

---

## Stroke in South Libya

Mutwakil G. Ahmed,\* Mohamoud Hussein Ali,\*\* Abdulqader M. Sufrani,\*  
Faraj A. Shenib,\* Abdu Nnaser M. Musbah,\*

---

### Abstract:

**Objective:** To determine incidence and risk factors for stroke in the Fezzan region, South Libya.

**Setting:** 2<sup>nd</sup> March Teaching Hospital, Sebha, South Libya.

**Methods:** This was a prospective hospital-based study of stroke patients admitted to 2<sup>nd</sup> March Teaching Hospital during a period from January 2001 to December 2001.

**Results:** Two hundred and thirty-two patients were admitted due to stroke during the study period to give an average annual incidence rate of 662 per 100000 deaths. One hundred and thirty patients (56%) were male. The mean age was 61± 16years. The 30-days case mortality rate was 22.4%. A diagnosis of brain infarction was made in 182 patients (78.4%). Of the remainder, intracerebral hemorrhage accounted for 13.4% and subarachnoid hemorrhage for 3.4%. Among risk factors hypertension (66.3%) overshadowed the rest. Cardiac disease (34.3%) was the second common risk factor.

**Conclusion:** The incidence of stroke is high in South Libya. Therefore, active programs need to be initiated to identify risk factors in the population at large. Upon identification effective therapy should be introduced and maintained.

**Keywords:** Stroke, hypertension, cardiac disease.

---

### Introduction:

Cerebrovascular disease comprises a heterogeneous group of diseases, that herald their presence by producing symptoms and signs resulting from either ischaemia or hemorrhage within the central nervous system. The term stroke is most commonly used by both physician and laypersons to refer to any one of this diverse group of disorders, and connotes the idea that onset of symptoms is abrupt and leaves a lasting physical or cognitive disability.<sup>1-3</sup>

The normal cerebral blood flow is 50-55 ml/100g/min. The threshold for synaptic transmission failure occurs when the cerebral blood flow drops to about 8-10ml/100g/min. At this point ischaemia sets in motion a cascade of biochemical alterations leading to Lactic acidosis, influx of calcium and sodium and efflux of potassium in cell death.<sup>4,6</sup>

Stroke is the third leading cause of death, after cardiovascular disease and cancer and a primary cause of long-term disability in much of the industrialized world. It is also a major cause of chronic disability and the most common neurologic condition requiring hospitalization.

Worldwide, stroke incidence approaches 180 cases per 100,000 deaths per year and its prevalence is roughly 500 to 600 per 100,000.

All forms of the disease included, 8 to 20% of patients die in the first 30 days. Among survivors, early recurrence adds to the neurologic deficit and lengthens hospital stay. Late recurrence of cerebrovascular affects 4 to 14% of patients per year. Overall, the 5-year survived rate averages 56% for men and 64% for women.

The disability occasioned by both initial and recurrent stroke causes extended stays in hospitals and leads to chronic care in institution, with resultant heavy strain on human and economic resources. In the United States alone, it accounts for \$ 29 billion per year in health costs and lost productivities. Sweeping summaries such as above provide some crude idea of the magnitude of the problem. Of the 500,000 new or recurrent strokes in the United States each year, 80-85% result from cerebral infarction, the remainder is due to hemorrhage.<sup>7-9</sup>

This study was carried out to examine the clinical characteristics of patients with cerebrovascular disease in 2<sup>nd</sup> March Teaching Hospital, Sebha, South Libya.

---

\* Department of Medicine, Sebha University.

\*\* Department of Radiology, Sebha University.

**Patients and Methods:**

This prospective study was conducted in 2<sup>nd</sup> March Teaching Hospital in Sebha. All patients with acute stroke admitted to the medical ward over a period of one year, from 1<sup>st</sup> January 2001 to December 31<sup>st</sup> were enrolled into the study. The clinical workup consisted of thorough history, detailed clinical examination and paraclinical investigations. Information collected included:- demographic data – gender and age, and smoking; symptoms experienced- headache, vomiting, seizures, loss of consciousness; activity at onset- normal daily activity, stress, sleep, previous history of hypertension, diabetes mellitus, cardiac disease, stroke or transient ischaemic attack, cancer, bleeding disorders and morbid inactivity.

