

Cerebrovascular Stroke among Senior Adult Population in Arar, KSA

Alaa Jameel A Ahmed¹, Salma Abdalla Mohamed Ali Abdalla², Sahar Sattam Alshammari³, Amal Mahmoud R Abdullah⁴, Ahmed Mahmoud R Abdullah¹, Alanazi, Manar Huzaym A¹, Alruwaili, Abeer Nahi K¹, Alanazi, Shahad Mohammed S¹, Alenezi, Fadih Nada M¹, Alruwaili, Maha Nahi K¹

¹ Students, Faculty of Medicine, Northern Border University, Arar, ² Internal Medicine Department Northern Border University, Arar, ³ Arabian Gulf University, Bahrain, ⁴ Internal Medicine Department King Faisal Specialist Hospital and research center, Riyadh, KSA

ABSTRACT

Background: In the Kingdom of Saudi Arabia, stroke is a rapidly growing problem and a major cause of illness and death. This increasing incidence is due to the changing life style in the country and high prevalence of diabetes mellitus, obesity, dyslipidemia, and hypertension, all considered to be important. The aim of this study is to determine the prevalence and determinant factors of cerebrovascular stroke among Saudi senior adults (above 50 years) in Arar, KSA. **Methods:** The present study is a descriptive cross sectional survey conducted on a representative sample of elderly people in the Northern Province of Saudi Arabia. **Results:** The overall prevalence rate of first-time stroke or repeated cerebrovascular stroke observed in this study was 4.3%. Mean age (\pm SD) of the cases was 61 \pm 9.25 and 50% of cases were 70-79 years old. Males constituted 83.3% of the cases and 50.0% ex-smokers. Regarding the associated cardiovascular diseases, arrhythmias was found in all cases, hyperlipidemia in 83.3%, hypertension in 50% of the cases and myocardial infarction in 50%. The majority (66.7%) were diabetics, 33.3% were obese, 33.3% had renal insufficiency and 50% had hypothyroidism. Stroke was significantly related to old age, male sex, hyperlipidemia, ischemic heart diseases and smoking ($P < 0.05$) while non-significantly related to hypertension, diabetes and Body Mass Index (kg/m^2) status. **Conclusion:** In Arar, Northern Saudi Arabia, the prevalence of cerebrovascular stroke among senior adult population was 4.3%, which is relatively high. In addition, there is definite lack of published researches on stroke. However, such research is vitally essential to plan for appropriate management programs to be set up, effective implementation of primary prevention strategies and proper allocation of health resources in this area. **Keywords:** prevalence and risk factors, cerebrovascular stroke, senior adults, Arar, KSA.

INTRODUCTION

Stroke is a medical emergency that can cause permanent neurological damage, complications, and disability^[1]. It is not only the second leading cause of death worldwide but also one of the main causes of adult-acquired disabilities^[2]. The worldwide prevalence rate for cerebrovascular diseases is between 500 and 700/100,000 populations^[3]. There have been numerous recent research reports regarding the risk factors for stroke, which include not only unhealthy lifestyle habits such as smoking and drinking but also hypertension, diabetes, and a family history of diseases, among other traits^[4,5]. Nevertheless, the heterogeneity of the pathology and nature of different countries and populations may evidence new risks for stroke like; socioeconomic variables^[6], ethnic factors, dietary habits and even endemic diseases^[7] can pose risks for stroke. Family history of stroke in a first-degree relative also increases the likelihood of suffering from an acute cerebrovascular event even after adjusting for other vascular risk factors^[8]. The etiology of stroke is multifactorial, and therapeutic actions focused on vascular risk factors, particularly in secondary stroke prevention have been shown to reduce the risk of recurrent stroke, as well as the risk of any other coronary or peripheral vascular episode^[9].

The Middle East region faces a variable burden of stroke. The incidence rate for all strokes ranged between 22.7 and 250 per 100,000 people per year in this region^[10]. Because of the dramatic transformation of the social, economic, and environmental conditions over the past few decades in this region, the lifestyle has changed rapidly, which has caused a transition to a high burden of stroke.

