# Awareness of Stroke among Teachers in Asser Region, Saudi Arabia 

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#### Abstract

Background: Stroke is a serious life-threatening medical disorder, which is caused by disruption of blood vessels supplying oxygen to the brain cells. Stroke is mainly categorized into two types, ischemic and hemorrhagic. Objective: To assess the knowledge of teachers and their contribution in spreading awareness related to stroke, its causes, risks, prevention, diagnosis and treatment. Design: A cross-sectional survey. Settings: Government schools in Asser region of Saudi Arabia. Subjects and methods: A 25 questionnaire set was distributed to the teachers for filling up, which included questions to evaluate the teacher's knowledge on stroke. Main outcome measures: Simple random sampling technique, SPSS software program, Chi-Square test. Results: Teachers from Saudi origin were statistically more aware about stroke ( $p$ value $=0.003$ ). A statistically significant difference ( $p$ value $=0.015$ ) was observed in terms of gender of teachers where it was observed that males spread more stroke awareness. Teachers with a bachelor's degree ( $p$ value $=0.020$ ) and the ones who specialized in social subjects spread ( $p$ value $=0.038$ ) significant awareness.

Conclusion: It is essential to increase knowledge of teachers regarding stroke. Various campaigns and awareness camps should be conducted to spread awareness. Limitations: This study was performed in only one tertiary hospital. Keywords: Asser Region; Survey; Stroke


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## Introduction

A stroke is a serious life-threatening medical disorder that occurs due to disruption of blood vessels supplying oxygen to the brain cells. The blood vessels transport oxygen and nutrients to the brain and are essential for normal functioning of the central nervous system. When a blood vessel is either blocked by a clot or is ruptured, the part of the brain that normally receives blood from that vessel does not get sufficient amount of oxygen, resulting in the death of the cell [1].

Stroke is mainly categorized into two types, ischemic and hemorrhagic. When a stroke is caused by a blockage (often due to a clot) in the artery, it is known as ischemic stroke, while the leaking or ruptured blood vessels lead to hemorrhagic stroke. Some people experience only a temporary disruption of blood flow to the brain (transient ischemic attack, or TIA) that doesn't cause permanent damage [1].

In the year 2013, stroke was found to be the second largest cause of death worldwide, contributing to $11.8 \%$ of all deaths [2]. An increase in the incidence of stroke was also observed in the Middle East by ElHajj et al. [3]. Their study reported a high incidence rate for all strokes ranging between 22.7 and 250 per 100,000 populations per year. A high prevalence rate, ranging between 508 and 777 per 100,000 population, was also reported with a high male-to-female ratio. In Kingdom of Saudi Arabia (KSA), stroke is a very prevalent condition, affecting 43.8 per 100,000 people other study conducted in 1993 by al Rajeh et al. [5]. Reported that males ( $\mathrm{p}<0.001$ ) are more affected with stroke and that the mean age of patient of stroke was $63+/-17$ years.

Lack of awareness has been considered as one of the major causes of the high incidence of stroke in the Middle East. The population is not aware of the risks, causes and symptoms associated with a stroke. Being aware of the risks can help in the primary prevention of the

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disease. Moreover, awareness regarding symptoms will lead to early initiation of medical treatment, thus avoiding permanent damage and complications. Therefore, there is a need to spread awareness among the entire population [3]. Teachers play an important role in a nation's development, as they are the lead source of creating awareness among the youth. By ensuring that teachers are aware about stroke, and are successfully managing to create a similar degree of awareness in their students, themorbidity and mortality associated with the disease can be reduced. Thus, the present cross-sectional study focused to assess the awareness of stroke among government schoolteachers in Asser region of KSA.

## Materials and Methods

## Targeted population

The study included male and female teachers employed in government schools, of both Saudi as well as non-Saudi origin. The teachers of private and international schools were excluded from the study.

Study design: A cross-sectional survey was conducted on a representative sample of teachers working in government schools in Asser region of Saudi Arabia. The survey was conducted by distributing a questionnaire among teachers of government schools.

