

## Students' Corner

### **Awareness of stroke risk factors, signs and treatment in a Pakistani population**

Zarmeneh Aly,<sup>1</sup> Kanza Abbas,<sup>2</sup> Syed Faraz Kazim,<sup>3</sup> Fawad Taj,<sup>4</sup> Fatima Aziz,<sup>5</sup> Affan Irfan,<sup>6</sup>  
Rashid Sheikh,<sup>7</sup> Mariam Shakir,<sup>8</sup> Syed M. Javed,<sup>9</sup> Zafar Fatmi<sup>10</sup>

Medical Student,<sup>1-3,5-9</sup> Community Health Sciences,<sup>10</sup> The Aga Khan University, Karachi, SW Cleveland Sleep Center, Cleveland, OH- 44122, USA<sup>4</sup>

#### **Abstract**

**Objective:** To assess the level of awareness in the general public on risk factors, symptomatology and immediate treatment of stroke.

**Method:** A cross sectional study was conducted in a sample of subjects visiting a tertiary care university hospital by means of a self-designed questionnaire. The study period extended between May and June, 2007.

**Results:** A total of 398 individuals were surveyed. Hypertension (69.1%) and stress (55.8%) were identified as two major risk factors for stroke. Among them 50.8% identified "Brain" as the principal organ involved in stroke out of which 78.2% of the response came from people whose level of education was intermediate-and-above. Around 13% of the study respondents did not know of any risk factor for stroke, while 11.6% of the study respondents didn't know about the alarming signs of stroke. The most frequent response (26.16%) to immediate management of stroke was to take the individual to Emergency Department/hospital. In all 56% reported that basic information about stroke was given to them by friend/relative.

**Conclusions:** The overall awareness of the study population regarding stroke was shown to be inadequate by this study. Knowledge was significantly greater in participants of younger age and a higher level of education (JPMA 59:495; 2009).

#### **Introduction**

Stroke is a clinical syndrome characterized by rapidly developing symptoms and/or signs of focal and at times global (for patients in coma) loss of cerebral functions, with symptoms lasting more than 24 hours or leading to death with no apparent cause other than that of vascular origin.<sup>1</sup> According to World Health Organization report 2002, total mortality due to stroke in Pakistan was 78512.<sup>2</sup> By 2020, stroke mortality will have almost doubled mainly as a result of increase in the proportion of older people and the future affects of current smoking patterns in developing countries.<sup>3</sup> Stroke is a huge burden on economy in terms of expenditure and treatment as well as disability associated with it, which translates into waste of precious man-hours, especially for developing countries.

Efficient, effective and rapid diagnosis of stroke is crucial. The diagnosis of stroke and its cause requires early identification of warning signs and as well as advanced diagnostic techniques which in turn influences management. Despite recent advances in stroke therapy, the public remains uninformed about strokes, and few stroke patients present to hospital in time to receive treatment<sup>4</sup> Studies conducted in industrialized countries have established lack of knowledge of stroke and its signs and symptoms.<sup>5</sup> Knowledge about stroke among the public is poor, but can be increased through public educational campaigns. Since early administration of tissue plasminogen activator is the most effective stroke treatment for patients. Getting to the emergency room as quickly as possible after they have had symptoms is essential for stroke prognosis.<sup>6</sup>

This highlights the importance of assessing knowledge of stroke risk factors and early signs and symptoms in the care-giving population and proposing suggestions accordingly.

Considering all the previous studies done on this topic, intensive health education is needed to improve awareness of stroke, especially among the most vulnerable groups, which would also include older age groups and women who are less aware of risk factors and perception of stroke.<sup>7</sup> The data also supports the need for targeted educational programmes about stroke risks and symptoms, underscoring the importance of public health programmes to improve awareness of stroke among vulnerable population. Further public education is needed to increase awareness of the warning signs and risk factors of stroke.

Our study focuses on assessing the degree of awareness in the people about signs, symptoms and risk factors of stroke.

