed by dyslipidemia, smoking, and aging. This finding was similar to the reports of studies from Brazil, Australia, and Ireland, where hypertension was the most common risk factor for stroke. However, our findings contrasted with a Saudi study that reported smoking as the most common risk factor for stroke. The awareness of the population about hypertension and its association with stroke is important because it is highly prevalent in the Saudi
population and is considered the most important single risk factor for stroke.\textsuperscript{12,24}

Contacting a doctor and going to the hospital were the most frequently reported correct responses to stroke in the present survey and were reported by three-fourths and two-thirds of the respondents. Calling an ambulance ranked third and was noted by approximately half of the respondents. Our findings contrasted with those of a Georgian study, in which 70\% of the participants reported that they should activate the emergency system.\textsuperscript{25} Calling the doctor or going to hospital may delay the activation of emergency care and minimize the opportunity of appropriate care.\textsuperscript{6}

A considerable portion of the study population (18.8\%) mentioned improper responses to stroke such as ignoring the condition or self-prescription. Ignoring and waiting to see if the condition will resolve spontaneously is an important factor for delay in treatment.\textsuperscript{26} Women, those above 40 years old, and married were significantly more prone to an improper response to stroke attack. These groups should be targeted in stroke educational programs.

In the current study, education through media and healthcare providers was a significant factor for improving knowledge regarding symptoms and risk factors for stroke. Different types of media such as television, radio, and newspapers have been reported the most important information sources in stroke education.\textsuperscript{27} However, the current study provides evidence that these sources may increase the probability of improper stroke response. This could be explained by the possibility that educational messages may focus only on disease symptoms and risk factor awareness and ignore the methods of proper response.

\textbf{Limitations.} The study limitations include design of the study being addressing patients attending urban PHCCs in the southwestern region. Generalization may be questionable in different settings. Another limitation is nature of the study being cross-sectional reflecting only the current level of awareness and not considering changes over time.

In conclusion, the present study reveals a notable deficit of knowledge about warning symptoms, risk factors, and proper response to stroke. Urgent health education strategies using different media methods are required to improve stroke awareness among a large section of the Saudi population. Health education messages about stroke symptoms, risk factors, and proper response should be provided for all patients receiving care in chronic disease clinics at PHCCs. Moreover, we recommended stroke awareness campaigns targeting different age groups and educational levels.

\textbf{Acknowledgements.} The authors gratefully acknowledge the cooperation of the Directors of involved Primary Health Care Centers in Abha, Kingdom of Saudi Arabia. We would also like to thank Editage for English language editing.

\textbf{References}

1. World Health Organization. The atlas of heart disease and stroke. Geneva (CH); 2004. https://www.who.int/cardiovascular_diseases/resources/atlas/en/.

2. Akala FA, El-Saharty S. Public-health challenges in the Middle East and North Africa. \textit{Lancet} 2006; 367: 961-964.

3. Al-Jadid MS, Robert AA. Determinants of length of stay in an inpatient stroke rehabilitation unit in Saudi Arabia. \textit{Saudi Med J} 2010; 31: 189-192.

4. El Sayed MM, Adeuja AO, El-Nahrawy E, Olaish MA. Characteristics of stroke in Hofuf, Saudi Arabia. \textit{Ann Saudi Med} 1999; 19: 27-31.

5. Kamran S, Bener AB, Deleu D, Khoja W, Jumma M, Al Shubali A, et al. The level of awareness of stroke risk factors and symptoms in the Gulf Cooperation Council countries: Gulf Cooperation Council stroke awareness study. \textit{Neuroepidemiology} 2007; 29: 235-242.

6. Ramírez-Moreno JM, Alonso-González R, Peral-Pacheco D, Millán-Núñez MV, Aguirre-Sánchez J. Stroke Awareness Is Worse among the Old and Poorly Educated: A Population-Based Survey. \textit{J Stroke Cerebrovasc Dis} 2015; 24: 1038-1046.

7. Becker K, Fruin M, Gooding T, Tirschwell D, Love P, Mankowski T. Community-based education improves stroke knowledge. \textit{Cerebrovasc Dis} 2001; 11: 34-43.

8. Pancioli AM, Broderick J, Kothari R, Brett T, Tüchfarber A, Miller R, et al. Public perception of stroke warning signs and knowledge of potential risk factors. \textit{JAMA} 1998; 279: 1288-1292.

9. Oh GJ, Moon J, Lee YM, Park HK, Park KS, Yun YW, et al. Public Awareness of Stroke and Its Predicting Factors in Korea: a National Public Telephone Survey, 2012 and 2014. \textit{J Korean Med Sci} 2016; 31: 1703-1710.