Sample size: The samplesize was calculated by using the following formula:
$\mathrm{N}=\left[\mathrm{Z}^{2 *}(\mathrm{p})^{*}(1-\mathrm{p})\right] / \mathrm{c}^{2}$
Where:
$\mathrm{N}=$ Calculated sample size
$\mathrm{Z}=\mathrm{Z}$ value $=1.96$ for $95 \%$ confidence level
$\mathrm{p}=$ Population Proportion $=0.50$
$c=$ confidence interval $=5 \%$
Accordingly, the appropriate sample size was found to be at least 385. However, to avoid the possible non-response, a total sample of at least 400 was estimated to be appropriate.

Sampling technique: Simple random sampling technique was used for enrollment of subjects in the study.

## Data collection methods

After receiving the ethical approval, the questionnaire was disturbed among teachers of government schools in Asser region of KSA. Based on the thorough review of relevant literature, a stroke awareness questionnaire was developed and included the following sections (appendix):

Demographics data including age, gender, ethnicity, education level, marital status, teaching years

Demographic data including age, gender, ethnicity, education level, marital status, teaching years, teaching level, specialization

A total of 25 questions were formed to cover various aspects of stroke, relating to the warning signs, risk factors, complications and treatment.The questionnaire was translated accurately into Arabic language and was divided into two parts. The first part contained five multiple-choice questions (MCQs) and the next 20 questions were to be marked as true or false.

A score of one mark was set for each correct answer for twenty questions. The five most important questions, which were considered important for teachers to know, were especially highlighted and were given a score of three each. In case any of these questions were missed or incorrectly marked, three marks were deducted out of the total score of $35\left(20+5^{*} 3\right)$ marks. The evaluation was done based on the scores awarded to the subject. Subjects with scores below 25 marks were considered having poor knowledge about stroke, while subjects scoring marks within 25-30 were considered to have good knowledge. Teachers scoring 30 marks or above were considered having excellent knowledge about the various aspects of stroke.

The teachers were also asked about the sources of their information, such as, television, social media, books, friends, a family member who had a history of stroke, school, public health provider, from which they gained information about stroke. The teachers were also asked about whether they had given any information about the risk involved in a stroke. The data was entered into a pre-designed excel spreadsheet.

## Data management and analysis plan

Data cleaning and preparation: Raw data was processed in accordance with the best practices for raw data management to identify any inaccuracies or incompleteness in advance of the statistical analysis. All the data was cleaned from any duplication or incompleteness. All the variables were included in the spreadsheet.

Data analysis: The statistical analysis began by transferring the data from Excel spreadsheet to SPSS software program. All variables were summarized and compared across the study groups. Interval variables such as age were summarized and reported in terms of mean and standard deviation. Categorical variables such as gender were summarized and reported in terms of frequency distribution with graphs. All categorical and interval variables were compared statistically across the study groups using Chi-Square test. A p-value of $<0.05$ was considered as significant.

Ethical considerations: Private information of teachers and their contact information were not made public.

## Results

A total of 626 subjects were included in the study with the mean (SD) age of 41 (8) years. Out of them, $79.1 \%(\mathrm{n}=495)$ were males and $20.9 \%(\mathrm{n}=131)$ were females. Saudi nationals were 596 in number, while 30 of the subjects were from other countries. The demographic profile of the subjects including their nationality, marital status, teaching experience has been explained in Table 1.

The questionnaire consisted of questions, which were developed to evaluate the knowledge of teachers on stroke awareness, its treatment, the risks as well as their understanding of the topic. A detailed account of the questionnaire with the answers given by the teachers has been presented in the Tables 2,3 and 4 . Table 5 represents the part of the questionnaire, which focused their ability to impart knowledge to the students.

