Prevalence and Risk Factors of Ischemic and Hemorrhagic Strokes in a Tertiary Hospital, Mogadishu-Somalia

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Abstract

INTRODUCTION:

Basic in Somali, a country in East Africa, no data are available about key features of stroke such as incidence, prevalence, and mortality or stroke subtypes. So, we decided to conduct this study to make sure the rate burden of stroke in our population and become a starting data for further research.

MATERIALS AND METHODS

We performed a retrospective hospital-based study in Mogadishu, Somali, to assess risk factors and etiology of stroke. Patients were recruited from January 1, 2019, to December 31, 2019, at the Mogadishu Somali–Turkey Recep Tayyip Erdoğan Training and Research Hospital.

RESULTS

A total of 292 participants with stroke (65.4% male and 34.6% women) were analyzed. The prevalence of Ischemic and Hemorrhagic Strokes were 66.8% and 33.2% respectively. A system for categorization of subtypes of ischemic stroke mainly based on etiology has been developed for the Trial of Org 10172 in Acute Stroke Treatment (TOAST)[7], the most prevalent were stroke of other determined etiology (28.7%), undetermined (24.6%) and large artery disease (22.1%) while the least common ischemic strokes were lunar stroke (11.3%) and cardio embolic (13.3%). The most prevalent hemorrhagic strokes were Basal ganglia

CONCLUSIONS: In Somalia there is no previous data for the prevalence and risk factors of the stroke. We concluded that the prevalence of hemorrhagic stroke in Somalia is more compared than the other countries (from 20% worldwide to 33.2% Somali). And the most risk factors were hypertension and diabetes mellitus.

Introduction

Stroke remains a major global health problem [1, 2] and its significance is likely to increase in the future due to ongoing demographic changes, including aging of the population and health transitions observed in developing countries [3.11]. According to the World Health Organization (WHO), stroke is defined as rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death which may be either ischemic or hemorrhagic disturbances of the cerebral blood circulation [4]. In Caucasian populations, approximately 80% of all strokes are ischemic while about 20% are hemorrhagic secondary to intracerebral and subarachnoid hemorrhage [5]. The 2013 Global Burden of Disease study reported that cerebrovascular diseases ranked the second leading cause of death after ischemic heart disease [6. 12]. The WHO has estimated that 15 million people suffer from stroke each year globally with African countries accounting for 86% of the stroke deaths [4, 5]. In Somali, a country in East Africa, no data are available about key features of stroke such
as incidence, prevalence, and mortality or stroke subtypes. So, we decided to conduct this study to make sure the rate burden of stroke in our population and become a starting data for further research.

**Materials And Methods**

We retrospectively conducted the data of the stroke patients whom visited or referred to the department of Neurology at Mogadishu Somalı– Turkey Recep Tayyip Erdoğan Training And Research Hospital from January 2019-December 2019. The confirmation of the stroke whether if it is hemorrhagic or ischemic is made using CT brain or MRI.

The inclusion of this study will be all patients who admitted in the neurology department and diagnosed with stroke whether hemorrhagic or ischemic over a period of one year from January 2019 to December 2019 will included in the study.

The patients who came in the outpatient department, patients who came in the emergency and refused to admit, and ICU patients were excluded.

A total of 292 hospitalized stroke patients during the period January 2019-December 2019 were included in the study. Demographic characteristics, risk factors, and stroke types were reviewed from the medical records of the patients. The data were entered and analyzed using SPSS version 20.0. Descriptive statistics such as percent and frequency were used to summarize patients’ characteristics.

**Results**

A total of 292 participants with stroke (65.4% male and 34.6% women) were analyzed. The prevalence of Ischemic and Hemorrhagic Strokes were 66.8% and 33.2% respectively (Table 1).

As shown in Fig. 1, the most prevalent ischemic strokes were stroke of other determined etiology (28.7%), undetermined (24.6%) and large artery disease (22.1%) while the least common ischemic strokes were lunar stroke (11.3%) and cardio embolic (13.3%). On the other hand, the most prevalent hemorrhagic strokes were Basal ganglia (59.8%) and Lobular stroke (18.6%) while the least common hemorrhagic strokes were cerebellar (1.0%) and pons (2.1%) (Fig. 2).

Age group ($X^2 = 36.674, p-value = 0.001$), Sex ($X^2 = 9.104, p-value = 0.003$), History of diabetes ($X^2 = 4.589, p-value = 0.032$) and History of hypertension ($X^2 = 7.840, p-value = 0.005$) were found to be associated risk factors of stroke (Table 1).
Table 1
Risk factors of stroke among studies subjects

