

## Pattern of Admission of Stroke in Benghazi Medical Center: A Cross Sectional Study

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### Abstract

**Background:** Stroke is a leading reason behind morbidity and mortality throughout the world. it accounts for 11.13% of total causes of mortality, and the main cause of disability worldwide. The aim of this study is to know the pattern of stroke admissions at Benghazi Medical Center, and the possible risk factors.

**Methods:** A cross sectional study of 110 patients admitted to BMC who diagnosed with stroke based on the International Classification of Diseases, Revision 10, from January to June 2019. Data about age, gender, comorbidities and medical history were collected.

**Results:** Within the study period, we review the medical records of 110 patients were diagnosed as stroke supported by ICD 10 coding. Our research protocol identified 110 stroke record, out of which 10 cases were unspecified stroke. Of 100 specified stroke cases, 70 cases described an ischemic incidence and 30 cases reported a hemorrhagic incidence. Analysis of demographic attributes over this dataset showed that 65 men and 35 women with mean ages of  $66.4 \pm 14.2$  and  $64.6 \pm 12.4$ , respectively, were admitted with stroke diagnosis, irrespective of stroke type. Patients aged 70 or more have higher incidence of stroke regardless of its type ( $P = 0.003$ ). the statistical association between cohort and stroke subtype was significant ( $P < 0.05$ ). Patients diagnosed with ischemic stroke have higher mortality rate compared with those with hemorrhagic ( $P = 0.004$ ). Furthermore, there was no significant statistical difference between stroke subtypes, and gender ( $P = 0.768$ ). statistically, diabetes mellitus and dyslipidemia were significantly associated with both ischemic and hemorrhagic stroke patients ( $p = 0.003$  and  $0.001$  respectively). While HTN was strongly associated with hemorrhagic strokes ( $P = 0.001$ ).

**Conclusion:** Ischemic stroke was more common than hemorrhagic stroke, analyzing risk factors, hypertension, diabetes mellitus, and dyslipidemia were the most prevalent risk factors of stroke in our studied population.

**Keywords:** Stroke; Global Burden of Disease (GBD); Hypertension; Diabetes Mellitus; Dyslipidemia

### Introduction

Stroke is a leading reason behind morbidity and mortality throughout the world. it accounts for 11.13% of total causes of mortality, and the main cause of disability worldwide. According to the most recent WHO data published in 2017 Stroke mortality in Libya reached 3,417 or 11.53% of total mortalities. The age adjusted Death Rate is 88.80 per 100,000 of population ranks Libya #87 within the world [1]. The major subtype of stroke is ischemic, which occurs in about 87% of all stroke cases [2]. At 2010, 11 million ischemic strokes were recorded by the Global Burden of Disease (GBD) study, 63% of them were in low and middle-income countries [3]. On the other hand, hemorrhagic

stroke was reported among 5.3 million patients, 80% of them were reported in low- and middle-income countries. Over 3 million deaths were recorded to be caused by ischemic stroke, with the same number occurred due hemorrhagic stroke [3,4]. Genetics, age, history of cerebrovascular event, smoking, alcohol consumption, physical inactivity, hypertension, dyslipidemia, diabetes mellitus, cardiovascular diseases, obesity, metabolic syndrome, diet and nutrition, are the main risk factors of stroke, they can be grouped into modifiable and non-modifiable risk factors [5,6].

### Aim of the Study

The aim of this study is to know the pattern of stroke admissions at Benghazi Medical Center and to identify major risk factors among those patients.

### Patients and Methods

A cross sectional study of records of 110 patients admitted to Benghazi Medical Center who diagnosed with stroke from January to June 2019. Based on (International Classification of Diseases, Revision 10 (ICD 10) codes in the categories of I60, I61, I62, I63 and I64). Diagnosis was mainly supported by physician's opinion, clinical findings, and magnetic resonance Imaging (MRI) or computed tomography (CT scan) reports. If the medical records were written with unspecified stroke (code I64 of ICD 10) it has been rechecked with a specialist coder to assign an accurate code supported MRI or CT scan reports or after consulting with the attending physician or a neurologist. We collect data on patient's (age, gender, ethnicity, and residency), diagnostic evaluations that has been done to the patients, type of stroke (hemorrhagic or ischemic), history of comorbid diseases (such as hypertension, ischemic and non-ischemic heart disease, diabetes, hyperlipidemia, old stroke or Transient Ischemic Attack), and history of cigarette smoking.

