Public knowledge and awareness of stroke among adult population in Taif city, Saudi Arabia

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ABSTRACT

الأهداف: تُعَدُّ السّكتةُ الدّماغيّةُ مرضًا عصبيًّا خطيرًا، فهي من أبرز أسباب الإصابة بالإعاقة طَويلة الأمد. غير أنّه يمكن تجنُّب الإصابة بالسّكتة الدّماغيّة؛ لِما لهذا المرض من عوامل خطورة كثيرة قابلة للتّغيير. وإنّ زيادة الوَعي بأعراض السّكتات الدّماغيّة يُسهل التعرُّفَ عليها عند حدوثها، وهذا بدوره يُساعد في سرعة التّدخُّل الطّبيّ.

المنهجية: تَمّ إجراء دراسة مقطعية على سكان مدينة الطائف البالغين، في المدة ما بين ديسمبر 2020م– فبراير 2021م وذلك مِن خلال عمل استبيان إلكترونيّ.

النتائج: تضمّنتْ دراستنا 3456 مُشاركًا، (43.6% ذكور، 56.4% إناث)، فأظهر التحليلُ الإحصائيُّ للبيانات أنّ (61.7%) من المشاركين لديهم معرفة جيّدة بمرض السّكتة الدماغيّة، لا سيّما الذّكور مِنْهم، الذينَ تتراوح أعمارهم بين 39-15 سنة. يعتبر (النّمطُ الغير صحيّ) أكثر عامل خطر تم التّعرف عليه من المشاركين، ويُمثِّلُ: (84.5%)، وفي مقابله كان الصّرع أقل عامل خطر تم التعرف عليه، ويُمثِّلُ: (34.8%). وكان أكثر عَرَض تم التّعرف عليه من المشاركين هو: التّلعثم في الكلام، ونسبتُه: (57.5%)، أمّا عَرَضُ الدُّوار فهو أقل عرض تم التعرف عليه، ونسبتُه: (36.2%). اتّفق (86.6%) من المشاركين في وصف السّكتة الدّماغيّة بأنّها حالةٌ صحّيّةٌ طارئةٌ، واتّفق آخرون على أنّها مرضٌ يُمكنُ علاجه، ويقع مجموعهم فيما يُقارب (41.5%)، أمّا ما نسبتهم (42.6%) فقد اتّفقوا على أنّها مرضٌ يُمكنُ تجنُّب الإصابة به.

الخلاصة: على الرغم من إدراك المشاركين أنّ السّكتةَ الدّماغيّةَ هي حالةٌ صحيةٌ طارئةٌ، وأنّ التدخُّلَ الطّبيّ السريع هو أمرٌ مُهمٌّ، إلا أنّ نتائج تحليل البيانات تُظهِرُ فجوةً كبيرةً بين المشاركين وبين معرفتهم بأعراض وعلامات الخطرِ المتعلّقة بالسكتة الدماغيّة. ومن ثَمّ فإنّ زيادة وعي المجتمع بهذه الأعراض والعلامات ستأثِّر –حتمًا– في سرعة حصول المريض على العلاج.

Objectives: To evaluate the knowledge and awareness of stroke in adult population in Taif, Kingdom of Saudi Arabia and to address the association between several sociodemographic variables of participants and their knowledge regarding stroke.

Methods: A cross-sectional study was conducted among adult residents in Taif, Kingdom of Saudi Arabia, during the period of December, 2020 to February, 2021 using an online questionnaire.

Results: Our study included 3456 participants (43.6% males, 56.4% females). Analysis showed that 61.7% of the participants were aware of stroke. Participants who were 15-39 years-old had good knowledge. Male participants had better knowledge than females. The most identified risk factor was 'unhealthy lifestyle' (84.5%) and the least identified one was 'epilepsy' (34.8%). The most identified symptom was 'slurred speech' (57.5%), and the least identified one was 'dizziness' (36.2%). Approximately 86.6% of the participants agreed that stroke was a medical emergency. A total of 41.5% of the participants agreed that stroke was treatable and 42.6% agreed that stroke was a preventable disease.

Conclusion: Although the participants recognize that stroke is a medical emergency and that early intervention is crucial, the obtained results show that there is a large gap in the knowledge of the warning signs and symptoms of stroke. Increasing community awareness about these warnings may affect how quickly the patient is treated.