#### **Methodology**

This cross-sectional study was conducted in Karachi, which is Pakistan's most populous city. The study period extended between May and June, 2007. The study sample of 398 individuals was selected from the out-patient department (OPD) of Aga Khan University Hospital (AKUH), a JCIA approved tertiary care hospital in Karachi. Two OPD settings were chosen which were the Community Health Center (CHC) and the Consulting Clinics (CC) with the exception of patients presenting to the Neurology OPD. These departments have a turnover of more than a 100 and 200 patients respectively,

everyday. The fee structure is such that the CHC is suitable for the middle and lower middle strata of the population and the CC for the upper middle and upper strata of society.

The survey instrument was a questionnaire which was prepared in accordance to relevant literature, pre-tested, and modified in terms of question clarity. The questionnaire included 23 questions in three sections. The first section included nine questions about socio-demographics. The second section included seven open-ended questions related to the awareness of the participants about warning signs, risk factors and management of stroke, designed to determine knowledge and attitude of participants.

Group of nine medical students, belonging to final year MBBS were trained to administer the questionnaire in a face-to-face interview, in both Urdu and English languages. They were trained for 2 hours in an accumulative session in order to adopt understanding and uniform questionnaire administration. Informed verbal consent was taken from the participants before administration of the questionnaire. In order to address the ethical issues or human subject research after completion of the study questionnaire, misconceptions about stroke were corrected and information about risk factors, warning signs and management of stroke was given verbally.

The questionnaire was administered to a population of 18 years and above without any prior history of stroke who presented to the study setting. Health professionals, medical students and people presenting to the Neurology OPD were excluded from the study population. A convenient sampling method was employed. Assumption of an anticipated positive awareness of 27 percent of signs, symptoms, and risk factors of stroke,<sup>6</sup> level of significance of 5 percent and an absolute precision of 5 percent, the minimal sample size was calculated to be 398. We used WHO, Sample Size Calculation Formula 2.1 for our estimation.

The data was collected from 07th June to 15th June by all the members of the group and was entered in coded form without any identifying information. Data was entered twice by two different data entry operators in EPIDATA (Version 3.02). The data entry was considered as valid if the error rate was less than 0.3%. The final data was converted to SPSS (Version 14.0) for analysis. Descriptive analysis was conducted by calculating means and proportions for continuous and discrete data respectively. Inferential analysis was done by using the Pearson chi square test of significance to identify associations amongst variables. The ethical approval of the study was obtained from Ethics Review Committee (ERC) and the Department of Community Health Sciences, at the Aga Khan University.

## Results

We surveyed 398 participants for our study. The

**Table-1: Sociodemographic details of our study population.**

Variables	n=398(%)
<b>Age</b>	
<20 yrs	18 (4.5)
21 to 60yrs	347(87.2)
>60yrs	33(8.3)
<b>Gender</b>	
Male	240 (60.6)
Female	158 (39.4)
<b>Education</b>	
Intermediate and onwards	276 (69.3)
Formal (Primary/Secondary)	71 (17.8)
Informal (Illiterate, Can read/write, Madrassah)	51 (12.8)
<b>Occupation</b>	
Professional, Skilled	226 (56.8)
Unemployed, Retired	140 (35.2)
Self-employed	32 (8.0)
<b>Socio-economic Status (Monthly Income)</b>	
Lower (<Rs.10,000)	71 (17.8)
Middle(Rs.10,000 to 50,000)	231 (58)
Upper (>Rs.50,000)	96 (24.1)

characteristics of study sample have been depicted in Table-1. The mean age of our sample was 39±14.2 years with the largest proportion of the study population in the 20-29 years age interval (28.6%). Male to female ratio was approximately 3:2. The level of education was intermediate-and-above in 69.3% participants.

Overall, only 23.1% believed that they have sufficient knowledge about stroke. The belief of having sufficient knowledge about stroke was more common among intermediate-and-above level of education (72.8%) and professionals/skilled population (64%).