About $77.2 \% ~(~ \mathrm{n}=483)$ subjects were aware that the stroke happened in brain while $60.4 \%(n=378)$ subjects were aware that symptoms of stroke appear suddenly (Table 2). More than $80 \%$ of patients were aware that stroke is due to lack of blood supply to brain ( $88.0 \%, \mathrm{n}=551$ ) and it may cause paralysis $(80.0 \%, \mathrm{n}=501)$ (Table 3). However, only $49.0 \%(\mathrm{n}=307)$ teachers knew that rash is not a sign of stroke. Only $35 \% ~(n=219)$ subjects marked "Stroke normally affects both sides of

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Table 1. Demographic profile of subjects included in the study.

|  |  | Mean (SD) | N (626) | \% |
| :---: | :---: | :---: | :---: | :---: |
| Age |  | 41 (7.63) years |  |  |
| Gender | Male |  | 495 | 79.1 |
|  | Female |  | 131 | 20.9 |
| Nationality | Saudi |  | 596 | 95.2 |
|  | Non-Saudi |  | 30 | 4.8 |
| Marital Status | Single |  | 30 | 4.8 |
|  | Married |  | 584 | 93.3 |
|  | Divorced |  | 12 | 1.9 |
| Degree | Doctoral |  | 15 | 2.4 |
|  | Master |  | 59 | 9.4 |
|  | Bachelor |  | 517 | 82.6 |
|  | Diploma |  | 35 | 5.6 |
| Specialization | Islamic Subjects |  | 149 | 23.8 |
|  | Arabic Languages |  | 111 | 17.7 |
|  | Mathematics |  | 105 | 16.8 |
|  | Sciences |  | 84 | 13.4 |
|  | Social Subjects |  | 78 | 12.5 |
|  | English Language |  | 30 | 4.8 |
|  | Physical Education |  | 20 | 3.2 |
|  | Computer Science |  | 18 | 2.9 |
|  | General |  | 16 | 2.6 |
|  | Art Education |  | 12 | 1.8 |
|  | Housekeeping |  | 3 | 0.5 |
| Teaching years |  | $19 \pm$ (49.93) years |  |  |
| Teaching Level | High school |  | 239 | 38.2 |
|  | Middle School |  | 132 | 21.1 |
|  | Elementary school |  | 255 | 40.7 |
| Score/35 |  | $21 \pm$ (6) |  |  |

Table 2. Questionnaire with multiple choice questions.

|  |  | N | \% |
| :---: | :---: | :---: | :---: |
| Stroke happens in | Heart | 21 | 3.4 |
|  | Brain* | 483 | 77.1 |
|  | Muscle | 109 | 17.4 |
|  | I don't know | 13 | 2.1 |
| Stroke is more common among | Men* | 309 | 49.4 |
|  | Women | 12 | 1.9 |
|  | Women and men are same | 141 | 22.5 |
|  | Not common | 82 | 13.1 |
|  | I don't know | 82 | 13.1 |
| Do symptoms of a stroke usually come | Suddenly* | 378 | 60.3 |
|  | Comes and go | 33 | 5.3 |
|  | Gradually | 110 | 17.6 |
|  | Without symptoms | 31 | 5.0 |
|  | I don't know | 74 | 11.8 |
| Which of these could help reduce the chance of stroke | Vitamin C | 12 | 1.9 |
|  | Fresh air | 29 | 4.6 |
|  | Drinking a lot of water | 209 | 33.4 |
|  | Exercis** | 284 | 45.4 |
|  | I don't know | 92 | 14.7 |
| Diagnosis of stroke can be done by | CT Scan | 244 | 39.0 |
|  | Blood Test | 24 | 3.8 |
|  | CT scan and blood test* | 214 | 34.2 |
|  | Creatinine analysis | 19 | 3.0 |
|  | I don't know | 125 | 20.0 |

*The right answer
the body" as a false statement, which was the correct answer (Table 3). Only $15.8 \%(\mathrm{n}=99)$ teachers knew that family history contributes to stroke (Table 4). A high percentage, $75.0 \%$ ( $\mathrm{n}=468$ ), of subjects

Table 3. Questionnaire with true and false questions related to stroke (Part I).

