



Epidemiology of Mortality From Cerebrovascular Accident in Patients Admitted to Sina (Farshchian) Educational-Medical Hospital of Hamadan in 2018-2019

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Abstract

Background and aims: Cerebrovascular accidents are a major cause of death and disability in many countries. Therefore, the epidemiological indicators are highly important in the case of these patients' mortality. The present study aimed to determine the epidemiology of mortality due to cerebrovascular accidents in patients admitted to Sina (Farshchian) hospital of Hamadan within 2018-2019.

Methods: In this descriptive cross-sectional study, data of deceased patients were collected from one-year medical records in the neurology wards of Sina (Farshchian) hospital in Hamadan using the census method and a researcher-made checklist. The exclusion criteria were the cause of death except for cerebrovascular accident and incompleteness of data in patient's medical record. Data were analyzed by descriptive statistical methods and SPSS 21.

Results: Out of the 1196 patients admitted to the neurology wards, 159 cases died, and this rate was nearly equal between men and women. The highest mortality frequency belonged to ischemic type (83%), people over 60 years old (83%), illiterate (77.4%), urban (69.2%), self-employed (42.8%) individuals, and those with a history of underlying disease (73.6%), no history of smoking (90.6%), previous stroke (78.6%), and family history of stroke (99.4%).

Conclusion: The findings of the present study showed that certain groups such as the elderly, illiterates, urban residents, self-employed, and people with underlying diseases had a higher mortality rate due to cerebrovascular accidents. Thus, special attention to these groups in health planning can be efficient in reducing the mortality of these accidents.

Keywords: Epidemiology, Mortality, Cerebrovascular Accidents

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Introduction

Cerebrovascular lesions are recognized as one of the leading causes of mortality and disability in developing and developed societies, imposing heavy diagnostic and therapeutic costs on patients and health care systems.¹ Therefore, studying the frequency of strokes in a certain population aiming at reducing its rate is important.² According to the World Health Organization (WHO), more than 50% of deaths and disabilities are due to heart diseases and brain stroke, causing the annual death of over 12 million people worldwide.³ After heart disease and cancer, stroke is the third most common cause of global death, which causes approximately 10% of deaths.⁴ The WHO predicted that stroke would be the second most common cause of death after ischemic heart disease by 2020.⁵ The contribution of stroke management costs to healthcare expenditures is globally staggering. Moreover,

these costs are expected to climb even further given that the number of elderly citizens living in industrialized countries has been projected to increase over the coming decades.⁶ Stroke is associated with the highest odds of reporting severe disability. Importantly, it is related to more individual domains of disability compared with other conditions and might be considered to be the most prevalent cause of complex disability.⁷ Stroke is classified into hemorrhagic and ischemic types based on the pathology of the focal brain lesion.⁸ Nearly 80% of strokes are ischemic (insufficient blood supply) while 20% of them are of hemorrhagic type (bleeding inside the brain tissue).⁹ The incidence of stroke increases with age and it is more common in men than women and blacks than white peoples.¹⁰ In each country, stroke death rates vary depending on social class and geographical status.¹¹ Compared with people in developed countries,

those in developing countries experience a higher stroke mortality rate.¹² In a study in Latin America, India, and China (2011), the prevalence of stroke in urban areas was generally higher compared to rural areas, and the levels of disability and dependency in stroke survivors were higher in urban areas.¹³ These patients may also have a genetic risk factor that can lead to stroke under certain environmental conditions.¹⁴ Nowadays, there are several known risk factors for stroke. For example, age, hypertension, dyslipidemia, diabetes mellitus, carotid stenosis, and non-valvular atrial fibrillation are risk factors for ischemic stroke.¹⁵ A review of studies demonstrated that mortality due to cerebrovascular accidents has been considered by researchers outside and inside Iran. For instance, de Santana et al in Brazil found that the highest mortality rate of stroke was related to people over the age of 70, and it was higher (52%) in men in comparison with women (48%). In this study, ischemic stroke was extremely more common (61%) than hemorrhagic stroke (39%).¹⁶ Likewise, Mazdeh et al in Hamadan showed that the recurrence of stroke in hospitalized patients in Farshchian hospital was 17.35%. Further, the prevalence of ischemic stroke in patients and the mortality due to the second stroke were 92% and 34.6%, respectively.² Similarly, Mazaheri et al reported that 51.9% of patients with stroke were men and 79.9% of them had an ischemic stroke. Among them, 35.82% had a history of the previous stroke and 42.98% reported a family history of stroke.¹⁷ Due to the importance of stroke, its costs, and preventability and unavailability of accurate statistics on stroke in the country, the present study sought to determine the epidemiology of mortality due to cerebrovascular accidents in patients admitted to Sina (Farshchian) hospital of Hamadan in 2018-2019.