When asked about the organ involved in stroke, almost half (50.8%) identified "brain", whereas 29.4% claimed "heart" to be the organ involved in stroke. Also cross tabulation of the responses with education level showed that 78.2% of the response "brain" came from people whose level of education was intermediate and above. However socio-economic status (monthly income) or gender did not seem to have any statistically significant association with identification of brain as the organ responsible for stroke.

Table-2 shows the frequencies of identification of risk factors for stroke by study respondents. Hypertension (69.1%) and stress (55.8%) were identified as two major risk factors. Hypercholesterolaemia (36.7%), age (33.7%), diabetes (33.4%), smoking (29.1%), and family history of stroke (29.1%) were perceived as other major predisposing factors for stroke by study sample. Recognition of Hypercholesterolaemia (p=0.002), 'no exercise'(p=0.001) and obesity (p=0.001) as predisposing factors for stroke was more common among males compared to females. Intermediate and onwards level of education was found to be associated with a higher correct identification

**Table-2: Frequencies of common positive responses to stroke risk factors and signs.**

<i>Risk Factors %</i>		<i>Signs %</i>	
Hypertension	69.2	Weakness of Body/Face	71.4
Stress	55.9	Numbness of Body/Face	60.6
Hypersholestrolemia	36.7	Slurred Speech	41.2
Age	33.7	Dizziness	29.4
Diabetes	33.4	Severe Headache	29.4
Smoking	29.1	Difficulty Understanding	27.4
Family History	29.2	Vision Problems	22.9
Obesity	26.6	Shortness of Breath	16.6
No Exercise	24.9		
Increased Salt Intake	23.9		
IHD/AF	23.6		
TIA	15.8		

IHD= Ischaemic Heart Disease.