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Stroke is a serious neurological disorder, and it is one of the major causes of long-term disability.[1] Global prevalence of stroke is estimated to be 80 million cases in 2016.[2] Stroke can occur owing to ischemia or hemorrhage and causes damage of brain tissue leading to neurological function and cognitive deficits.[3] Among different types of stroke, blockage of arterial supply in the brain, which is known as ischemic stroke, is the most common type of stroke.[4] Stroke is a preventable neurological disease that has many modifiable risk factors. Patients with chronic diseases (namely, hypertension, diabetes mellitus, hyperlipidemia, and cardiac disease) or cigarette smokers (which are the commonest risk factors) are considered to have higher risk of stroke.[5] Stroke risk increases in women using an oral contraceptive pills for long duration.[6] Lifestyle modification (namely, salt restriction, smoking cessation, sports, and maintaining normal weight) can reduce the risk of stroke up to 50%.[7] The incidence of stroke is decreasing in many countries due to improved high blood pressure control and decreased levels of smoking.[8] Patients with risk factors should be aware of the risk of stroke and must have knowledge about the warning signs. Stroke warning signs include sudden numbness or weakness of the face or limbs, confusion, speaking difficulties, difficulty seeing, difficulty walking, and severe headache with an unknown cause.[9] Early identification of stroke symptoms with early management of acute attack is very effective to reduce the burden of stroke complications.[10] Lack of knowledge of the warning signs and the importance of time to manage stroke attack may lead to delay the decision of seeking medical help.[11] Increasing stroke awareness expedites stroke symptom recognition and seeking medical attention.[12]

Stroke is the second leading cause of death worldwide (9.7% of all deaths) just after ischemic heart disease.[13] With aging, the incidence of stroke increases. The incidence reaches 670-970 of 100,000 per year for people over 65 years old.[14] The incidence of stroke in Kingdom of Saudi Arabia (KSA) is 29 per 100,000 people annually.[15] It is a major cause of death and disability in KSA (with up to 6.4% mortality rate).[16]

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Methods. This is a descriptive cross-sectional study that was conducted during the period of December, 2020 to February, 2021 to assess general knowledge about stroke among adults in Taif, KSA. the purpose of the study was to evaluate the knowledge and awareness of stroke in adult population in Taif, KSA, and to address the association between several sociodemographic variables of participants and their knowledge regarding stroke. The study was performed on Taif residents. The ethical approval for our research was provided by the Deanship of scientific research, Taif university, Taif, KSA. as our research involved human subjects, the principles of Helsinki declaration were applicated.

Inclusion criteria were all male and female adults living in Taif, KSA, who were over 15 years old and agreed to participate in the study; all of them were invited to participate in the study on a voluntary basis and with an anonymous identity. They were allowed to withdraw at any time. All participants under 15 years old and those living outside Taif, KSA, were excluded.

Information from the participants who met the inclusion criteria and agreed to participate was obtained using a self-filling online questionnaire. The questionnaire was provided in English and Arabic and asked about sociodemographic variables of participants such as age, gender, education, and occupation. Questions about source of information and presence of different comorbidities were included, and the remaining questions assessed awareness, knowledge, risk factors, and warning signs.

The data was analyzed using the Statistical Package for Social Sciences version 23 (IBM Corp., Armonk, NY, USA) and presented as numbers and frequencies. To determine the relationship of categorical variables, Pearson's chi-square test was used.

Results. Our study was performed to assess the awareness of stroke and knowledge related to its risk factors, prevention, and treatment. Online survey responses from 3456 participants, who fulfilled the eligibility criteria and completely answered all items in the questionnaire, were included for analysis. Sociodemographic characteristics showed that 43.6% of the participants were males, and 56.4% were females. Other characteristics are shown in **Table 1**. The performed analysis showed that approximately 61.7% of the participants (n=2134) were aware of stroke.

To calculate the level of knowledge related to stroke, the scores of all knowledge-related items in the questionnaire were added based on correct and incorrect responses. The correct answer for each item

was given a score of one, and an incorrect answer was given a score of zero. Thus, the maximum knowledge score that one participant could get for the knowledge part related to stroke was 34, and the minimum score was zero. The mean total knowledge score for our study population was determined to be 16.8±7.2. Based on the obtained percentages, the scores were categorized into good (≥80%), fair (60-79%), and poor (<60). The obtained results showed that only 8.7% (n=300) of the participants had 'good' knowledge regarding stroke, and the majority (69.7%) of the participants had 'poor' knowledge (**Table 1**).

