

Epidemiology of Stroke in A Village From Sohag Upper Egypt; Community Based Study.

Sayed Ahmed Fathy El-Zayat¹, Ahmed Fathy Hamed², Hussein Awad El Gharieb¹, Mohammed Hamed Rashad¹ and Ahmed Sabry Yaseen^{1*}.

¹ Neurology Department, Faculty of Medicine, Al-Azhar University

² Community Medicine Department, Faculty of Medicine, Sohag University
drasy2014@gmail.com

Abstract: Background: Stroke now ranks as the second leading cause of death and the first cause of morbidity worldwide. The aim of this study was to explore the incidence and prevalence of stroke, its different subtypes and associated risk factors in a sample from Sohag Governorate. Methods: A cross sectional study was done on a sample from Sohag governorate, At the community level, house to house screening. Patients included who complaining of acute cerebrovascular stroke (ischemic, and hemorrhagic (including ICH and SAH) in the period from 1/4/2017 to 30/9/2017 and all old cases before April 2017. We excluded patients with Traumatic SAH and traumatic ICH and with any case Suffer from acute neurological deficit due to non-vascular cause like tumors or infections. Results: Ninety-three cases were diagnosed as having CVS; 77 cases were presented with ischemic stroke representing 82.8 % and 16 cases were presented with hemorrhagic stroke representing 17.2 %. Our study shows significant statistical difference between both study groups as regard Marital Status, Hepatic diseases, also as regard Side of Hemiplegia, Seizures (Generalized more than Focal), vomiting, Impaired Consciousness, and Sphincteric disturbances. The most common risk factor for stroke was hypertension, which was observed among 69.89% of all stroke cases, followed by smoking and diabetes mellitus (DM). The Prevalence of cerebrovascular stroke per 1000 total population was 5.47 while the incidence of new stroke cases was 1.7 stroke cases/ 1000 population at risk (at 6 months). Conclusion: Overall, the prevalence of stroke in Egypt is higher than in many surrounding countries. Clinical presentation and risk factors.

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1. Introduction

Cerebrovascular stroke; is a disease of rapidly developing symptoms and signs of sudden death of some brain cells due to lack of oxygen when the blood flow to the brain is lost by blockage or rupture of an artery to the brain and at time global loss of cerebral function lasting more than twenty-four hours or leading to death with no apparent cause other than one of vascular origin.¹

The burden of stroke is Worldwide increasingly being carried by developing and lower-income countries. Based on World Health Organization (WHO) reports; cerebrovascular accidents (stroke) are the second leading cause of death and the third leading cause of disability. Worldwide, 70% of strokes and 87% of both stroke-related deaths and disability-adjusted life years occur in low- and middle-income countries.²

In Egypt, according to recent estimates, the overall prevalence rate of stroke is high with a crude prevalence rate of 963/100,000.³

Hypertension, hyperlipidemia, diabetes mellitus, coronary atherosclerosis, cigarette smoking, and advancing age have been identified as risk factors for

stroke and effective prevention strategies reducing stroke mortality.⁴

Our study was aimed to explore the epidemiological pattern of the cerebrovascular stroke in a sample from Sohag Governorate; This include the incidence and prevalence of stroke by subtypes (ischemic and hemorrhagic) and stroke risk factors.

2. Methods

A cross sectional study was done on a sample from Gazerat Mahrous Village (total population 17000) which located in Sohag governorate. Sohag is one of the largest governorates of Egypt in the southern part of the country (Upper Egypt). The survey was done at the community level, house to house screening of residents by trained interviewers. Demographic and other relevant clinical information were also obtained from the participants. We also obtain the duration of stroke, events and symptoms that preceded the stroke, drug history, identified the risk factors for stroke and the investigations done by the patient as CT brain, MRI brain and any other lab and imaging done by the patient.

Those who were adjudged to be positive for

stroke were screened with a stroke-specific questionnaire and made to undergo a complete neurological examination which was performed by a neurologist in their homes. The questionnaire included the initial screening questions and additional stroke-specific questions to further confirm the diagnosis.

Patients included who complaining of acute cerebrovascular stroke (ischemic, and hemorrhagic (including ICH and SAH) in the period from April 2017 to October 2017 and all old cases before April 2017.

We excluded patients with Traumatic SAH and traumatic ICH and with any case Suffer from acute neurological deficit due to non-vascular cause like tumors or infections.

All cases subjected to the following; (1) Detailed medical and neurological history, (2) General and neurological examination and, (3) Radiological investigations; urgent brain computed tomography (CT), brain magnetic resonance image (MRI), brain magnetic resonance angiography (MRA) and brain magnetic resonance venography (MRV) according to clinical data.