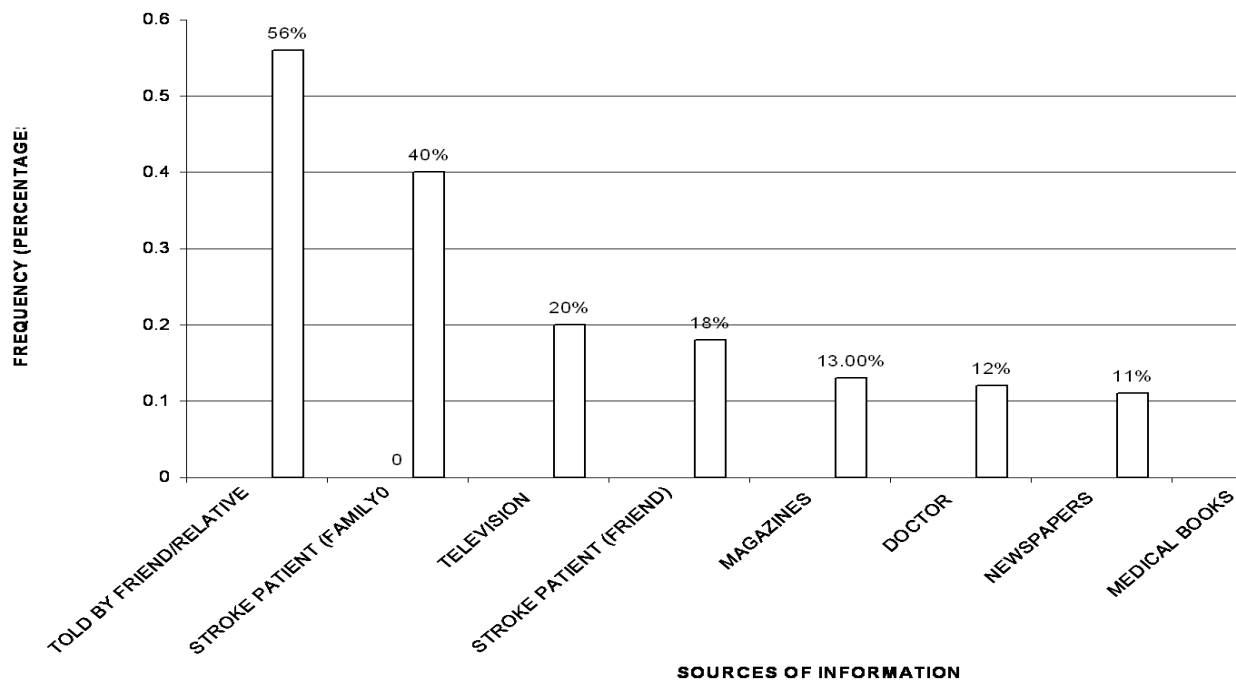


Figure: Frequencies of sources of information of study respondents.

of risk factors as compared to lower education level. ( $P < 0.05$ ).

Study participants belonging to younger age group (<40) correctly identified more risk factors as compared to those

belonging to older age groups ( $P < 0.01$ ).

Seventy percent of the study participants identified unilateral or bilateral weakness of the body or face as a sign of stroke whereas numbness of body or face was regarded as a sign by 60.6%. Table-2 depicts the responses of study participants regarding the signs and symptoms of stroke.

A statistically significant correlation was found between younger ( $P < 0.03$ ) and educated groups ( $P < 0.05$ ) with awareness of early signs of stroke. Males were more likely to identify shortness of breath as an early sign of stroke compared to women ( $p = 0.001$ ).

When asked about the choice of management in case of an imminent stroke, the most frequently encountered response was to take individual to emergency department/hospital (26.16%). When asked about the source of information about the risk factors and warning signs of stroke, 56% reported that they were told by friend/relative, 30.9% had information because they had a stroke patient in the family whereas 20% have learnt about stroke from television. No significant correlation was found in either case. Figure depicts the percentages of sources of information of study respondents.

## Discussion

This hospital-based study indicates the desirability of improving the level of public awareness regarding its stroke,

risk factors, symptoms, and treatment options. The general knowledge of people about stroke came out to be lower than optimum but their knowledge of individual risk factors, signs and symptoms and methods of management fares better. The system through which information is generally gathered is discussion with friends and relatives.

A majority of the study sample correctly identified the brain as being the causative organ. Our results indicate that 40.8% of the population incorrectly consider that other organs or part of body are responsible for stroke. This is in concurrence with some or the previous studies.<sup>9</sup>

Another component of stroke awareness is knowing the true risk factors. In our sample 86.9% of the participants correctly stated at least one of these risk factors, 70.2% knew at least two and 53% knew at least 3. These values varied between 68% and 80% in the literature.<sup>6,9-11</sup>

In this study, high blood pressure was the most frequently identified risk factor as in other studies.<sup>5,12</sup> Stress is not considered as a classical risk factor for stroke by American Stroke Association. It is, however, an established risk factor for causing stroke and is reported in high percentages in some studies.<sup>13-15</sup> Stress was ranked as a close second to hypertension as the most frequently identified risk factor in our study. The total identification of other major risk factors such as diabetes, hypercholesterolaemia and old age, is slightly greater than previously reports.<sup>10</sup> Although the burden of hypertension was slightly more than diabetes in our population, the awareness of it being a risk factor was markedly raised. This observation correlates to stroke as being caused by the heart.

The reason why knowledge of stroke risk factors is important is two-fold. Firstly, to be aware of their increased risk status and to adopt measures to protect themselves from an impending stroke. Secondly the factors are modifiable, and modifications of individual behaviours rely, in part, on the understanding that certain behaviour patterns may lead to increased disease risk. In fact, research has shown that increased awareness in patients at high risk for stroke lead to improved compliance with stroke prevention practices.<sup>16,17</sup>

Our finding that there was a strong association between intermediate-and-above level of education and younger age group with their correct identification of stroke risk factors did not differ from other studies.<sup>6,9</sup> Low level of education and old age may lead to limited interaction with society and therefore to less interest in following medical developments, and thereby resulting in a low level of health care knowledge about stroke.