When we assessed the relationship of knowledge with different age groups of the participants, it was determined that those who belonged to the 15-39 year-old age group demonstrated comparatively more 'good knowledge' than other age groups; this result showed a statistically significant relationship (p=0.002). Male participants had more 'good knowledge' (11.1%) related to stroke and risk factors than females (6.8%); this result showed a statistically significant correlation (p<0.001). Participants who were single and had an education of bachelor or higher had comparatively more 'good knowledge', and those who had high school or lower education showed 'poor knowledge'; this result was significantly correlated (p<0.001). Participants who were 'employed' and those who were students had comparatively more 'good knowledge' than those who were unemployed (p<0.001). It was also determined that the knowledge was 'good' in participants who were smokers than those who never smoked; this result showed a statistically significant relationship (p<0.05). Other variables (namely, nationality, income of the participants, and presence of chronic diseases) did

Table 1 - Relationship between knowledge and sociodemographic characteristics.

Characteristics	n (%)	Knowledge			*P*-value (X^2)
		Good	Fair	Poor	
		n (%)			
Total sample	3456 (100.0)	300 (8.7)	746 (21.6)	2410 (69.7)	
Age					
15-39	2477 (71.7)	241 (9.7)	520 (21.0)	1716 (69.3)	0.002 (17.367)
40-59	894 (25.9)	52 (5.8)	214 (23.9)	628 (70.2)	
60 or older	85 (2.5)	7 (8.2)	12 (14.1)	66 (77.6)	
Gender					
Male	1508 (43.6)	167 (11.1)	327 (21.7)	1014 (67.2)	<0.001 (20.055)
Female	1948 (56.4)	133 (6.8)	419 (21.5)	1396 (71.7)	
Marital status					
Married	1444 (41.8)	92 (6.4)	325 (22.5)	1027 (71.1)	<0.001 (16.899)
Unmarried	2012 (58.2)	208 (10.3)	421 (20.9)	1383 (68.7)	
Nationality					
Saudi	3327 (96.3)	288 (8.7)	726 (21.8)	2313 (69.5)	0.231 (2.929)
Not Saudi	129 (3.7)	12 (9.3)	20 (15.5)	97 (75.2)	
Education					
High school or lower	1063 (30.8)	53 (5.0)	230 (21.6)	780 (73.4)	<0.001 (27.066)
Bachelor or higher education	2393 (69.2)	247 (10.3)	516 (21.6)	1630 (68.1)	
Occupation					
Employed	1053 (30.5)	87 (8.3)	227 (21.6)	739 (70.2)	
Unemployed	711 (20.6)	32 (4.5)	148 (20.8)	531 (74.7)	<0.001 (26.615)
Student	1692 (49.0)	181 (10.7)	371 (21.9)	1140 (67.4)	
Income					
<5000	1942 (56.2)	158 (8.1)	399 (20.5)	1385 (71.3)	
5000-10000	604 (17.5)	51 (8.4)	132 (21.9)	421 (69.7)	0.114 (7.449)
>10000	910 (26.3)	91 (10.0)	215 (23.6)	604 (66.4)	
Smoking					
Absent	2919 (84.5)	236 (8.1)	642 (22.0)	2041 (69.9)	0.010 (9.222)
Present	537 (15.5)	64 (11.9)	104 (19.4)	369 (68.7)	
Chronic disease					
Absent	2996 (86.7)	259 (8.6)	638 (21.3)	2099 (70.1)	0.533 (1.257)
Present	460 (13.3)	41 (8.9)	108 (23.5)	311 (67.6)	

not show any significant relationship with knowledge (**Table 1**).

The responses related to knowledge about different risk factors of stroke showed that the least identified risk factor by the participants was epilepsy (34.8%), and the most identified one was 'unhealthy lifestyle' (84.5%), followed by hypertension (72.5%), and age >65 years (72.2%; **Table 2**). When we assessed the knowledge related to symptoms of stroke, 'dizziness' was the least identified one by the participants (36.2%), and the most identified one was 'slurred speech' (57.5%; **Table 2**). When the participants were asked about what would someone need to do if they saw a person who was having a stroke, it was agreed by 91.1% of the participants that they would immediately take the person to hospital or call emergency services (**Table 3**).

The performed analysis showed that approximately 13.3% (n=460) of the participants had at least one more systemic disease that was a risk factor for stroke. Participants who had one or more systemic diseases had shown more 'good knowledge' related to stroke than those who did not have any systemic disease; however,

Table 2 - Knowledge related to different risk factors and symptoms of stroke by gender.