Informed consent was obtained from all participating subjects. This study was reviewed and approved by The Cairo University Research Ethics Committee.

Statistical analysis:

Data was analyzed using Data was analyzed using IBM SPSS Statistics for Windows version 22. Qualitative data was expressed as number and percentage. Chi-square (χ^2) test and Fisher's Exact Test were used for comparison regarding qualitative variables as appropriate. A 5% level was chosen as a

level of significance in all statistical tests used in the study.

3. Results

In this study, Positive cases for cerebrovascular stroke were 103 cases, 10 cases were excluded after examination and assessment of all positive cases; three cases were hysterical, two cases were diagnosed with subdural hematoma, two cases were traumatic SAH and three cases were diagnosed with Parkinson's disease.

Ninety-three cases were diagnosed as having CVS; 77 cases were presented with ischemic stroke representing 82.8 % and 16 cases were presented with hemorrhagic stroke representing 17.2 %.

The Prevalence of cerebrovascular stroke per 1000 total population was 5.47 while the incidence of new stroke cases was 1.7 stroke cases/ 1000 population at risk (at 6 months).

The Prevalence of cerebrovascular stroke between males (N. =8890) was 5.84 While Prevalence of cerebrovascular stroke between females (N. =8110) was 5.1.

Characteristics of individual trials and all trials combined are summarized in **(Table 1)**. Age is the single most important risk factor for stroke, for each successive 10 years after the age of 40; The majority of patients were in age groups 40-60 years (38.7%) and More than 60 (44%), Only one case was detected under the age of 20 years. Males exceeded females (55.91% vs 44.09%), married patients constituted more than half the patients, House wife, Manual worker and Technical patients were the most frequency.

Table 1: Demographic Characters of the studied patients.

Variables	Frequency (N)	Percent (%)	
Age (Years)	Below 20	1	1.08%
	20 to 40 years	15	16.13%
	40 to 60	36	38.71%
	More than 60	41	44.09%
Sex	Female	41	44.09%
	Male	52	55.91%
Occupation	House wife	34	36.56%
	Manual worker	21	22.58%
	Official	3	3.23%
	Professional	4	4.30%
Marital Status	Technical	31	33.33%
	Married	61	65.59%
	Single	5	5.38%
	Widow	25	26.88%
	Divorced	2	2.15%

In comparison between ischemic and hemorrhagic groups regards demographic data; there was no statistical significant difference (p-value >

0.05) as regard age, gender and occupation while a significant statistical difference (p-value = 0.008) was noted between both groups as regard Marital Status

(Table 2).

The most common risk factor for stroke was hypertension, which was observed among 69.89% of all stroke cases, followed by smoking and diabetes mellitus (DM). Hypertension was more prevalent among patients with hemorrhagic strokes (81.25%), while hyperlipidemia, Cardiac and diabetes mellitus were more among ischemic stroke patients. There was statistically significant relation as regard liver diseases (P,0.001) **(Table 3).**

Clinical presentation in patients according to subtypes of stroke are shown in **Table 4.** There were significant statistical differences between both study groups as regard Vomiting, Seizures, impaired Consciousness and Sphincteric disturbances. There were significant statistical differences between both

study groups as regard Type of Seizures and Side of Hemiplegia. Generalized seizures was common than focal type (55.5% vs.44.5%). (58%) cases within ischemic stroke group had right Side Hemiplegia compared while (73%) cases within hemorrhagic stroke had left Side Hemiplegia.

Figure 1 shows the distribution of cases of Ischemic Stroke by Location; 19 cases were cortical (24.6%), 15 cases were basal ganglionic (19.5%), 17 cases were capsular (internal capsule) (22%) while 9 cases were Normal CT. **Figure 2** shows the distribution of cases of Hemorrhagic Stroke by Location; Seven cases were cortical (44%), seven cases were Subcortical (44%), and two cases were SAH (12%).