Materials and Methods

Study Population and Type

The population of this cross-sectional study included all patients admitted and deceased in the Neurology Wards of Sina (Farshchian) hospital in Hamadan during 2018-2019.

Sample Size and Sampling Method

Sampling was performed by the census method from March 21, 2018, to March 20, 2019. The research sample consisted of all cases of mortality due to cerebrovascular accidents in Sina (Farshchian) hospital within 2018-2019 having the characteristics of the units under study. Out of 1196 patients with cerebrovascular accidents, 159 patients, who had the inclusion criteria and died due to stroke, were evaluated in this study.

Inclusion and Exclusion Criteria

The exclusion criteria included cause of death except for cerebrovascular accidents and incompleteness of data in the patient's medical record. On the other hand, the inclusion criteria were having cerebrovascular diseases/disorders, hospitalized patients (from March 21, 2018, to March 20, 2019), and patients admitted to the neurology

department.

Data Collection Tools

Data were collected by a researcher-made checklist from the files of deceased patients, and the face validity of the checklist was confirmed by 10 faculty members of the Nursing and Midwifery School of Hamadan.

Variables

Variables under study consisted of demographic information including age, gender, level of education, place of residence, employment status, income, history of previous stroke and family history of stroke, and history of smoking and underlying diseases.

Statistical Analysis

The obtained data were analyzed using descriptive statistical methods (e.g., median, average, and standard deviation) by SPSS software, version 21.

Results

Out of the total number of 1196 patients admitted to the Neurology Ward of Farshchian hospital, 159 patients had died due to cerebrovascular accidents, and the hospital case fatality rate was equal to 13.2%. According to the results, most of the dead ones were in the sixth decade of life and over (83%). According to [Table 1](#), the highest frequency of mortality was related to illiterate (77.4%), urban (69.2%), and self-employed persons (42.8%) although the mortality rate was almost equal among men and women. Based on data in [Table 2](#), the highest number of mortality was due to ischemic stroke, which accounts for 83% of all deaths. Furthermore, most of the deceased patients had a history of previous underlying disease (73.6%) while having no history of smoking (90.6%), stroke in the family (99.4%), and previous stroke (78.6%).

Discussion

Based on the results of the present study, out of 1196 patients admitted to the Neurology Wards of Sina (Farshchian) hospital of Hamadan, a total of 159 patients died with a definitive diagnosis of cerebrovascular accidents, and the overall mortality frequency was equal to 13.2%. In this regard, Mazdeh et al reported that the mortality rate of cerebrovascular accidents was equal to 13.59%.¹ In another study by Mahmoudi et al, this rate was equal to 17.1%,¹⁸ which is in line with the findings of the present study.

It is worth noting that the highest deaths due to stroke among those who died over the age of 60 accounted for 83% of all deaths. Based on the results of Zhang et al, a limited number of deaths was observed in the UK in 2007 in those under 35 years of age (186 deaths), and the absolute number of deaths increased from this age. The peak in the absolute number of deaths was found in those aged 75 years and over (43649 deaths).¹⁹ de Santana et al also reported that the highest percentage of deaths due to stroke in Brazil was related to people over the age of 70

Table 1. Frequency of Mortality due to Cerebrovascular Accidents in Patients Admitted to the Neurology Ward of Farshchian Hospital in Hamadan in Terms of Demographic Variables