Definition and cause, risk factors, and symptoms	Correct responses by gender n (%)	Total correct responses	*P*-value
Stroke is a medical emergency	M: 1276 (84.6) F: 1717 (88.1)	2993 (86.6)	0.003
Definition of stroke	M: 1230 (81.6) F: 1717 (88.1)	2895 (83.8)	0.002
Type of strokes	M: 344 (22.8) F: 427(21.9)	2600 (75.2)	0.532
The most common type of stroke is ischemic stroke	M: 892 (59.2) F: 1212 (62.2)	2104 (60.9)	0.067
Diabetes is a risk factor for stroke	M: 705 (46.8) F: 764 (39.2)	1469 (42.5)	<0.001
Hypertension is a risk factor for stroke	M: 1085 (71.9) F: 1420 (72.9)	2505 (72.5)	0.537
Hyperlipidemia is a risk factor for stroke	M: 1028 (68.2) F: 1131 (58.1)	2159 (62.5)	<0.001
Epilepsy is a risk factor for stroke	M: 511 (33.9) F: 692 (35.5)	1203 (34.8)	0.316
Heart disease is a risk factor for stroke	M: 829 (55.0) F: 1026 (52.7)	1855 (53.7)	0.178
Family history for stroke consider a risk factor for stroke	M: 655 (43.4) F: 871 (44.7)	1526 (44.2)	0.453
Incidence of stroke increase at age 65 years and older	M: 1085 (71.9) F: 1411 (72.4)	2496 (72.2)	0.753
Unhealthy lifestyle increase the incidence of stroke	M: 1252 (83.0) F: 1667 (85.6)	2919 (84.5)	0.040
Hemi-paralysis	M: 714 (47.3) F: 870 (44.7)	1584(45.8)	0.116
Weakness or numbness of one limb	M: 701 (46.5) F: 859 (44.1)	1560 (45.1)	0.162
Weakness or numbness of the face	M: 587 (38.9) F: 741 (38.0)	1328 (38.4)	0.595
Slurred speech	M: 844 (56.0) F: 1142 (58.6)	1986 (57.5)	0.117
Severe headache	M: 621 (41.2) F: 865 (44.4)	1486 (43)	0.058
Trouble seeing	M: 540 (35.8) F: 801 (41.1)	1341 (38.8)	0.001
Imbalance	M: 680 (45.1) F: 1019 (52.3)	1699 (49.2)	<0.001
Confusion	M: 639 (42.4) F: 941 (48.3)	1580 (45.7)	0.001
Dizziness	M: 520 (34.5) F: 731 (37.5)	1251 (36.2)	0.065

Table 3 - Knowledge related to prevention and treatment of stroke by gender.

Knowledge	Responses by gender Correct, n(%)	Total responses	*P*-value
Response when seeing a patient going through stroke	M: 1336 (88.6) F: 1814 (93.1)	3150 (91.1)	0.033
Is there any current treatment for stroke?	M: 616 (40.8) F: 818 (42.0)	1434 (41.5)	0.499
Early medical intervention will prevent severe disability following stroke	M: 1283 (85.1) F: 1744 (89.5)	3027(87.6)	<0.001
A fully recovery from stroke is possible	M: 747 (49.5) F: 854(43.8)	1601(46.3)	0.002
Is stroke a preventable disease?	M: 692 (45.9) F: 780 (40.0)	1472 (42.6)	0.001
Stroke could be prevented by controlling blood pressure	M: 533 (35.3) F: 643 (33.0)	1176(34)	0.150
Stroke could be prevented by controlling blood sugar	M: 461 (30.6) F: 503 (25.8)	964(27.9)	0.002
Stroke could be prevented by controlling blood cholesterol	M: 510 (33.8) F: 561 (28.8)	1071(31)	0.001
Stroke could be prevented by quitting smoking	M: 520 (34.5) F: 584 (30.0)	1104(31.9)	0.005
Stroke could be prevented by doing regular exercise and eating healthy diet	M: 573 (38.0) F: 648 (33.3)	1221(35.3)	0.004
Stroke could be prevented by controlling using of blood thinner	M: 411 (27.3) F: 441 (22.6)	852(24.7)	0.002

this result did not show any statistically significant relationship (p=0.533; **Table 1**). Approximately 86.6% (n=2993) of the participants agreed that stroke was a medical emergency, and 83.8% (n=2895) of the participants mentioned that it occurred owing to lack of blood supply to the brain (**Table 2**). In our study, approximately 15.5% (n=537) of the participants were smokers, and 15.1% (n=442) of those who agreed that smoking and unhealthy lifestyle practices increased the incidence of stroke were smokers (p=0.282).