|  |  | N | \% |
| :---: | :---: | :---: | :---: |
| Stroke is due to lack of blood supply to brain | True* | 551 | 88.0 |
|  | False | 32 | 5.1 |
|  | I don't know | 43 | 6.9 |
| Strokes may cause paralysis | True* | 501 | 80.0 |
|  | False | 80 | 12.8 |
|  | I don't know | 45 | 7.2 |
| Stroke is a medical emergency | True* | 550 | 87.8 |
|  | False | 43 | 6.9 |
|  | I don't know | 33 | 5.3 |
| A quarter of strokes occur in people under the age of 65 | True* | 134 | 21.4 |
|  | False | 372 | 59.4 |
|  | I don't know | 120 | 19.2 |
| Fever and Sweating is a sign of stroke | True* | 269 | 43.0 |
|  | False | 151 | 24.1 |
|  | I don't know | 206 | 32.9 |
| Slurred speech is a sign of stroke | True* | 358 | 57.2 |
|  | False | 110 | 17.6 |
|  | I don't know | 158 | 25.2 |
| Weakness in the arms/legs is a sign of stroke | True* | 518 | 82.7 |
|  | False | 18 | 2.9 |
|  | I don't know | 90 | 14.4 |
| Rash is a sign of stroke | True | 66 | 10 |
|  | False* | 307 | 50 |
|  | I don't know | 253 | 40 |
| Stroke normally affects both sides of the body | True | 273 | 43.6 |
|  | False* | 219 | 35.0 |
|  | I don't know | 134 | 21.4 |
| Diabetes increases chance of stroke | True* | 420 | 67.1 |
|  | False | 85 | 13.6 |
|  | I don't know | 121 | 19.3 |
| High blood pressure increases chance of stroke | True* | 550 | 87.9 |
|  | False | 13 | 2.0 |
|  | I don't know | 63 | 10.1 |
| Epilepsy increases chance of stroke | True | 307 | 49.0 |
|  | False* | 113 | 18.1 |
|  | I don't know | 206 | 32.9 |
| High cholesterol increases chance of stroke | True* | 453 | 72.4 |
|  | False | 66 | 10.5 |
|  | I don't know | 107 | 17.1 |

never guided their students about stroke. Social media ( $26.1 \%$, $\mathrm{n}=292$ ), television ( $17.8 \%, \mathrm{n}=199$ ), and books $(12.9 \%, \mathrm{n}=144)$ significantly contributed as the chief source of information ( $p$ value $=0.245$ ) for the teachers (Table 6).

A pie chart (Figure 1) was created on the basis of the total score calculated from the score of the subjects, which showed that $71.73 \%$ of the teachers were not aware of the magnitude of the problem of stroke, or the related risks, symptoms and the treatment.

Teachers from Saudi origin were statistically more aware of stroke ( $p$ value $=0.003$ ) as compared to those from other countries. There was no statistically significant difference among teachers as far as knowledge about stroke was concerned, in terms of gender ( $p$ value $=0.273$ ), marital status ( $p$ value $=0.228$ ), qualification ( $p$ value $=0.64$ ), specialization ( $p$ value $=0.280$ ) and teaching level ( p value=0.311) as presented in Table 7. However, the same was not true when it came to about creating awareness about stroke among their students.

## Discussion

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Table 4. Questionnaire with true and false questions related to stroke (Part II).

|  |  | N | \% |
| :---: | :---: | :---: | :---: |
| Family history contributes to stroke | True* | 99 | 15.8 |
|  | False | 356 | 56.9 |
|  | I don't know | 171 | 27.3 |
| Nobody makes a full recovery after a stroke | True | 209 | 33.4 |
|  | False* | 262 | 41.8 |
|  | I don't know | 155 | 24.8 |
| Stroke survivors suffer from post-stroke depression | True* | 196 | 31.3 |
|  | False | 186 | 29.7 |
|  | I don't know | 244 | 39.0 |
| Stroke can be treated at house | True | 49 | 7.8 |
|  | False* | 475 | 75.9 |
|  | I don't know | 102 | 16.3 |
| There is a noticeable effect of the stroke on the patient's face | True* | 448 | 71.6 |
|  | False | 52 | 8.3 |
|  | I don't know | 126 | 20.1 |
| Stroke is a major cause of deaths in the world and Saudi Arabia | True* | 364 | 58.1 |
|  | False | 126 | 20.2 |
|  | I don't know | 136 | 21.7 |
| Drugs prescribed for stroke are aspirin and warfarin | True* | 434 | 69.4 |
|  | False | 66 | 10.5 |
|  | I don't know | 126 | 20.1 |