Table 2: Comparison between study groups regards Demographic data:

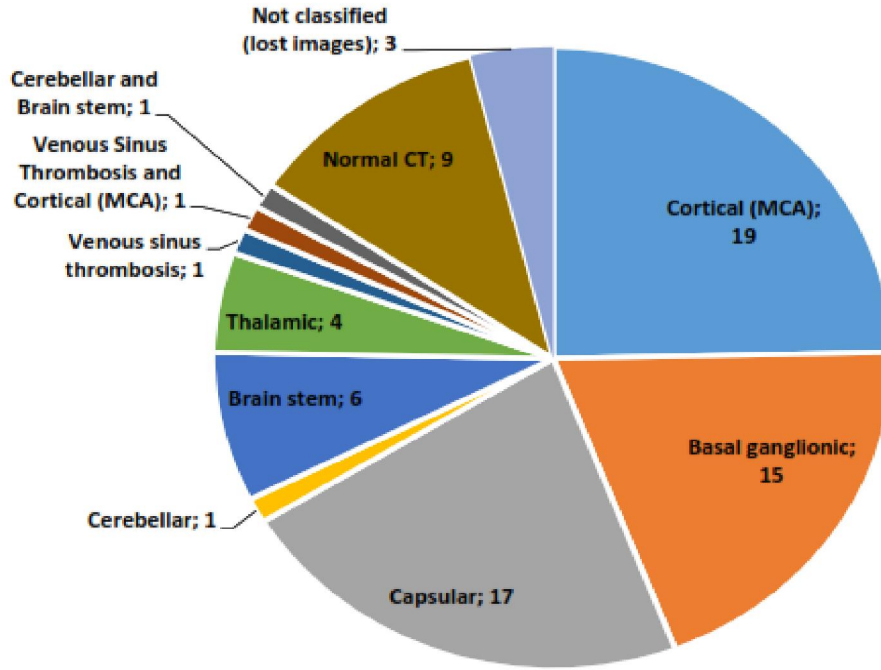
Variable	Ischemic NO.	Hemorrhagic NO.	P-value
Age	Below 20	0	0.263
	20 to 40 years	11	
	40 to 60	29	
	More than 60	36	
Gender	Male	43	0.977
	Female	34	
Occupation	Manual worker	17	0.722
	Technical	27	
	Official	2	
	Professional	4	
	House wife	27	
Marital Status	single	4	0.008
	married	46	
	divorced	2	
	widow	25	

Table 3: Risk factors distribution in both stroke types:

	Ischemic (N)	Hemorrhagic (N)	P-value
Special Habits	Smoking	41	0.897
	Alcohol	0	
	None	35	
	Smoking & alcohol	1	
Renal	Yes	1	0.651
	No	76	
Cardiac	Yes	20	0.669
	No	57	
Diabetes mellitus	Yes	31	0.244
	No	46	
Hypertension	Yes	52	0.565
	No	25	
Hyperlipidemia	Yes	13	0.284
	No	64	
Hepatic	Yes	0	0.001
	No	77	
Oral contraceptive pills	Yes	6	0.13
	No	28	
Similar Family conditions	Yes	8	0.351
	No	69	

Table 4: Clinical presentation in both types of stroke

		Ischemic	Hemorrhagic	P-Value
Vomiting	Yes	23	12	0.001
	No	54	4	
Seizures	Yes	19	8	0.043
	No	58	8	
Headache	Yes	47	12	0.296
	No	30	4	
Facial Nerve Palsy	Yes	68	13	0.449
	No	9	3	
Tinnitus	Yes	10	0	0.13
	No	67	16	
Vertigo	Yes	10	1	0.453
	No	67	15	
Diminution of Vision	Yes	6	0	0.253
	No	71	16	
Diplopia	Yes	12	2	0.757
	No	65	14	
Dysarthria	Yes	70	14	0.679
	No	7	2	
Dysphasia	Yes	18	5	0.512
	No	59	11	
Impaired Consciousness	Yes	15	7	0.038
	No	62	9	
Memory Defect	Yes	13	4	0.45
	No	64	12	
Cerebellar manifestation	Yes	4	0	0.357
	No	73	16	
Bulbar Paralysis	Yes	28	5	0.701
	No	49	11	
Hypoglossal Paralysis	Yes	68	13	0.449
	No	9	3	
Hemiparesis or Hemiplegia	Yes	74	15	0.677
	No	3	1	
Hemihypoesthesia	Yes	10	2	0.958
	No	67	14	
Gait disturbances	Yes	65	13	0.757
	No	12	3	
Sphincteric disturbances	Yes	22	10	0.009
	No	55	6	
Side of Hemiplegia	Left	26	11	0.03
	Bilateral	5	1	
Type of Seizures	Focal	9	3	0.043
	Generalized	10	5	
First attack or Recurrent	First attack	69	15	0.615
	Recurrent	8	1	
Date of beginning of disease	From April 2017 to September 2017	25	4	0.562
	Before April 2017	52	12	
Time between symptom and start of treatment	Less than 4 hours	3	1	0.413
	From 4 to 8 hours	5	2	
	More than 8 hours	69	13	



Location of Ischemic Stroke according to Brain Imaging

Figure 1: Location of Ischemic Stroke according to Brain Imaging.

