

# Assessment of Stroke Patients Admitted to a Tertiary Emergency County Hospital of Mehedinți - Romania

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**ABSTRACT:** Cerebrovascular accidents (CVA)-strokes represent a major public health problem worldwide, due to the large number of people affected. Also, there is a large number of people who die from stroke, especially in developing countries. Our study included a group of 119 patients, diagnosed with stroke and admitted to the Emergency Hospital of Drobeta Turnul-Severin, Mehedinți county, between 2016-2020. The analysis of risk factors and associated comorbidities showed that stroke can affect both the elderly and young people, under 20 years old. However, approximately 4/5 of CVA patients (79.83%) were aged over 50 years old. If non-ischemic strokes predominated in patients under the age of 50, after this age there is a tendency to balance the incidence between the eight main forms of stroke. No significant differences were observed regarding the social environment of the patients, which shows that the risk factors are almost identical in both social environments. Among the modifiable risk factors, we highlighted: high blood pressure in 55.46% of cases, obesity in 19.33% of cases, atherosclerosis in 10.92% of cases, diabetes mellitus in 10.92%, kidney failure in 6.72% of cases. The data we obtained show that there are possibilities to reduce the incidence of stroke by controlling and reducing the modifiable risk factors.

**KEYWORDS:** Cerebrovascular accidents (strokes), cerebral ischemia, meningeal hemorrhage, risk factors.

## Introduction

Cerebral vascular accidents (CVA)-strokes are currently a major public health problem worldwide, as the number of people affected by and dying from CVA increased dramatically in recent decades [1,2].

It is also possible that their incidence will increase in the future, due to the aging of the population, demographic changes, changes in health systems in developing countries, etc. [2,3].

The incidence of stroke increases rapidly with age, doubling with every decade after the age of 55 years old [4].

Data from the 2013 Global Burden of Disease (GBD) study showed that while mortality from stroke decreased worldwide over the past two decades, there was a significant increase in the absolute number of people affected by stroke worldwide between 1990 and 2013.

Currently, there is almost no country in the world where the absolute number of incident and fatal strokes decreased [3].

The increasing burden of stroke in the world suggests that their primary prevention strategies are not effective enough and therefore new and more effective primary prevention strategies are required.

Most of the stroke burden continued to occur in developing countries, accounting for approximately 75.2% of global stroke deaths and 81.0% of global stroke-related disability-adjusted life years (DALYs) [1].

Some studies showed that approximately 3 to 4% of total health care expenditures in Western countries are spent on stroke patients [5].

In the US, the average lifetime cost of ischemic stroke per person, which includes inpatient care, rehabilitation, and aftercare, is estimated to be approximately \$140,048 [6].

Hospitalization costs for acute stroke represent, in the first year, about 70% of total costs for stroke [7].

A worrying phenomenon is the increasing incidence of stroke among adults aged 20 to 64 years old, especially in countries with low and medium incomes [8,9].

## Aim

Starting from data published in the last 10-15 years, in the present study we proposed an analysis of stroke cases admitted to the Emergency Hospital of Drobeta Turnul-Severin, Mehedinți county, between 2016-2020, in order

to highlight the particularities of these patients, compared to other studies.

### Patients, Material and Methods

The performed study is a retrospective descriptive one, in which we highlighted the main characteristics of stroke in patients admitted to the Emergency Hospital of Drobeta Turnul-Severin, Mehedinți county, between 2016-2020.

The study included a group of 119 patients, mainly from Mehedinți county, but also from neighbouring counties (Gorj, Caras-Severin, etc.).

All clinical and paraclinical data were extracted from the patient clinical observation sheets and patient records.

The collected data were systematized and introduced in the "Excel" program in order to be processed electronically and displayed in the form of charts or diagrams, for a more accurate and efficient interpretation of the data.

For the extraction of data from medical documents and their processing, the consent of the manager of the Drobeta Turnul-Severin Emergency Hospital and the Ethics Committee of the same hospital were obtained in advance.