Investigations performed included complete blood cells and platelet count, coagulation profile, renal and liver function tests, serum glucose level, urinalysis, chest –X- ray, electrocardiogram and computed tomography. The annual incidence of stroke was computed in reference to annual mortality rate data published by the Secretary of Health and Social Welfare.<sup>10</sup>

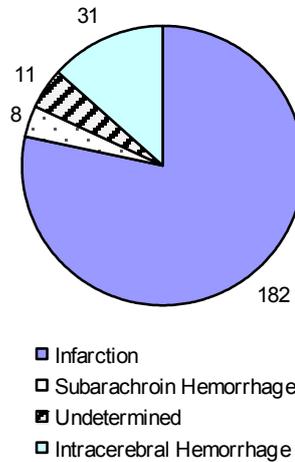
**Results:**

During this study period a total of 232 patients were admitted due to acute stroke with an average annual incidence rate of 662 per 100,000 deaths. One hundred and thirty patients (56%) were male. Age has played a major role in incidence with 158 patients (68.1%) in the sixth to eighth decades of life. The mean age was 61+ 16 years somewhat younger than in many western countries. Fifty-two patients (22.4%) died within the first 30 days.

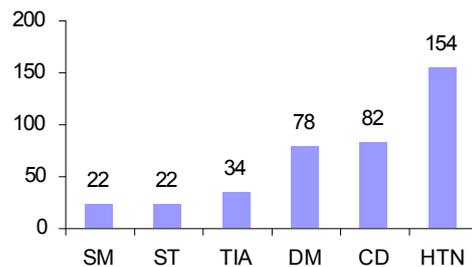
In this study a diagnosis of brain infarction was made in 182 patients (78.4%). Of the remainder intracerebral hemorrhage accounted 13.4% and subarachnoid for 3.4% of cases. The stroke subtype was undetermined in 11 patients (Fig. 1). Among modifiable risk factors (illustrated in Fig. 2) hypertension overshadowed the rest (66.33%).

Cardiac disease was the second common risk factor. Seventy-eight patients (33.6%) were diabetic. A history of transient ischaemic attack was obtained in 14.7% of patients. Twenty-two patients (9.5%) had a previous episode of stroke. Cigarette, smoking, was reported by (9.5%) of patients.

**Fig. 1: Stroke subtype.**



**Fig. 2: risk factors for stroke.**



SM = smoking.  
 ST = Stroke.  
 TIA Transient ischaemia.  
 DM = Diabetes Mellites.  
 CD = Cardiac Disease.  
 HTN = Hypertension.

**Discussion:**

Stroke remains the third most common cause of death in the developed world and is the leader in causes of disability.<sup>11</sup> To prevent stroke, it is necessary to identify and correct predisposing factors in persons at high risk. The frequency and relative impact of these factors have been and are being identified in free-living populations through means of epidemiological studies such as those performed in Framingham, Massachusetts and by the Mayo Clinic study of the population of Rochester.<sup>12-14</sup> There is a high likelihood that a concerted effort to reduce and treat risk factors

will continue to decrease the incidence of stroke.

This hospital-based study of stroke has revealed a high incidence rate of 662 per 100,000 deaths per year. However, this is comparable to results of a study in the Northern Manhattan population, where stroke incidence rate for deaths per year was 567 per 100,000 for blacks and 331 per 100,000 for whites.<sup>15</sup> This and most other findings substantiate that the greatest incidence of stroke is in black nations.

However an incidence rate of 180 per 100,000 deaths per year is the generally accepted figure worldwide. Values vary considerably in different regions around the world. A low incidence of 43.8 per 100,000 has been reported for Saudi Arabia. Annual rates as low as 120 per 100,000 for males and 56 per 100,000 for females have been reported from Perth in Australia. Much higher rates have been reported from the Far East. Thus so far, insights into the basis for these differences in these rates have not led to firm conclusions, but it is hoped that studies lead to a better delineation of controllable risk factors.

As expected, comparable to all studies, age played a major role. Stroke has its highest incidence in the sixth to eighth decades of life.

In this population, a diagnosis of brain infarction was made in 78.4% of the cases of stroke. Of the remainder, intracerebral hemorrhage accounted for 13.4% and subarachnoid hemorrhage for 3.4%. These findings are consistent with those of other nations.<sup>14-17</sup>

Lumping together all types of stroke, the 30-days case mortality rate in this series was 22.4%, compared to 8-20% in the Framingham and Northern Manhattan stroke studies and emphasized the need to improve stroke patient care.<sup>15, 18</sup>

Of all the risk factors for stroke, hypertension (66.3%) was the most important. Hypertension is strongly related to both infarction and hemorrhage.