Location of Hemorrhagic Stroke according to Brain Imaging

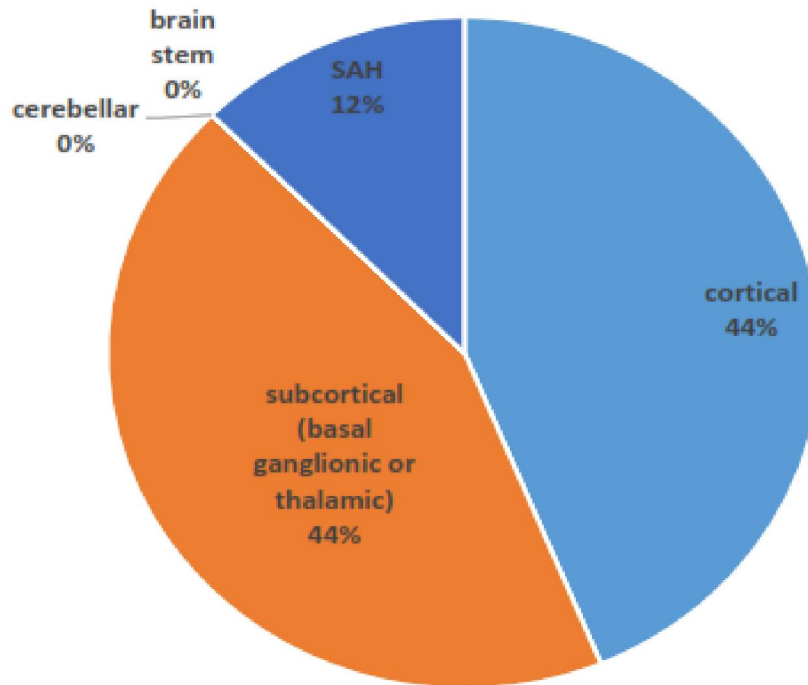


Figure 2: Distribution of cases of Hemorrhagic Stroke by Location.

4. Discussion

The Prevalence of cerebrovascular stroke was 5.47 cases per 1000 total population while the incidence of new stroke cases was 1.7 stroke cases/1000 population at risk (at 6 months). Meta-analysis of Egyptian studies revealed that, Ischemic stroke constituted 64.5 % while hemorrhagic stroke constituted 35.5 % of stroke in Egypt.⁵

There are much variations between different studies regarding stroke incidence where in U.S. population stroke incidence is between 0.5 to 1/1000 population, while in Malmo, Sweden the incidence was reported to be lower 0.3/ 1000 population but higher incidence rates was reported in U.K. (incidence is 2/1000/ population /y and also in Copenhagen with incidence of 2.14/1000 population /y.⁶

These variations in those different studies are mainly due to that, some of these studies are hospital based and others are community based and also due to the wide variations between different racial groups regarding stroke related risk factors. Where our study is a community based.

Regarding stroke subtypes, we reported hemorrhagic stroke in 17.2 % and ischemic in 82.8 %. This proportion is nearly similar rates compared with Ain shams study, it was 22% for hemorrhage and 75% infarction.

El Sayed et al stated that the most frequent stroke subtype in Saudi Arabia was ischemic infarcts (79%), followed by intracerebral hemorrhage (18.8%) and subarachnoid hemorrhage (2.2%). Studies from India confirmed that the incidence of ischemic stroke was higher when compared with the other types.^{5,7}

The Prevalence showed a steady increase with advancing age. This is in agreement with most studies of stroke, which concluded that age has been identified as a marker of risk for stroke.⁸

Prevalence was higher among males than females except for the young adult group (20 to, 40 years), where stroke prevalence was higher among females than males. Males also outnumbered females in all subtypes of stroke, and this is in agreement with previous epidemiological studies, which have reported that compared with women, stroke strikes men more often.⁹

Our results higher than other national studies, where smoking reported in 33.3% of stroke patients, in Egyptian metanalysis smoking reported in 36.1% and also in NOMASS smoking reported in 36.7% of stroke patients.¹⁰

We reported that (67.5%) cases had history of hypertension within ischemic stroke group compared with (81.25%) cases within hemorrhagic stroke. Our results agree that reported in some studies, e.g. in Ain shams study hypertension reported in 67% of stroke patients, in USA, NOMASS¹¹ reported in 54.3% and

in meta-analysis of eight national studies¹⁰ reported in 67.1%, while other studies in US reported the population attributable risk of hypertension for stroke is as great as 40%.¹²

Our results also agree with most of previous studies which reported hypertension to be more in hemorrhagic stroke.