### Statistical analysis

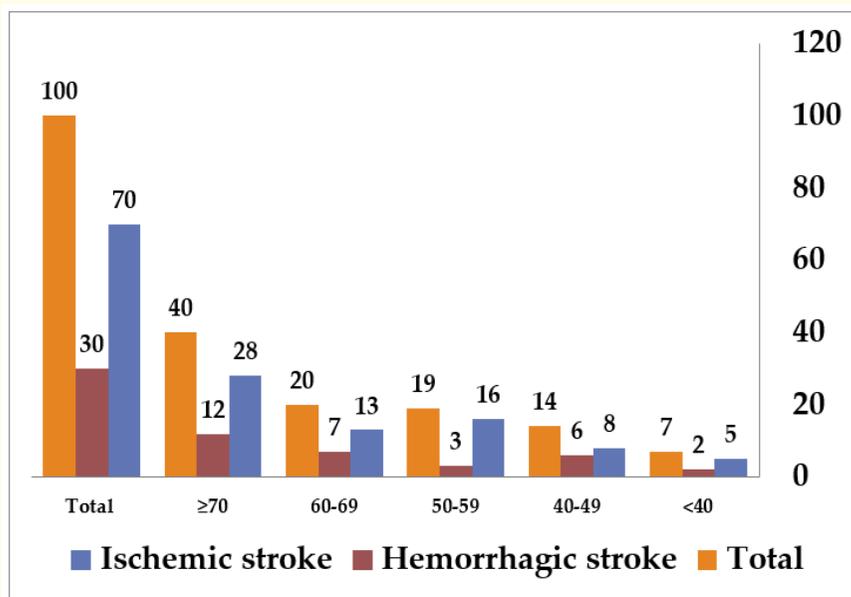
The data was summarized using Microsoft excels 2010 then coded and processed on IBM compatible computers, using the Statistical Package for Social Sciences (SPSS) software (version 17). Descriptive statistics of the different variables were presented either as frequencies and percentages or as means  $\pm$  SD. For statistical comparisons, independent samples Chi square test was employed for testing statistical significance of association between two discrete variables. Significant value is set up at  $P < 0.05$ .

### Results

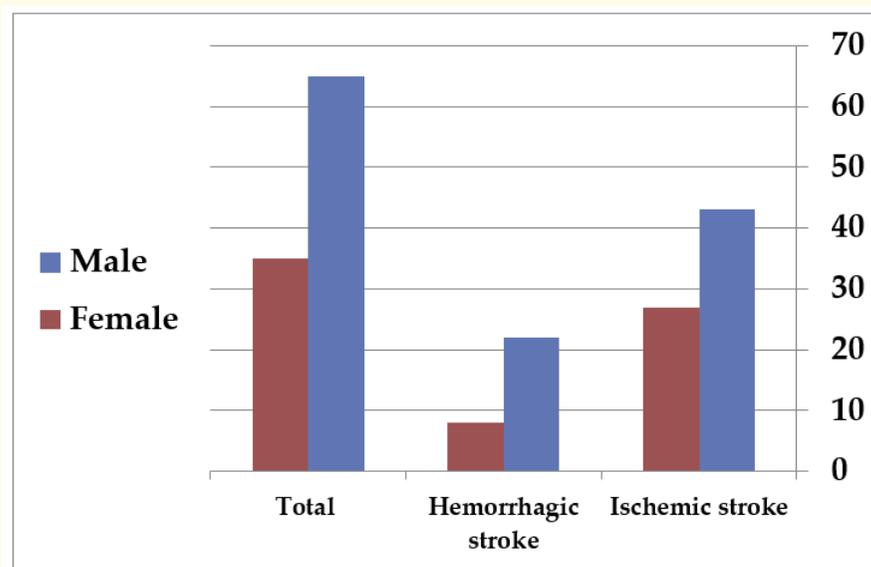
within the study period, we review the medical records of 110 patients were diagnosed as stroke supported by ICD 10 coding. Our research protocol identified 110 stroke record, out of which 10 cases were unspecified stroke. Of 100 specified stroke cases, 70 cases described an ischemic incidence and 30 cases reported a hemorrhagic incidence. Analysis of demographic attributes over this dataset showed that 65 men and 35 women with mean ages of  $66.4 \pm 14.2$  and  $64.6 \pm 12.4$ , respectively, were admitted with stroke diagnosis, irrespective of stroke type. Patients aged 70 or more have higher incidence of stroke regardless of its type ( $P = 0.003$ ). the statistical association between cohort and stroke subtype was significant ( $P < 0.05$ ). patients diagnosed with ischemic stroke have higher mortality rate compared with those with hemorrhagic ( $P = 0.004$ ). Furthermore, there was no significant statistical difference between stroke subtypes, and gender ( $P = 0.768$ ). statistically, diabetes mellitus and dyslipidemia were significantly associated with both ischemic and hemorrhagic stroke patients ( $p = 0.003$  and  $0.001$  respectively). While HTN was strongly associated with hemorrhagic strokes ( $P = 0.001$ ). While HTN was strongly associated with both hemorrhagic strokes ( $P = 0.001, 0.003$  respectively). There was no significant difference between ischemic and hemorrhagic stroke with regard to other risk factors.