Studies in Saudi Arabia have provided a hospital-based crude annual incidence rate of stroke of 15.1 per 100,000 persons in Jizan^[11], 29.8 per 100,000 persons in the Eastern province^[4], and 43.8 per 100,000 persons in Riyadh^[12].

In Aseer region, an overall minimal incidence rate of hospitalized first-time stroke of 57.64 per 100,000 persons per year. A steady increase was noticed depending on the patients' age, reaching a figure of 851.81 for those patients aged 70 years and more. Overall, the incidence rate for females was lower compared to males^[13].

A previous study in northeast China found that; the overall prevalence of stroke in Jilin Province was 7.2%. Of all stroke cases, 91.7% were ischemic stroke and 8.3% were hemorrhagic stroke. The prevalence rates of dyslipidemia, smoking and hypertension were ranked as the top three

cerebrovascular risk factors and were 62.1%, 61.8% and 57.3%, respectively. However, only hypertension was significantly associated with hemorrhagic stroke^[14].

The main aim of this study is to determine the prevalence and determinant factors of cerebrovascular stroke among Saudi adults in Arar, KSA.

PARTICIPANTS AND METHODS

The present cross sectional community based study was conducted in Arar city, the capital of Northern Borders Governorate on 276 adult people of age 50 years and more. The sample size was calculated using the sample size equation: $n = z^2 p(1-p)/e^2$, considering target population more than 1000, and study power 95%.

Systematic random sampling technique was followed. After identifying the first house randomly in the selected area, every 9th house was visited to include all the adult subjects residing in those selected houses till the required sample is covered. Data was collected through personal interviews with the sampled population and filling the questionnaire which guided us to the data of socio-demographic characteristics such as age, sex, educational status and marital status, it also included smoking status and certain types of diseases that may be prevalent among adults suggested to affect neurological diseases such as hyperlipidemia, hypertension, diabetes mellitus and obesity. The questionnaire included also questions regarding the already previously diagnosed cerebrovascular stroke and its determinants, after ensuring the diagnosis by reviewing the accompanied health records and prescriptions and asking the caregivers about the case.

Ethical considerations

Data collector gave a brief introduction to the participants by explaining the aims and benefits of the study. Informed written consent was obtained from all participants.

Anonymity and confidentiality of data were maintained throughout the study. There was no conflict of interest.

Statistical analysis

We utilized the statistical package for social sciences, version 16 (SPSS Inc., Chicago, Illinois, USA) to analyze the study data. The results were

displayed as counts and percentages. The X^2 test was used as a test of significance, and differences were considered significant at P value less than 0.05.

RESULTS

Table (1) illustrates the sociodemographic characteristics and BMI status of the studied elderly population. The table showed that mean age (\pm SD) was 60 (\pm 9.25) years, male to female ratio was 47.8 to 52.2, married were 62.3 while 33.3 were widow, illiteracy constitutes 48.6%, primary school literates were 19.6% and total of 76.2% had less than secondary education, about half (45.7%) were obese, 26.8% underweight and only 24.6% had normal weight.

Figure (1) illustrates the percentage distribution of cerebrovascular stroke among the studied population. The overall prevalence rate of first-time stroke or repeated cerebrovascular stroke observed in this study was 4.3%.

Table (2) illustrates the prevalence of cerebrovascular stroke and other related chronic diseases among the studied population. Hypertension was found in 44.9%, Myocardial infarction in 11.6%, arrhythmias in 6.5%, hypothyroidism in 12.3%, diabetes 37.0%, diabetic nephropathy in 5.8% and renal insufficiency in 6.5%. As regards the BMI, about half (45.7%) were obese, 26.8% overweight and only 24.6% had normal weight.

Table (3) illustrates the socio-demographic characteristics and related chronic diseases among the studied cerebrovascular stroke cases, Mean age (\pm SD) of cases was 61 \pm 9.25 and 50% of cases were 70-79 years old. Males constituted 83.3% of the cases and 50.0% ex-smokers. Regarding the associated cardiovascular diseases, arrhythmias was found in all cases, hyperlipidemia in 83.3%, hypertension in 50% of the cases and myocardial infarction in 50%. The majority (66.7%) were diabetics, 33.3% were obese, 33.3% had renal insufficiency and 50% had hypothyroidism.