Control of risk factors remains an important target for intervention.<sup>18</sup> Hypertension control rates remain low in general. Of known hypertensives, only 31% are controlled to a level <140/90 mm Hg in the United States.<sup>19</sup> Increasing awareness of the risk factors and warning signs of stroke among both women and men may be the initial step in reducing the burden of this disease.<sup>18</sup>

The National Institute of Neurological Disorders and Stroke has defined the important warning signs of a stroke.<sup>20</sup> The percentage of people who were aware of at least one two or three warning sign was 88.4%, 69.3% and 55.4%, respectively. Out of the total 11.6% of the study respondents didn't know of any alarming signs of stroke. The values for knowledge of at least one warning sign varied between 69% and 84% in literature.<sup>6,9-11</sup>

The most common warning sign identified by the people was weakness of one or both sides of the face or body (71.4%) followed by numbness of one or both sides of the face or body (60.6%). This was similar to other studies.<sup>6,21</sup> Univariate analysis in our study showed that young age group and higher level of education was significantly associated with the correct identification of warning signs as supported by studies.<sup>5</sup> Knowledge of stroke warning signs at the population level is thought to be critical in the early recognition and referral of patients who have had acute strokes.<sup>22,23</sup> This factor is critical since the time window for effective therapeutic intervention may be only 4 hours.<sup>6,24</sup>

The primary sources of information of participants in the study were relatives and friends. This reflects the importance of educating the population at large. It should be ensured that the knowledge they possess is accurate and free from misconceptions. Electronic media is generally known to have a considerable role in disseminating information in the context of developing countries.<sup>9,10,13</sup> It was unfortunate to note that only 12% of our study population acquired their knowledge of stroke from doctors. This indicates that priority should be given to effective conveyance of knowledge from doctor to patient.

Our study has encountered several limitations. Although interviewers were trained on how to avoid leading questions, nonetheless, interviewer bias might have influenced the participants response. The hospital based study sample might not be representative of the population at large.

Stroke is not easy to recognize because symptoms vary. Information should be provided to general public, especially those at high risk, emphasizing importance of early presentation. The results of our study have contributed to the understanding of stroke risk factor knowledge and in particular stroke risk perception among individuals. People relied on their friends and family for information which necessitates the education of the population at large.

One implication of our results is the importance of increasing public awareness about stroke and stroke prevention, particularly in the at-risk population. Initiatives such as ensuring the retention of simple and accurate information regarding the warning signs, symptoms, and treatment of stroke in both patients and families as they go through stroke rehabilitation may be an effective means of promulgation of this information to the general public.

One way of doing this is by dissemination of audio-visual

materials besides the text materials which is also efficacious.<sup>25</sup> Further research can be done on methods of promoting community education about recognizing stroke and appropriate responses by people who experience stroke.

### Acknowledgements

The authors would like to thank Dr Ayeesha K. Kamal. Her expertise and guidance as stroke-neurologist has been instrumental in making this project possible.