### Discussion

In our study ischemic stroke was the commonest subtype accounting for 70% of cases, while hemorrhagic stroke was reported in 30% of cases, these results are similar to previous studies conducted in Libya, El Zunni., *et al.* in their review of stroke incidence and pattern in Benghazi ischemic stroke was reported in 76.9%, while hemorrhagic stroke was reported in 23.1% [7], same results was reported in



Graph 1: Distribution of age and its association with stroke subtypes ( $p = 0.003$ ).



Graph 2: Distribution of gender and stroke.

Risk factor	Ischemic stroke	Hemorrhagic stroke	Total
Hypertension	19	25	44
Diabetes mellitus	59	21	80
Dyslipidemia	54	20	64
TIA*	4	3	7
Cardiac disease	16	7	23
CKD**	6	1	7
Smoking	39	7	46

**Table 1:** Risk factors associated with stroke.

\*Transient Ischemic Attack; \*\*Chronic Kidney Disease.

south Libya where 78.4% of strokes were ischemic [8]. These results are consistent with results of studies from other countries [9-11]. Tirschwell, *et al.* has suggested that higher incidence of ischemic could be related to more exposure to modifiable risk factors which can be reduced by lifestyle modifications [12].

As expected, comparable to most studies [13-15] age played a major role. Stroke has its highest incidence in the sixth to eighth decades of life. In our study mean age 65.3 ± 10.2 years, Patients aged 70 or more have higher incidence of stroke regardless of its type (P = 0.003). It was slightly higher compared with previous studies in Libya [7,8] and other developing countries where stroke where the mean age was between 50 and 60 [16-20].

Both hemorrhagic and ischemic stroke were more prevalent among males, same results were reported in other studies [7,8,10,13]. Mortality rate was higher among patients who were diagnosed by hemorrhagic strokes, this can be due to fatal aneurysmal brain ruptures for which an early diagnosis and screening for un-ruptured aneurysms [21].

In our study, hypertension was the third most common risk factor of stroke after diabetes and dyslipidemia, with higher prevalence among hemorrhagic stroke patients. In other studies hypertension was the first most common risk factor for both ischemic and hemorrhagic [7,8,10,22]. A prospective study of 50,000 adults in the Golestan Cohort by Sepanlou and colleagues [23] showed a positive association between hypertension and stroke mortality: they found that the stroke mortality rate was 147.1 (95%CI: 133.9 - 160.1) per 100,000 person-years, although they did not consider stroke subtypes.

Diabetes mellitus and dyslipidemia were significantly associated with both ischemic and hemorrhagic stroke patients (p = 0.003 and 0.001 respectively), This finding is in line with other studies that show strong association between diabetes and stroke [7,8,17, 23].

**Conclusion**

Ischemic stroke was more common than hemorrhagic stroke, analyzing risk factors, hypertension, diabetes mellitus, and dyslipidemia were the most prevalent risk factors of stroke in our studied population.

**Author Contribution**

Equal contribution.

**Financial Support and Sponsorship**

Nil.

### Conflicts of Interest

There are no conflicts of interest.

### Compliance with Ethical Principles

The study was conducted according to the Declaration of Helsinki 1975. The study was approved by our scientific committee, and all participants provided informed consent. All the information was kept confidential, and no individual identifiers were collected.

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