Stroke was significantly related to old age, male sex, hyperlipidemia, ischemic heart diseases and smoking ($P < 0.05$) while non-significantly related to hypertension, diabetes and Body Mass Index (kg/m^2) status. (Table 4).

Table (1): Socio-demographic characteristics and smoking among the studied elderly, Arar, 2017 (N=276)

Variables	Frequency (No.)	Percent (%)
Age group		
• 50-	180	65.2
• 70-	72	26.1
• 80+	24	8.7
• Mean age (\pm SD)	60 \pm 9.25	
Sex		
• Female	144	52.2
• Male	132	47.8
Education		
• Illiterate	134	48.6
• Primary	54	19.6
• Preparatory	22	8.0
• Secondary	22	8.0
• University or more	44	15.9
Working status		
• Shepherd	30	10.9
• Military	6	2.2
• No work	148	53.6
• Retired	92	33.3
Marital status		
• Widow	92	33.3
• Single	6	2.2
• Married	172	62.3
• Divorced	6	2.2
Smoking		
• Non smoker	186	68.8
• Smokers	20	7.2
• Ex-Smoker	66	23.9

Table (2): Prevalence of cerebrovascular stroke and other related chronic diseases among the studied population, Arar, 2017 (N=276)

Cerebrovascular stroke	No.	%
• Yes	12	4.3
• No	264	95.7
Cardiovascular diseases		
• Coronary artery bypass operation	2	.7
• Hypertension	124	44.9
• Hyperlipidemia	132	47.8
• Myocardial infarction	32	11.6
• Valve diseases	2	.7
• Arrhythmias	18	6.5
• Ischemic heart diseases	22	8.0
• No cardiovascular diseases	76	27.5
Other Nervous system diseases		
• Parkinson's disease	8	2.9
• Essential tremors in the hands	2	.7
Thyroid diseases		
• Hyperthyroidism	14	5.1
• Hypothyroidism	34	12.3
• no	228	82.6
Psychiatric diseases		
• Depression	24	8.7
• Alzheimer 's disease	8	2.9
• Obsessive compulsive	8	2.9
Diabetes		
• Yes	102	37.0
• No	174	63.0
Body Mass Index (kg/m2) status		
• Underweight	8	2.9
• Normal	68	24.6
• Overweight	74	26.8
• Obese	126	45.7
Mean BMI (\pm SD)	29.99 \pm 9.73	

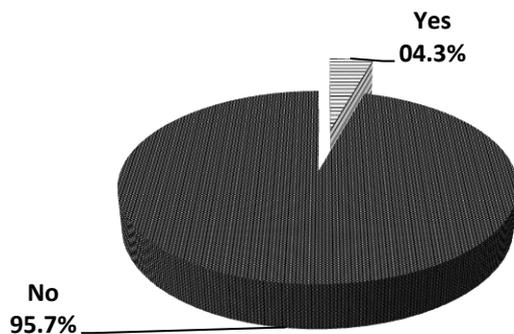
Figure (1): Prevalence of cerebrovascular stroke among senior adults in Arar city, Northern Saudi Arabia, 2017

Table (3): Socio-demographic characteristics and related chronic diseases among the studied Cerebrovascular stroke cases, Arar, 2017 (N=12)

Variables	No.	Percent (%)
Age group		
• 50-	4	33.3
• 70-	6	50.0
• 80+	2	16.7
• Mean age (\pm SD)		61 \pm 9.25
Sex		
• Female	2	16.7
• Male	10	83.3
Education		
• Illiterate	4	33.3
• Primary	4	33.3
• Preparatory	4	33.3
Marital status		
• HWidow	2	16.7
• Married	8	66.7
• Divorced	2	16.7
Cardiovascular diseases		
• Hypertension	6	50.0
• Hyperlipidemia	10	83.3
• Arrhythmias	12	100.0
• Myocardial infarction	6	50.0
Thyroid diseases		
• Hypothyroidism	6	50.0
• No	6	50.0
Psychiatric diseases		
• Depression	6	50.0
• Obsessive compulsive	2	16.7
• No psychiatric diseases	4	33.3
Renal diseases		
• Diabetic nephropathy	2	16.7
• Renal insufficiency	4	33.3
• No renal disease	6	50.0
Period of hospital treatment		
• < 2 weeks	8	66.7
• >2 weeks	4	33.3
Response to treatment		
• Excellent	2	16.7
• Good	2	16.7
• Bad	8	66.7
Compliance with physiotherapy		
• Yes	7	58.3
• No	5	41.7
Response to physiotherapy		
• Excellent	5	41.7
• Good	2	16.7
• Bad	5	41.7
Disability after treatment		
• Yes	3	25.0
• No	9	75.0
Recurrence of stroke		
• Yes	1	8.3
• No	11	91.7