The Framingham study indicates that the control of hypertension is as important for stroke prevention in the eighth and ninth decades of life as it is at younger ages. A number of clinical studies have demonstrated a reduction in stroke incidence and mortality when hypertension is treated.<sup>2, 6, 15, 17</sup>

Following hypertension, the most important risk factor in this study was heart disease (34.3%) Persons with cardiac impairment of any sort whether symptomatic or not carry more than twice the risk for stroke than do

persons with normal cardiac function. This is true whether cardiac impairment is determined by the presence of overt diseases, evidence of left ventricular hypertrophy by Electrocardiogram and X-ray readings or arrhythmias. Furthermore, coronary heart disease is the major cause of death among stroke survivor as well as among patients with transient ischaemic attack.<sup>14, 19</sup>

In the Framingham study, patients with nonrheumatic atrial fibrillation developed strokes five times as often as those without fibrillation. Atrial fibrillation with rheumatic heart disease was associated with a 17-fold increase. In the stroke prevention in atrial fibrillation studies, 325mg of aspirin a day was associated with significant relative risk reduction in stroke.<sup>20</sup>

Diabetes mellitus was found to be the third common risk factor in this population. Much of the risk in diabetic patients is because of co-existent hypertension, but there is a significant independent impact, which is greater for women. Although, diabetes should be treated, to date there is no evidence that treatment will reduce the risk for stroke.<sup>14</sup>

The occurrence of previous transient ischaemic attacks was detected in 14.7% of the study patients. There is increasing evidence that the risk for stroke can be appreciably decreased in individuals who experience transient ischaemic attacks. One of the most promising approaches to therapy is related to the platelet antiaggregants such as aspirin and ticlopidine.<sup>22, 23</sup>

Once a stroke has occurred, the risk of recurrent stroke increases 10 to 20 times. This proved to be true in 9.5% of our patients. Although it might at first appear to be too late, the knowledge of this increased risk offers the opportunity to institute vigorous therapy for associated disease and other risk factors, which might decrease the likelihood of a repeat insult and more severe dysfunction or death.<sup>14</sup>

Several studies have established cigarette smoking, reported in 9.5% of our patients, to be a major treatable risk factor. The risk increases with the number of cigarettes and decreases significantly in 2 years after cessation of smoking, reverting to that of nonsmokers at 5 years.<sup>18, 25, 26</sup>

In conclusion, the evidence reviewed indicates that stroke can be decreased significantly in such communities with high incidence rates by treating certain major risk factors. Foremost among these are the independent factors of hypertension, cardiac disease, transient

ischaemic attacks, cigarette smoking, use of street drugs and possibly a high hematocrit value. Therefore, active programs need to be initiated and continued so that risk factors can be identified in the population at large. Upon identification, effective therapy should be introduced and maintained. There are other definite major risk factors for which there is no compelling evidence that specific treatment now available will result in a decrease in stroke rate. These include diabetes mellitus, increased blood fibrinogen, previous strokes and a symptomatic carotid artery bruits. On the other hand a number of other factors are not as strongly correlated with increased risk of stroke but can be effectively treated. These include high-fat diet, elevated blood lipids, excessive alcohol intake, sedentary activity and obesity. Accordingly, it would appear that these, too, should be identified and treated if possible. When treatment is not possible, observation of the patient should be continued

for the purpose of identifying other treatable factors and of implementing new treatment modalities when they are identified.

For intensive medical survey and treatment programs, a smaller number of individuals at extremely high risk need to be identified. The Framingham study concluded that a general cerebrovascular risk profile including five factors could identify the 10 percent of the population who would have one third to one half of all strokes. These factors were hypertension, elevated serum cholesterol, abnormal glucose tolerance, cigarette smoking and left ventricular hypertrophy as determined by electro- cardioigram. Although one cannot assume a cause- and- effect relationship for each of these multiple factors, it is quite important to identify them. When each is treated, the probability greatly increases that at least one treatment will be effective in reducing stroke incidence and mortality.