Demographic Variable	No.	Percent
Age (year)		
<20	2	1.3
20-39	4	2.5
40-60	21	13.2
>60	132	83
Gender		
Male	80	50.3
Female	79	49.7
Level of education		
Illiterate	123	77.4
Primary education level	30	18.9
Cycle education level	2	1.3
Diploma education level	3	1.9
Bachelor's degree or higher	1	0.6
Residence		
Urban	110	69.2
Rural	49	30.8
Job		
Employee	15	9.4
Self-employed	68	42.8
Unemployed	52	32.7
Farmer	24	15.1

Table 2. Frequency of Mortality due to Cerebrovascular Accidents in Patients Admitted to the Neurology Ward of Farshchian Hospital in Hamadan in Terms of Clinical Variables

Clinical Variables	No.	Percent
Type of stroke		
Ischemic	132	83
Hemorrhagic	27	17
History of previous stroke		
Positive	34	21.4
Negative	125	78.6
Family history of stroke		
Positive	1	0.6
Negative	158	99.4
History of smoking		
Positive	15	9.4
Negative	144	90.6
History of underlying disease		
Positive	117	73.6
Negative	42	26.4

(60.2%).¹⁶ Generally speaking, older people are more prone to stroke due to vascular changes and atherosclerosis, and this should be considered in clinical care.

The results of the present study revealed that 50.3% and 49.7% of mortality cases due to stroke belonged to men and

women, respectively. In the study of Zhang et al in France, Germany, Italy, Spain, the UK, and the US, mortality rates were consistently lower in females compared to males.¹⁹ In a 7-year follow-up of patients with stroke in Latvia, Mihejeva et al concluded that (52%) of deaths occurred in males,²⁰ which conforms to the results of this study. This contradiction may be due to physiological differences between men and women.²¹ Generally, the rate of deaths due to stroke is higher in men than women, and this is probably due to the higher consumption of alcohol and cigarettes, which are also important risk factors for cardiovascular and metabolic diseases.²²

According to the results of the current study, the highest mortality frequency was recorded in people with ischemic stroke (83%). In this regard, Feigin et al found that almost 51% of deaths from stroke were due to ischemic stroke worldwide.²³ In a study by de Santana et al, ischemic stroke was the most common type, accounting for 61.8% (95% CI: 61.5-62.1%) of deaths due to stroke,¹⁶ which is consistent with our findings. Considering that underlying diseases (e.g., hypertension, dyslipidemia, diabetes, and atrial fibrillation) are risk factors for ischemic stroke,²⁴ and the majority of the studied population had underlying diseases, the mortality of ischemic stroke was higher in this statistical community.

The results of the study further showed that 78.6% of deceased people had no history of a stroke while 21.4% of patients had a history of stroke in the past. In the study conducted by Adoukonou et al in Parakou on patients with stroke, 16.9% of dead people had a history of stroke.²⁵ Moreover, Mihejeva et al found that 13% of dead cases due to stroke had recurrent stroke,²⁰ which is in conformity with the findings of the present study.

Based on the results of this study, 99.4% of deceased people did not have a family history of stroke. In addition, the findings of Shamshirgaran et al indicated that 13.2% of deceased people due to stroke had a positive family history of stroke.²⁶ Additionally, in a 5-year research study of stroke mortality, Lambert et al concluded that 11.1% of deceased people had a family history of stroke,²⁷ which contradicts the results of the present study. The reason for this conflict in findings may be the illiteracy of the majority of the examined patients and their lack of awareness of having a family history of stroke.

Our results further revealed that 90.6% of deceased patients afflicted with stroke had no history of smoking, which is contradictory with the findings of Alhazzani et al, implying that smoking status was a significant risk factor for in-hospital mortality.²⁸ Mihejeva et al also demonstrated that 28% of deceased people due to stroke had a smoking history.²⁰ This difference may be due to the more prominent role of other risk factors in our study community and the lack of honesty in answering questions. Moreover, racial and lifestyle differences and different statistical communities can cause varying results.