Table (4): Relationship between stroke and age group, sex, hypertension, DM, ischemic diseases, smoking and Body Mass Index (kg/m2) status

Variables	Stroke		Total (n=276)	P value
	Yes (n=12)	No (n=264)		
Age group				
• 50-	4	176	180	0.05
	33.3%	66.7%	65.2%	
• 70-	6	66	72	
	50.0%	25.0%	26.1%	
• 80-	2	22	24	
	16.7%	8.3%	8.7%	
Sex				
• Female	2	142	144	0.012
	16.7%	53.8%	52.2%	
• Male	10	122	132	
	83.3%	46.2%	47.8%	
Ischemic diseases				
• Yes	6	46	52	
	50.0%	17.4%	18.8%	
• No	6	218	224	0.013
	50.0%	82.6%	81.2%	
Smoking				
• Non smokers	4	186	190	0.025
	33.3%	70.5%	68.8%	
• Smokers	2	18	20	
	16.7%	6.8%	7.2%	
• Ex- smokers	6	60	66	
	50.0%	22.7%	23.9%	
Hypertension				
• Yes	6	120	126	
	50.0%	45.5%	45.7%	
• No	6	144	150	0.757
	50.0%	54.5%	54.3%	
Hyperlipidemia				
• Yes	10	122	132	0.012
	83.3%	46.2%	47.8%	
• No	2	142	144	
	16.7%	53.8%	52.2%	
Diabetes Mellitus				
• Yes	2	49	51	0.965
	16.7%	18.6%	18.5%	
• No	8	166	174	
	66.7%	62.9%	63.0%	
Body Mass Index (kg/m2) status				
• Underweight	0	8	8	0.235
	.0%	3.0%	2.9%	
• Normal	4	64	68	
	33.3%	24.2%	24.6%	
• Overweight	4	70	74	
	33.3%	26.5%	26.8%	
• Obese	4	122	126	
	33.3%	46.2%	45.7%	

DISCUSSION

Stroke is a significant public health issue worldwide [20] and accounted for 47.3% of the overall neurological disorders burden. Stroke ranked first among age standardized DALY rates for neurological disorders globally and in the Middle East countries [16].

In the Kingdom of Saudi Arabia, stroke is a rapidly growing problem and a major cause of illness and death. This increasing incidence is due to the changing life style in the country and high prevalence of diabetes mellitus, obesity, dyslipidemia, and hypertension, all considered important [17].

The present study is a descriptive cross sectional survey conducted on a representative sample of elderly people in the Northern Province of Saudi Arabia. The aim of this study is to determine the prevalence and determinant factors of cerebrovascular stroke among Saudi adults in Arar, KSA.

The present study showed that, the age of elderly ranges from 50-92 years with a mean age 60 years, male to female ratio was 47.8 to 52.2. In southwest Saudi Arabia by Al-Modeer *et al.*, the age of elderly ranges from 60-104 years with a mean of 77.2. Most of the studied elderly (55.9%) were females [20]. In Al Rajeh *et al.*, in a hospital that exclusively treated the Saudi Arabian National Guard hospital, the mean age of the patients was 63 years [12].

In our study the prevalence of stroke (4.3%) were more in males than females.