<table>
<thead>
<tr>
<th>Variable</th>
<th>Ischemic Stroke</th>
<th>Hemorrhagic Stroke</th>
<th>χ² (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–39 years</td>
<td>15 (45.5)</td>
<td>18 (54.5)</td>
<td>36.674</td>
</tr>
<tr>
<td>40–64 years</td>
<td>72 (56.7)</td>
<td>55 (43.3)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>≥ 65 years</td>
<td>108 (81.8)</td>
<td>24 (18.2)</td>
<td></td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>116 (60.7)</td>
<td>75 (39.3)</td>
<td>9.104</td>
</tr>
<tr>
<td>Female</td>
<td>79 (78.2)</td>
<td>22 (21.8)</td>
<td>(0.003)</td>
</tr>
<tr>
<td><strong>Hypertension</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>121 (61.4)</td>
<td>76 (38.6)</td>
<td>7.840</td>
</tr>
<tr>
<td>No</td>
<td>74 (77.9)</td>
<td>21 (22.1)</td>
<td>(0.005)</td>
</tr>
<tr>
<td><strong>Diabetes mellitus</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>37 (80.4)</td>
<td>9 (19.6)</td>
<td>4.589</td>
</tr>
<tr>
<td>No</td>
<td>158 (64.2)</td>
<td>89 (35.8)</td>
<td>(0.032)</td>
</tr>
<tr>
<td><strong>Previous Stroke</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>32 (80.0)</td>
<td>8 (20.0)</td>
<td>3.651</td>
</tr>
<tr>
<td>No</td>
<td>163 (64.7)</td>
<td>89 (35.3)</td>
<td>(0.056)</td>
</tr>
<tr>
<td><strong>Total Cholesterol</strong> (mg/dl)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 200</td>
<td>68 (98.6)</td>
<td>1 (1.4)</td>
<td>0.381</td>
</tr>
<tr>
<td>&gt; 200</td>
<td>26 (100.0)</td>
<td>0 (0.0)</td>
<td>(0.537)</td>
</tr>
</tbody>
</table>

KEY: AOR (Adjusted Odd Ratio), CI (Confidence Interval = 95%), P-value < 0.05 is significant

Discussion
Stroke is one of neglected non communicable diseases which significant[15] increasing in Sub-Saharan Africa[13. 14]. In Somalia, there is no recorded data about the epidemiologically and the burden of stroke. So this research gives a basic backbone of future publication of stroke in the country.
This study included 292 patients of stroke admitted in a tertiary hospital in a Mogadishu-Somali for one year, and the study showed ischemic stroke (66.2%) was most prevalent type of stroke, while hemorrhagic stroke was (33.2%). This means that hemorrhagic stroke in Somalia is more compared than the other countries (from 20% worldwide to 33.2% in Somali). The most risk factors of Ischemic stroke were Hypertension (61.4%), and Diabetes (80.4%), while hemorrhagic stroke, Hypertension was (38.6%), and diabetes mellitus was (19.6%). History of diabetes ($X^2 = 4.589, p-value = 0.032$) and History of hypertension ($X^2 = 7.840, p-value = 0.005$) were found to be associated risk factors of stroke. 10% of the participants there total cholesterol was more than 200mg/dl. 13.6% had previous history of stroke. Also smoking and khat chewing which is associated with a rise in arterial blood pressure[9.10] was done but the data was incomplete.

A system for categorization of subtypes of ischemic stroke mainly based on etiology has been developed for the Trial of Org 10172 in Acute Stroke Treatment (TOAST)[7.], the most prevalent were stroke of other determined etiology (28.7%), undetermined (24.6%) and large artery disease (22.1%) while the least common ischemic strokes were lunar stroke (11.3%) and cardio embolic (13.3%). On the other hand, the most prevalent hemorrhagic strokes were Basal ganglia (59.8%) and Lobular stroke (18.6%) while the least common hemorrhagic strokes were cerebellar (1.0%) and pons (2.1%).

Limitations of the study: only once center of tertiary hospital was done for this study, which is Mogadishu-Somalia Turkey Training and Research Hospital, and it's the only center that has the capacity for stroke patients. Second, due to lack of medical insurance of the country some patients did not afford to pay the financial related tomography or MRI and the hospital admission fees. Finally the history of some patients was incomplete about khat chewing and smoking of cigars.

In Somali, no previous data are available about key features of stroke such as incidence, prevalence, and mortality or stroke subtypes. So, we did not compare the results of the prevalence to the previous local studies. This study will be the only available for stroke prevalence and its risk factors in Somalia.

**Conclusion**

Stroke is a major cause of disability. In Somalia there is no previous data for the prevalence and risk factors of the stroke. We concluded that the prevalence of hemorrhagic stroke in Somalia is more compared than the other countries (from 20% worldwide to 33.2% in Somali). And the most risk factors of Ischemic stroke were Hypertension (61.4%), and Diabetes (80.4%), while hemorrhagic stroke, Hypertension was (38.6%), and diabetes mellitus was (19.6%).

**Abbreviations**

CVA  
Cerebrovascular Accident  
MRI
Magnetic Resonance Imaging
CT scan
Computed Tomography
TOAST
Trial of Org 10172 in Acute Stroke Treatment

Declarations

ETHICAL APPROVAL

Ethical clearance was obtained from the Ethical Review Board of MogadishuSomali– Turkey Recep Tayyip Erdoğan Training And Research Hospital: Phar/12/2017). Letter of permission was presented to the management of Referral Hospital who allowed us to use the patients’ medical records. To ensure confidentiality of the patients’ information, the name and address of the patients were not recorded during data collection.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

AUTHORS’ CONTRIBUTIONS

All the authors were involved in developing the idea, designing of the study, data collection, and statistical analysis. All authors participated in the write-up of the manuscript. All authors approved the submitted version of the manuscript.

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3. Rustam Al-Shahi Salman, MA, PhD, FRCP (Edin), Centre for Clinical Brain Sciences, University of Edinburgh, Edinburgh, Scotland.
4. WHO MONICA Project Principal Investigators, “The world health organization MONICA project (monitoring trends and determinants in cardiovascular disease): a major international collaboration,”


Figure 1

classification of Ischemic Stroke
Classification of Hemorrhagic Stroke

Figure 2

Classification of Hemorrhagic Stroke

Basal ganglia
lobular
Thalamus
Intraventricular
Subarachnoid hemorrhage
Pons
Cerebellar