10. Borhani Haghighi A, Karimi AA, Amiri A, Ghaffarpasand F. Knowledge and attitude towards stroke risk factors, warning symptoms and treatment in an Iranian population. \textit{Med Princ Pract} 2010; 19: 468-472.

11. Shehata HS, Ahmed SM, Abdelalim AM, El Sherbiny N. Knowledge and attitude towards stroke among workers in Cairo University Hospitals. \textit{The Egyptian Journal of Neurology, Psychiatry and Neurosurgery} 2016; 53: 54.

12. Alaqeel A, AlAmmari A, AlSyefi N, Al-Hussain F, Mohammad Y. Stroke awareness in the Saudi community living in Riyadh: prompt public health measures must be implemented. \textit{J Stroke Cerebrovasc Dis} 2014; 23: 500-504.

13. Alahmari K, Paul S. Prevalence of Stroke in Kingdom of Saudi Arabia-Through a Physiotherapist Diary. \textit{Mediterranean Journal of Social Sciences} 2016; 7: 228.

14. Saver JL, Smith EE, Fonarow GC, Reeves MJ, Zhao X, Olson DM, et al. The “golden hour” and acute brain ischemia: presenting features and lytic therapy in >30,000 patients arriving within 60 minutes of stroke onset. \textit{Stroke} 2010; 41: 1431-1439.

15. Jarou Z, Harris N, Gill L, Azizi M, Gabasha S, LaBril R. Public stroke knowledge: Those most at risk, least able to identify symptoms. \textit{Med Stud Res J} 2013; 3: 3-8.

16. World Health Organization. Adequacy of sample size in health studies. Geneva (CH); 1990.
17. World Health Organization. Fact sheet No. 310: the 10 leading causes of death in the world, 2000 and 2012. Geneva (CH); 2014. https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death
18. Grady A, Carey M, Sanson-Fisher R. Assessing awareness of appropriate responses to symptoms of stroke. Patient Educ Couns 2014; 95: 400-405.
19. Truelsen T, Krakup LH. Stroke awareness in Denmark. Neuroepidemiology 2010; 35: 165-170.
20. Worthmann H, Schwartz A, Heidenreich F, Sindern E, Lorenz R, Adams HA, et al. Educational campaign on stroke in an urban population in Northern Germany: influence on public stroke awareness and knowledge. Int J Stroke 2013; 8: 286-292.
21. Gomes ABAGR, Henrique M Jr, Schoeps VA, Santos MMSA, Pellegrinelli A, de Matos BP, et al. Popular stroke knowledge in Brazil: A multicenter survey during “World Stroke Day”. eNeurologicalSci 2016; 6: 63-67.
22. Sug Yoon S, 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: 1926-1930.
23. Hickey A, O’Hanlon A, McGee H, Donnellan C, Shelley E, Horgan F, et al. Stroke awareness in the general population: knowledge of stroke risk factors and warning signs in older adults. BMC Geriatr 2009; 9: 35.
24. Meschia JF, Bushnell C, Boden-Albala B, Braun LT, Bravata DM, Chaturvedi S, et al. Guidelines for the primary prevention of stroke: a statement for healthcare professionals from the American Heart Association/American Stroke Association. Stroke 2014; 45: 3754-3832.
25. Feigin VL, Mensah GA, Norrving B, Murray CJ, Roth GA. Atlas of the Global Burden of Stroke (1990-2013): The GBD 2013 Study. Neuroepidemiology 2015; 45: 230-236.
26. Ramírez-Moreno JM, Alonso-González R, Peral Pacheco D, Millán-Nuñez 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]. Neurologia 2016; 31: 24-32. [English, Spanish]
27. Silver FL, Rubini F, Black D, Hodgson CS. Advertising strategies to increase public knowledge of the warning signs of stroke. Stroke 2003; 34: 1965-1968.

Authorship entitlement

Excerpts from the Uniform Requirements for Manuscripts Submitted to Biomedical Journals updated November 2003.
Available from www.icmje.org

The international Committee of Medical Journal Editors has recommended the following criteria for authorship; these criteria are still appropriate for those journals that distinguish authors from other contributors.

Authorship credit should be based on 1) substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; 2) intellectual content; and 3) final approval of the version to be published. Authors should meet conditions 1, 2, and 3.

Acquisition of funding, collection of data, or general supervision of the research group, alone, does not justify authorship.
An author should be prepared to explain the order in which authors are listed.