* The right answer

Table 5. Questionnaire with questions related to imparting knowledge to students

|  |  | $\mathbf{N}$ | $\%$ |
| :--- | :--- | :--- | :--- |
| Have you ever told your students <br> about a stroke? | Never | 470 | 75.1 |
| What did you tell your students? | Sometimes | 142 | 22.7 |
|  | Always | 14 | 2.2 |
|  | About symptoms and signs | 0 | 0 |
|  | About complications | 26 | 19.3 |
|  | Methods of prevention | 12 | 8.9 |
|  | Total | 135 | 100.0 |

Table 6. Sources of information used to spread awareness

|  |  | N | N\% |
| :---: | :---: | :---: | :---: |
| Sources of information | TV | 199 | 17.8 |
|  | Social media | 292 | 26.1 |
|  | School | 41 | 3.7 |
|  | Books | 144 | 12.9 |
|  | Health providers | 95 | 8.5 |
|  | A friend was attacked by stroke | 83 | 7.3 |
|  |  | 121 | 10.8 |
|  | A family member was attacked by stroke | 121 | 10.8 |
|  | Nothing | 121 | 10.8 |
|  |  | 144 | 12.9 |
|  |  | 121 | 10.8 |
|  |  | 144 | 12.9 |
|  |  | 121 | 10.8 |
|  |  | 144 | 12.9 |
|  |  | 121 | 10.8 |
|  |  | 144 | 12.9 |

A stroke, also known as a Cerebro-Vascular Accident (CVA) is associated with the loss of functioning ability of areas of the brain due to a clot or bursting of a blood vessel which supplies oxygen to the brain. Stroke may lead to impairment of physical, psychological, social and/or cognitive functions, depending on its severity, type and areas affected in the brain. Arterial hypertension, diabetes mellitus, cigarette smoking, microvascular rupture, hyperlipidemia, advancing age, sickle cell disease, human immunodeficiency virus/acquired immune


Figure 1: Pie chart representing awareness of stroke among teachers.

Table 7. Demographic profile in teachers with poor, good and excellent knowledge.