It should be noted that in this study, 73.6% of deceased patients due to a stroke suffered from underlying

diseases, which is consistent with the findings of Tirschwell et al, representing that hypertension (96.1%), hypercholesterolemia (36.0%), diabetes mellitus (31.0%) were associated with 28-day mortality.²⁹ This is also in line with the results of Lambert et al, indicating that the population, who died due to stroke, had hypertension (76.4%), diabetes mellitus (36.4%), dyslipidemia (58.7%), and chronic kidney diseases (28.5%).²⁷ The presence of underlying diseases can be a risk factor for cerebrovascular diseases with changes in the body, especially cerebral arteries, and the results of this study can probably be a strong reason for this issue.

The findings also revealed that the highest number of deaths due to stroke belonged to people who lived in urban areas (69.2%) and 30.8% of deceased people lived in rural areas, which is consistent with the findings of Borhani-Haghighi et al in southern Iran, demonstrating that 86.6% and 13.4% of dead people due to stroke lived in urban and rural areas, respectively.³⁰ In their study, Fleet et al found that rural hospitals in Canada had higher 30-day in-hospital mortality rates following stroke compared to urban academic hospitals,³¹ which contradicts the findings of our study. Geographical differences and different statistical communities in terms of culture and lifestyle could be the possible explanation for this discrepancy. Those living in urban areas have more access to the hospital and are more likely to go to the hospital, and this might be the reason for the higher mortality in the urban population compared to the rural one in our study. Differences in the ratio of the urban and rural population in the study area could be another explanation for this result.

On the other hand, the findings of the present study showed that the highest death toll was related to illiterate people (77.4%) and those with primary education (18.4%), respectively. Generally, the findings of the study indicated that the deaths caused by stroke were higher in people with lower levels of education. Based on the findings of Ahacic et al, persons with low education and low income had a higher risk for stroke-specific mortality. The risk of dying was lower in persons with university education compared to those with elementary education,³² which is in line with the results of this study. Che et al also found that deaths due to stroke were higher among the illiterate (15.3%) and patients with primary education (8%) compared to people with middle (3.8%) and college (3%) education,³³ which is also consistent with the findings of the present study. A larger proportion of the illiterate population in the study area may be the reason for higher mortality. Additionally, lower levels of education are associated with a lack of awareness of the risk factors and symptoms of stroke, which could be a contributing factor to mortality due to stroke.

Based on the results of the current study, the highest rate of mortality was observed in self-employed people (42.8%) and unemployed people (32.7%), respectively. In the study conducted by Puthkhaio et al in Thailand, the highest deaths due to stroke happened among unemployed and

housework people (46.9%) and then people with manual occupation class (27.2%).³⁴ This difference in the results of different studies is probably due to a difference in categorizing occupations which relies on the author's opinion and different statistical communities. Nonetheless, it is understood that unemployment is an important factor in stroke mortality. Similarly, Morovatdar et al found that unemployment prior to stroke was associated with an increased risk of 1- and 5-year post-stroke mortality,³⁵ which is consistent with our result. The pressure of excessive work and stress related to hard work and even unemployment can probably be the causes of stroke.

Limitation

Our study was of descriptive type and included a limited study population.

Conclusion

Overall, the highest mortality was observed in people over 60 years. Therefore, special attention should be paid to elderlies to forestall further deaths. Illiterates, urban residents, and self-employed people, and those with underlying diseases had a high mortality rate due to cerebrovascular accidents. Therefore, paying enough attention to these groups in health planning could reduce mortality caused by stroke. The study also revealed that ischemic stroke caused more mortality compared to hemorrhagic stroke, thus further studies could help in determining the reasons.

Ethical Approval

The research plan was approved by the student research committee (with the plan number 9804182864) and the ethics code was obtained from the Ethics Committee of Hamadan University of Medical Sciences (number IR.UMSHA.REC.1397.732). The required data were collected after presenting a letter of introduction from the Research Deputy to the hospital management, obtaining necessary licenses from the Security Unit and the Nursing Office of Sina Hospital in Hamadan, and considering the use of the information in the archived files in the medical record unit.

Conflict of Interest Disclosures

The authors declared no conflict of interests.

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