In Fayoum, Egypt study, the prevalence of stroke (2.8%) were more in males than females, this is less than our finding [18]. In Al-Modeer study, Stroke was found in 34.9% of elderly, more in males than females (39.4% of males and 27.1% of females), which is far higher than our figure [19]. A stroke registry revealed 0.04% (0.03% males, 0.017% females) of first-ever strokes affecting Saudi nationals [12] which is far less than our figure. Al Rajeh *et al.*, reported overall prevalence rate of stroke 1.8% which is also less than our figure [20]. In a study conducted in Dubai, cerebrovascular accident affected 38.8% of the studied elderly, more prevalent in males than females [21].

In the present study, the mean age of stroke cases was 61 and 50% of cases were 70-79 years old, there was significant relationship between stroke and advancing of age.

Studies reported that old age, high blood pressure, prior stroke or Transient Ischemic Attack (TIA), diabetes, high cholesterol, tobacco smoking and

atrial fibrillation were the major risk factors for stroke [22-24]. In Saudi Arabian study, it was reported that the frequency of stroke showed a steady increase with age until the 7th decade [25].

Males constituted 83.3% of cases ($P < 0.05$). and 50.0% ex-smokers. Regarding the associated cardiovascular diseases, arrhythmias was found in all cases, hyperlipidemia in 83.3%, hypertension in 50% of cases and myocardial infarction in 50%. The majority (66.7%) were diabetics, 33.3% were obese, 33.3% had renal insufficiency and 50% had hypothyroidism. Stroke was significantly related to old age, male sex, hyperlipidemia, ischemic heart diseases and smoking ($P < 0.05$) while non-significantly related to hypertension, diabetes and Body Mass Index (kg/m^2) status.

A study reported that the risk factors significant for stroke in the Saudi population are smoking (19%) heart disease such as atrial fibrillation and ischemic heart disease,

which is supportive to our results, while they found systemic hypertension (38%), diabetes mellitus (37%) as significant risk factors which is not concomitant with our findings [18]. The overall incidence rate for females was lower compared to males [19].

In northeast China it was found that; the prevalence rates of dyslipidemia, smoking and hypertension were ranked as the top three cerebrovascular risk factors and were 62.1%, 61.8% and 57.3%, respectively and hypertension was significantly associated with stroke [14].

In the present study, the prevalence of Parkinsonism was 2.9%. In Southern Saudi Arabia, Al-Modeer study, Parkinsonism was 4.3% [19], which is consistent with our figure. Rajeh *et al.*, reported overall prevalence of parkinsonism 0.27% which is also less than our figure [20].

In the present study the prevalence of depression observed in this study (8.7%) is lower compared to other studies. For example in Riyadh, Saudi Arabia, the prevalence of depression was 20% among primary health care patients [22]. However our figure is high compared to Al-Modeer *et al.*, in southeast Saudi Arabia found the prevalence of depression among elderly was 1.6%. Other study in Abha City, Saudi Arabia showed a higher prevalence (4.6%) [19].

CONCLUSION AND RECOMMENDATIONS

In Arar, Northern Saudi Arabia, the prevalence of cerebrovascular stroke among senior adult population was 4.3%, which is relatively high. In addition, there is definite lack of published

researches on stroke. However, such research is vitally essential to plan for appropriate management programs to be set up, effective implementation of primary prevention strategies and proper allocation of health resources in this area.

LIMITATIONS OF THE STUDY

The details of types and causes of cerebrovascular stroke could not be specified due lack of investigations. Large wide scale study is needed to find the details of the causes.