|  |  | Poor |  | Good |  | Excellent |  | P-Value |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | N | \% | N | \% | N | \% |  |
| Gender | Male | 355 | 71.1 | 124 | 25.1 | 16 | 3.2 | 0.273 |
|  | Female | 94 | 71.8 | 29 | 22.1 | 8 | 6.1 |  |
| Nationality | Saudi | 434 | 72.8 | 142 | 23.8 | 20 | 3.4 | 0.003* |
|  | Non-Saudi | 15 | 50 | 11 | 36.7 | 4 | 13.3 |  |
| Marital status | Single | 19 | 63.3 | 9 | 30 | 2 | 6.7 | 0.228 |
|  | Married | 419 | 71.7 | 144 | 24.7 | 21 | 3.6 |  |
|  | Divorce | 11 | 91.7 | 0 | 0 | 1 | 8.3 |  |
| Degree | Doctoral | 9 | 60 | 6 | 40 | 0 | 0 | 0.64 |
|  | Master | 41 | 69.5 | 15 | 25.4 | 3 | 5.1 |  |
|  | Bachelor | 373 | 72.1 | 123 | 23.8 | 21 | 4.1 |  |
|  | Diploma | 26 | 74.3 | 9 | 25.7 | 0 | 0 |  |
| Specialization | English Language | 23 | 76.7 | 5 | 16.7 | 2 | 6.7 | 0.280 |
|  | Mathematics | 75 | 71.4 | 23 | 21.9 | 7 | 6.7 |  |
|  | Computer Science | 15 | 83.3 | 3 | 16.7 | 0 | 0 |  |
|  | Arabic Language | 84 | 75.7 | 22 | 19.8 | 5 | 4.5 |  |
|  | General | 13 | 81.3 | 3 | 18.8 | 0 | 0 |  |
|  | Sciences | 52 | 61.9 | 30 | 35.7 | 2 | 2.4 |  |
|  | Housekeeping | 2 | 66.7 | 1 | 33.3 | 0 | 0 |  |
|  | Art Education | 10 | 83.3 | 1 | 8.3 | 1 | 8.3 |  |
|  | Social Subjects | 62 | 79.5 | 14 | 17.9 | 2 | 2.6 |  |
|  | Physical Education | 12 | 60 | 8 | 40 | 0 | 0 |  |
|  | Islamic Subjects | 101 | 76.8 | 43 | 28.9 | 5 | 3.4 |  |
| Teaching Level | High School | 169 | 70.7 | 62 | 25.9 | 8 | 3.3 | 0.311 |
|  | Middle School | 104 | 78.8 | 24 | 18.2 | 4 | 3 |  |
|  | Elementary School | 176 | 69 | 67 | 26.3 | 12 | 4.7 |  |

*The Chi-square statistic is significant at the 0.05 level
deficiency syndrome infection and cerebral malaria are the commonly established risk factors [6-11].

The incidence of stroke in low and middle-income countries is seen to be more than that in the high-income countries. Since the management of stroke is associated with a relatively high cost, it becomes difficult for the people in these countries to afford the management of consequences of this disease. The incidence of stroke in the Middle East is also very high and there is an urgent need to create awareness about this condition [12,13].

As teachers play an important role in spreading awareness, the

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present study was conducted to assess the knowledge of teachers employed in government schools regarding stroke. The findings of the study inferred that a very small percentage (3.83\%) of representative samplehad excellent knowledge on the subject. The results also showed that teachers of Saudi nationality were significantly more knowledgeable. Male teachers, teachers with specialization in social subjects and those with a bachelor's degree spread significantly more awareness about stroke among their students than others.

Overall, the survey conducted on the subjects clearly gives an idea about the present-dayscenario, as far as awareness about stroke in the country is concerned. It can be clearly understood that numerous awareness campaigns should take place in the respective regions of the nation on a priority basis. It is imperative that information about stroke is made available to the population. Of utmost importance and concern was the finding that only a few of the teachers wereaware of the symptoms of stroke. This implies that they will most likely fail to recognize if anyone is having a stroke, thus delaying the treatment. Moreover, subjects were not aware of the treatment of the stroke.

Thus, this survey helped in understanding the demographic condition of stroke awareness in the population and gave a clear insight on the gaps in knowledge regarding the same. It brings to light the urgent need of creating more awareness in both the youth as well as the adult population of the nation about this life-threatening medical condition.

There have been some studies focusing on stroke awareness in different communities of the society, but to the best of our knowledge, this was the first attempt that assessed the knowledge of teachers on stroke for the purpose of spreading awareness. More such studies are warranted to assess the knowledge of different sectors and their contribution in spreading awareness regarding a disease such as stroke. This would help understand the need and level of awareness that is required to be achieved to decrease the incidence of disease, limit complications, and improve the overall quality of life.

The present study evaluated the knowledge of government teachers related to stroke and the level of their contribution in spreading awareness regarding the disease, its diagnosis, treatment, risks and prevention. It was found that a very less percentage of teachers had
excellent knowledge where teachers with Saudi origin were significantly more knowledgeable. Males, teachers with specialization in social subjects and those with a bachelor's degree spread significantly more awareness than others. The survey gives an insight of the awareness about stroke among the teaching group in the KSA. It is essential to increase knowledge of teachers regarding this disease with the help of various campaigns and awareness camps.

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