#### References:

1. Biller J. & Durocher A. Ischaemic cerebrovascular disease. In Biller J. ed. Practical Neurology. Philadelphia (USA), Lippincott- Raven. 1997. p. 23-39.
2. Mohr J.P. & Sacco R.C. Morbidity and Mortality of Stroke. In Morre W.S., ed., Surgery for cerebrovascular disease. Philadelphia (USA), W.B. Saunders. 1997. p. 9-15.
3. Bonita R., Stewart A., & Rasschom R. International trends in stroke mortality, 1970-1985. *Stroke*, 1991; 21: 989-994.
4. Adam H.P. Studies of Org 10172 in patients with acute ischaemic stroke. *Haemostasis*, 1992; 22: 99-101.
5. Scheinberg P. Stroke: The way things really are. *Stroke*, 1994; 25: 1290-1293.
6. Zeiler K. & Kollegger H. Risk factors associated with ischaemic stroke. Implications for disease prevention. *CNS Drugs*, 1994; 1: 132-134.
7. Fisher CM. Clinical syndromes in cerebral thrombosis, hypertension hemorrhage and ruptured saccular aneurysm. *Clinical Neurosurg*, 1995; 22: 117-120.
8. Lisk DR. Early presentation of hemispheric intracerebral hemorrhage. Prediction and outcome and guidelines for treatment allocation. *Neurology*, 1994; 44: 133-135.
9. Vermeulen M & Van Gijn J. The diagnosis of subarachnoid hemorrhage. *J. Neural Neurosurg Psychiatr*, 1990; 50 365-368.
10. The secretary of Health and Social Welfare Statistics and Information Centre. *Sert-libya*. 2000; p. 3-19.
11. Sacco R. L. Ischemic stroke. In Gorelick P.B., Alter M. Eds. *Handbook of Neuroepidemiology*. New York: Marcel Dekker, 1994; p. 135-147.
12. Wolf PA. Kannel WB. & Veler J. Current studies of risk factors stroke. In Barnett HJM, ed. *Neurologic clinics*. Vol. 1:1 Philadelphia (USA) W.B. Saunders Company. 1983; p. 193-202.
13. Garraway WM., Whisnant JP., & Furlan AJ. The declining incidence of stroke. *N. Engl. J. Med.* 1979; 300: 449-451.
14. Wolf PA., Cobb JL, D'Agostino L. Epidemiology of stroke. In Barnett J. JM. Mohr JP. Stein BM., Yatsu FM, ed. *Stroke: pathophysiology, Diagnosis, and Management*. New York. Churchill, livingstone, 1992; p. 234.
15. Sacco RL. Hauser WA., & Mohr JP. Hospitalized stroke in blacks and Hispanics in Manhattan. *Stroke*, 1991; 22: 1491-1493.
16. Al Rajeb S., Awada A., Niazi G. & Larbi E. Stroke in a Saudi Arabian National Guard Community. *Stroke*, 1993; 24 1365-1637.
17. Ward G. Jamarozik K & Stewart- Wynne E. Incidence and outcome of cerebrovascular disease in Perth, Western Australia, *Stroke*, 1988; 19: 1501.

18. Sacco RL, Wolf PA. & Kannel WB. Survival and recurrence. The Farmingham study. *Stroke*, 1982; 13: 290-295.
19. MacMahon S., Peto R., & Cutler J. Blood pressure, stroke and coronary heart disease. *Lancet*, 1990; 335: 827- 829.
20. Stroke Prevention in Atrial Fibrillation Investigators. Stroke prevention in atrial fibrillation study: Final results. *Circulation*, 1991;84:527-531.
21. Olivares L., Castaneda E., Grife A.& Alter M. Risk factors in stroke: A clinical study in Mexican patients. *Stroke*, 1973; 4: 773-778.
22. UK-TIA study Group Aspirin trial: final results. *J Neurosury. Psychiatry*, 1991; 54: 1044-48.
23. Gent M. Blakely J. & Easton J. The Canadian American Ticlopidine study in thromboembolic stroke. *Lancet*, 1989; 1:1215-1217.
24. Robins M.& Baum H. The National survey of stroke: Incidence. *Stroke*, 1981; 12:1-5.
25. Abbott RD. Yin Y. Reed DM. & Yano K. Risk of stroke in male cigarette smokers. *N. Eng. Med* 1986; 315: 717-719.
26. Kawachi I., Coldiz GA. & Stampfer M. Smoking cessation and decreased risk of stroke in women. *JAMA*, 1993; 269: 232-237.