### References

1. Davenport R, Dennis M: Neurological emergencies: acute stroke. *J Neurosurg Psychiatr* 2000; 68: 277-88.
2. World Health Organization (WHO). The atlas of heart disease and stroke. (Online) Available from URL: [www.who.int/cardiovascular\\_disease/resources/atlas/en/](http://www.who.int/cardiovascular_disease/resources/atlas/en/)
3. Rothwell PM. The high cost of not funding stroke research: a comparison with heart disease and cancer. *Lancet* 2001; 357: 1612-16.
4. Becker K, Fruin M, Gooding T, Tirschwell D, Love P, Mankowski T. Community-based education improves stroke knowledge. *Cerebrovasc Dis* 2001; 11: 34-43.
5. Pancioli AM, Broderick J, Kothari R, Brott T, Tuchfarber A, Miller R, et al. Public perception of stroke warning signs and knowledge of potential risk factors. *JAMA* 1998; 279: 1288-92.
6. Pandian JD, Jaison A, Deepak SS, Kalra G, Shamsher S, Lincoln DJ, et al. Public awareness of warning symptoms, risk factors, and treatment of stroke in northwest India. *Stroke* 2005; 36: 644-8.
7. Nicol MB, Thrift AG. Knowledge of risk factors and warning signs of stroke. *Vasc Health Risk Manag* 2005; 1: 137-47.
8. Aho K, Hamsen P, Hatano S, Marquardsen J, Smirnov VE, Strasser T. Cerebrovascular disease in the community: results of a WHO collaborative study. *Bull World Health Organ* 1980; 58: 113-30.
9. 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: 1926-30.
10. Muller-NJ, Nolte CH, Rossnagel K, Jungehulsing GJ, Reich A, Roll S, et al. Knowledge about risk factors for stroke: a population-based survey with 28,090 participants. *Stroke* 2006; 37: 946-50.
11. Reeves MJ, Hogan JG, Rafferty AP. Knowledge of stroke risk factors and warning signs among Michigan adults. *Neurology* 2002; 59: 1547-52.
12. Kim JS, Yoon SS. Perspectives of stroke in persons living in Seoul, South Korea. A survey of 1000 subjects. *Stroke* 1997; 28: 1165-9.
13. Schneider AT, Pancioli AM, Khoury JC, Rademacher E, Tuchfarber A, Miller R, et al. Trends in community knowledge of the warning signs and risk factors for stroke. *JAMA* 2003; 289:343-6.
14. Truelsen T, Nielsen N, Boysen G, Gronbaek M. Self-reported stress and risk of stroke: the Copenhagen City Heart Study. *Stroke* 2003; 34: 856-62.
15. American Heart Association. Stroke Risk Factors. (Online) Cited on July 20, 2008. Available from URL: [\[www.americanheart.org/presenter.jhtml?identifier=4716\]](http://www.americanheart.org/presenter.jhtml?identifier=4716).
16. Samsa GP, Cohen SJ, Goldstein LB, Bonito AJ, Duncan PW, Enarson C, et al. Knowledge of risk among patients at increased risk for stroke. *Stroke* 1997; 28: 916-21.
17. Kreuter MW, Strecher VJ. Changing inaccurate perceptions of health risk: results from a randomized trial. *Health Psychol* 1995; 14: 56-63.
18. Ferris A, Robertson RM, Fabunmi R, Mosca L. American Heart Association and American Stroke Association national survey of stroke risk awareness among women. *Circulation* 2005; 111: 1321-6.
19. Hajjar I, Kotchen TA. Trends in prevalence, awareness, treatment, and control of hypertension in the United States, 1988-2000. *JAMA* 2003; 290: 199-206.
20. National Institute of Neurological Disorders and Stroke. Brain attack: stroke warning signs. (Online) Cited on 24 July, 2008. Available from URL: [www.ninds.nih.gov/disorders/stroke/warning-signs.htm](http://www.ninds.nih.gov/disorders/stroke/warning-signs.htm).
21. Al Shafae MA, Ganguly SS, Al Asmi AR. Perception of stroke and knowledge of potential risk factors among Omani patients at increased risk for stroke. *BMC Neurol* 2006; 6:38.
22. Kothari R, Sauerbeck L, Jauch E, Broderick J, Brott T, Khoury J, Liu T: Patients' awareness of stroke signs, symptoms, and risk factors. *Stroke* 1997; 28: 1871-5.
23. Williams LS, Bruno A, Rouch D, Marriott DJ. Stroke patients' knowledge of stroke. Influence on time to presentation. *Stroke* 1997; 28: 912-5.
24. Ginsberg MD. The validity of rodent brain-ischemia models is self-evident. *Arch Neurol* 1996; 53: 1065-7; discussion 1070.
25. Stern EB, Berman M, Thomas JJ, Klassen AC. Community education for stroke awareness: An efficacy study. *Stroke* 1999; 30: 720-3.