Hypertension is the single most important modifiable risk factor for stroke and is considered a major risk factor for both infarction and hemorrhage. Most estimates for hypertension indicate a relative risk of stroke of approximately 4 when hypertension is defined as systolic ≥ 160 mmHg and/or diastolic ≥ 95 mmHg.¹⁰

Hypertension has the same effect on stroke mortality as on stroke incidence that it was reported in our as in other studies, therefore measures that have been shown to control blood pressure will reduce hypertension related stroke risk as well as fatal stroke and consequent disabilities.¹³

In the present study, hyperlipidemia reported in (83%) cases had no history of Hyperlipidemia within ischemic stroke group compared with (94%) cases within hemorrhagic stroke with no definite causal relationship with stroke subtypes can be defined.

Regarding incidence of hyperlipidemia in stroke in general, there is much discrepancy between different studies, where Ain Shams study reported incidence of 34.9% for dyslipidemia and in Egyptian meta-analysis three studies dyslipidemia was reported in 57.9%, western studies showed also much variations where, some studies reported higher results as 41%⁵⁸ while others reported much lower results as 2.1%⁶⁹, and 4.6%.¹⁴

The present study showed that all cases within ischemic stroke group had no history of Hepatic diseases while (12.5%) of cases within hemorrhagic stroke had history of Hepatic diseases with highly significant statistical difference (p-value < .001) between both study groups as regard Hepatic disease.

Neal et al., reported in a nationally representative sample of Medicare beneficiaries, cirrhosis was associated with an increased risk of stroke, particularly hemorrhagic stroke. A potential explanation of these findings implicates the mixed coagulopathy observed in cirrhosis.¹⁵

The oral contraceptive pills used in the 1960s and 1970s with an estrogen content > 50 μg were strongly associated with increased stroke risk, about triple the risk of ischemic stroke, less for hemorrhagic strokes. Fortunately, the modern oral contraceptive pills, with progesterone only or with low estrogen content carry a lower or no increased stroke risk.¹⁶

In our study, 7.5% of female stroke patients were on contraceptive pills, more in the ischemic stroke

group 85.7% compared with 14.3% in the hemorrhagic stroke group.

Our study showed significant statistical difference between both study groups as regard Vomiting, Seizures, impaired Consciousness and Sphincteric disturbances.

Headache was recorded in 63.4 % of patients in this study, which is comparable with that in the study by **Siddique et al** who reported headache among 60% and vomiting among 75% of patients. Headache, vomiting, and vertigo were found to be significantly more common accompaniments of hemorrhagic stroke than other types of stroke, which is in agreement with **Siddique et al**.¹⁷

Hemiparesis and hemiplegia were the commonest presentation of stroke (95.7%), which is in agreement with **Siddique et al**,¹⁷ and **Omkar Prasad et al**,¹² found that the commonest clinical feature at presentation of stroke in India was hemiplegia (80%), followed by dysarthria (60%) and aphasia (59%). In the current study, patients had less speech defects (90.3% for dysarthria and 24.7% for Dysphasia). This difference could be attributed to the type of the study – whether a prospective or retrospective study like the present one.¹⁸

Regarding the side of the lesion, our study showed significant statistical difference (p-value = 0.03) between both study groups, 49.46% had right-sided lesions, in disagreement with other studies, which found that left hemisphere brain infarction was more common than right hemisphere lesion.^{12,17}

Conclusion

In Sohag Upper Egypt stroke study, The Prevalence of cerebrovascular stroke per 1000 total population was 5.47 while the incidence of new stroke cases was 1.7 stroke cases/ 1000 population at risk (at 6 months) with higher incidence of ischemic strokes. Overall, the prevalence of stroke in Egypt is higher than in many surrounding countries. The Prevalence showed a steady increase with advancing age, married participants showed higher incidence of ischemic and hemorrhagic strokes, Hyperlipidemia, Cardiac diseases, diabetes mellitus, history of recurrent strokes and smoking were reported more in ischemic strokes. Hypertension, renal affection and Hepatic disease reported more with hemorrhagic strokes. Seizures (Generalized more than Focal), vomiting, Impaired Consciousness, and Sphincteric disturbances were found to be significantly more common clinical presentations of our patients.

The lack of TPA (tissue plasminogen activator) was one of the limitations; out of cases that diagnosed with ischemic stroke only three cases, receive TPA. while Seventy-Three cases did not receive as it was

not available and one case did not receive TPA as it was out of time window.

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