Upon assessing the knowledge among participants regarding the treatment of stroke, it was determined that 41.5% of the participants agreed that currently there was treatment available for stroke, and most of the participants believed that early medical intervention would prevent severe disability following the stroke. Only 46.3% of the participants believed that full recovery from stroke was possible, and 42.6% agreed that stroke was a preventable disease. The responses related to preventive measures for stroke were shown in (**Table 3**).

When we assessed the source of information related to stroke, 41.4% obtained it from TV or social media, 26.1% from friends and family, 22.2% from health workers, and 14.4% from books or flyers.

Discussion. Being more aware of stroke and its consequences will help with its early recognition and affect the prognosis through early medical intervention.

Our results showed that 69.7% of the participants had poor general knowledge about stroke. Mousa et al,[16] showed that 76.6% of the participants had poor knowledge of stroke. Al-Beladi et al,[17] showed that a large proportion of high-risk patients had poor awareness of the risk factors and warning signs of having a stroke. A study conducted in Qassim region,KSA, also showed a similar proportion of poor knowledge among hypertensive participants.[18] Another study, which was performed to measure the knowledge of high school girls about stroke in the Eastern region of KSA, showed that most of the participants (91.1%) had a low knowledge score.[20] Poor knowledge level also was observed in Tabuk, KSA.[19] Our research showed improved general knowledge about stroke compared to previous studies. This is likely due to the larger number of our participants were in the 15-39 age group. Which has more exposure to the recent advances in different technologies namely, internet which could have a synergistic effect in increasing awareness about different health problems.[21] Also, may be due to curiosity of the younger generation to read and educate themselves about different health-related problems which was also found in a recent systematic review.[22]

A total of 83.8% of our participants correctly defined the cause of stroke as the lack of blood supply

to the brain. Similar results were obtained from 2 other studies in KSA.[16,20]

Unhealthy lifestyle was the most identified risk factor for stroke followed by hypertension and old age. Diabetes and hypertension were the most identified risk factors in other studies.[17,23] Epilepsy was the least identified risk factor for stroke; it was identified by only one-third of the participants, which was similar to a different study.[16] New onset seizure at the old age should herald the suspicion of stroke. Epilepsy is yet to be determined as a risk factor for stroke.[24]

In our study, slurred speech was the most identified sign of stroke possibly because it could be quickly noticed by the participants. This was also reported in previous studies.[23,25]

Stroke is a medical emergency for which urgent medical intervention is needed; a total of 86.6% of the participants agreed with this statement. A similar result was obtained in multiple studies, which showed that a higher proportion of the responders would call an ambulance.[16,26-28]

A total of 20-30% of the participants from different studies believed that there was a treatment for stroke.[16,17] This result should motivate the health care personnel and other health-related sectors to increase community awareness of the availability of specific stroke treatments, which may provide more time to the patients by bringing them early to emergency room (ER).

Rapid treatment and recovery from stroke attack often depend on the spouse or other family members. Continuous motivation and support provided by the family to the patient has significant impact on overall recovery from stroke.[29] Lack of support and living alone have negatively affected the long-term prognosis after stroke.[30] In addition, the male patient living alone after stroke attack were twice as likely to die as female patient living alone.[31] Regular follow-up for clinics, rehabilitation centers and increasing self-esteem of the patient should be encouraged early after stroke.

In general, stroke can be prevented by controlling the risk factors. However, this was only known by 42.6% of the participants in our study. In the Western region, KSA, two-thirds of the participants agreed that lifestyle modification could help prevent stroke.[16] Future studies are needed to address the effect of different methods of health education on controlling risk factors and how that will impact the stroke onset and recovery.

Limitations. Limiting the questionnaire to an online version which hindered the ability of illiterate people to participate is a limitation. The study was carried out in only one city is another limitation.

In conclusion, Taif adult population, KSA, has low level of knowledge regarding stroke. This is more noticeable in individuals who are older and have lower education level. Targeting this category can be carried out through campaigns on TV, street signs, and more visual measures to address the risk factors, symptoms, and the effect of early medical intervention on patients' prognosis by increasing the level of knowledge.

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Clinical Practice Guidelines

Clinical Practice Guidelines must include a short abstract. There should be an Introduction section addressing the objective in producing the guideline, what the guideline is about and who will benefit from the guideline. It should describe the population, conditions, health care setting and clinical management/diagnostic test. Authors should adequately describe the methods used to collect and analyze evidence, recommendations and validation. If it is adapted, authors should include the source, how, and why it is adapted? The guidelines should include not more than 50 references, 2-4 illustrations/tables, and an algorithm.