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REFERENCES

1. **El-Tallawy HN, Farghaly WM, Shehata GA et al. (2013):** Epidemiology of non-fatal cerebrovascular stroke and transient ischemic attacks in Al Quseir, Egypt. *Clinical Interventions in Aging*, 8:1547-1551.
2. **Bonita R, Mendis S, Truelsen T et al. (2004):** The global stroke initiative. *Lancet Neurol.*, 3(7):391-393.
3. **El-Tallawy H, Farghaly W, Shehata G (2013):** Epidemiology of non-fatal cerebrovascular stroke and transient ischemic attacks in Al Quseir, Egypt. *Clin Interv Aging*, 8: 1547-1551.
4. **Jamrozik K, Broadhurst R, Anderson C (1994):** The role of lifestyle factors in the etiology of stroke. A population-based case-control study in Perth, Western Australia. *Stroke*, 25: 51-59.
5. **Kelly D, Robert D (2004):** Secondary prevention strategies in ischemic stroke: identification and optimal management of modifiable risk factors. *Mayo Clin Proc.*, 79: 1330-1340.
6. **Furukawa T, Mathias T, Marcon S (2011):** Stroke mortality by residence and place of death: Paraná State, Brazil, 2007. *Cad Saude Publica.*, 27:327-334.
7. **Lima-Costa M, Matos D, Ribeiro A (2010):** Chagas Disease predicts 10-year stroke mortality in community-dwelling elderly: the Bambui cohort study of aging. *Stroke*, 41:2477-2482.
8. **Marrugat J, Arboix A, García-Eroles L, Salas T et al. (2007):** The estimated incidence and case fatality rate of ischemic and hemorrhagic cerebrovascular disease in 2002 in Catalonia] *Rev Esp Cardiol.*, 60:573-580.
9. **Dichgans M (2016):** Genetics of ischaemic stroke. *Lancet Neurol.*, 6:149-161.
10. **El-Hajj M, Salameh P, Rachidi S (2016):** The epidemiology of stroke in the middle east. *Eur. Stroke J.*, 1(3):180-198.
11. **Ayoola A, Banzal S, Elamin A (2003):** Profile of stroke in Gazan, kingdom of Saudi Arabia. *Neurosciences*, 8(4):229-32.
12. **Robert A, Zamzami M (2014):** Stroke in Saudi Arabia: A review of the recent literature. *Pan Afr. Med. J.*, 17:14
13. **Alhazzani A, Mahfouz A, Abolyazid A et al. (2018):** Study of Stroke Incidence in the Aseer Region, Southwestern Saudi Arabi. *Int. J. Environ. Res. Public Health*, 15: 215 .
14. **Zhang F, Guo Z, Wu Y et al. (2017):** Prevalence of stroke and associated risk factors: a population based cross sectional study from northeast China. *BMJ* ., 7(9):e015758.
15. **Thrift A, Thayabaranathan T, Howard G (2017):** Global stroke statistics. *Int. J. Stroke*, 12: 13-32.
16. **Feigin V, Abajobir A, Abate K (2017):** Global, regional, and national burden of neurological disorders during 1990-2015: A systematic analysis for the global burden of disease study 2015. *Lancet Neurol.*, 16: 877-897.
17. **Hassan S (2015):** A Study of Morbidity Pattern among Geriatric Population in Fayoum Governorate, Egypt. *Journal of American Science*, 11(4):90-95.
18. **Al-Modeer M, Hassanien S, Jabloun C (2013):** Profile of morbidity among elderly at home health care service in Southern Saudi Arabia. *J Family Community Med.*, 20(1):53-57.
19. **Al Rajeh S, Bademosi O, Ismail H et al. (1993):** A community survey of neurological disorders in Saudi Arabia: the Thugbah study. , 12(3):164-78.
20. **AlShaali A, Al Jaziri A (2015):** Health profile of elderly patients registered in the Elderly Home Based Primary Care, Dubai, United Arab Emirates. *Middle East Journal of Age and Ageing*, 12(1):13-19
21. **Becker S, Al Zaid K, Al Faris E (2002):** Screening for somatization and depression in Saudi Arabia: a validation study of the PHQ in primary care. *Int. J. Psychiatry Med.*, 32:271-283.
22. **Donnan G, Fisher M, Macleod M (2008):** Stroke. *Lancet*, 371(9624):1612-1623.
23. **Folyovich A, Bakos M, Kantor Z et al. (2012):** Stroke prevention--a population screening day in district XII of Budapest. *Ideggyogy Sz.*, 65(3-4):101-5.
24. **Mathers CD, Boerma T, Ma D (2009):** Global and regional causes of death. *Br Med Bull.*, 92:7-32.
25. **Al-Rajeh S, Larbi E, Bademosi O et al. (1998):** Stroke register: experience from the eastern province of Saudi Arabia. *Cerebrovasc Dis.*, 8(2):86-9.