### Results

The analysis of the group of patients with moderate and severe forms of stroke, who required admission to the Neurology Department of the Emergency Hospital of Drobeta Turnul-Severin, showed that the disease can affect both the elderly and young people aged under 20 years old (Figure 1).

As expected in our group as well, most of the patients (95 people, i.e. 79.83%) with stroke were over 50 years old.

In our study, the incidence of stroke increased with age. Most people with stroke were registered in the age decade of 70-80 years old (32 people, i.e. 26.89%).

The decrease in the incidence of stroke after the age of 80 is caused by the decrease of the population group due to death from other conditions.

Of the two forms of stroke, ischemic ones represented about 1/3, i.e. 32.77% (39 cases), while non-ischemic strokes represented 2/3, i.e. 67.23% (80 cases).

Another peculiarity of our group consists in the fact that of the 50 strokes registered under the age of 60, only 8 cases were ischemic strokes (16%) and 42 non-ischemic strokes (84%) (Figure 2).

Also, our data showed that non-ischemic strokes were recorded under the age of 20, while ischemic strokes were only recorded after the age of 30.

After the age of 60, ischemic strokes had an incidence close to non-ischemic ones.

Thus, after the age of 60, of the 69 strokes, 31 were ischemic (44.93%) and 38 non-ischemic (55.07%).

Regarding the sex of people affected by stroke, our study showed that the disease affects both sexes in close proportions.

Thus, of the 119 hospitalized patients, 63 (52.94%) were men and 56 (47.06%) were women (Figure 3).

Regarding the social environment of stroke patients, it was found that the disease affects both urban and rural people in an approximately equal proportion.

In our study, 61 cases of stroke (51.26%) came from rural areas and 58 cases (48.74%) from urban areas (Figure 4).

The data we obtained show that risk factors for stroke are found to be equally distributed in both social environments.

The analysis of the risk factors involved in the etiopathogenesis of stroke allowed us to find that cardiovascular diseases and especially high blood pressure (HBP) are on the 1st place.

Of the 119 patients included in the studied group, 66 (55.46%) presented high BP values (Figure 5).

The data we obtained confirm the very close relationship between stroke and cardiovascular diseases, HBP being the most important modifiable risk factor for all types of stroke.

Obesity represents another major risk factor for stroke, as it is associated with dyslipidaemia, hypercholesterolemia, coagulation disorders, etc.

In our study, only 23 patients (19.33%) with stroke were also diagnosed with obesity (Figure 6).

Atherosclerosis, through the remodelling of the cerebral vessel walls is, along with HBP, a major factor in the occurrence of stroke.

In our study, 13 patients (10.92%) with stroke were also diagnosed with atherosclerosis (Figure 7).

Diabetes mellitus is a well-known risk factor for neurovascular disease.

In our study, only 13 patients (10.92%) had diabetes (Figure 8).

Kidney failure was another comorbidity monitored in our study.

The data analysed from the medical documents showed that only 8 patients with stroke (6.72%) also had kidney failure (Figure 9).

Regarding the deaths that occurred in the hospital, out of a total of 119 patients, only 11 died (9.24%) (Figure 10).

The percentage of those who died could be higher because some stroke patients were discharged at the request of the family, before complete remission of symptoms.

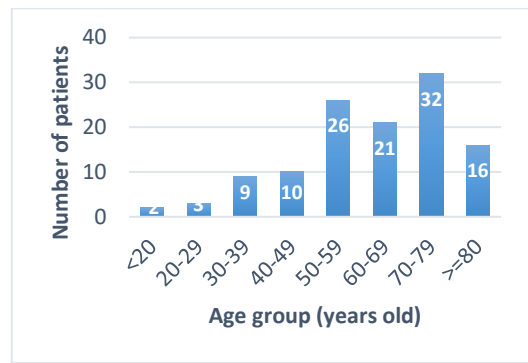


Figure 1. Distribution of stroke patients by age group.

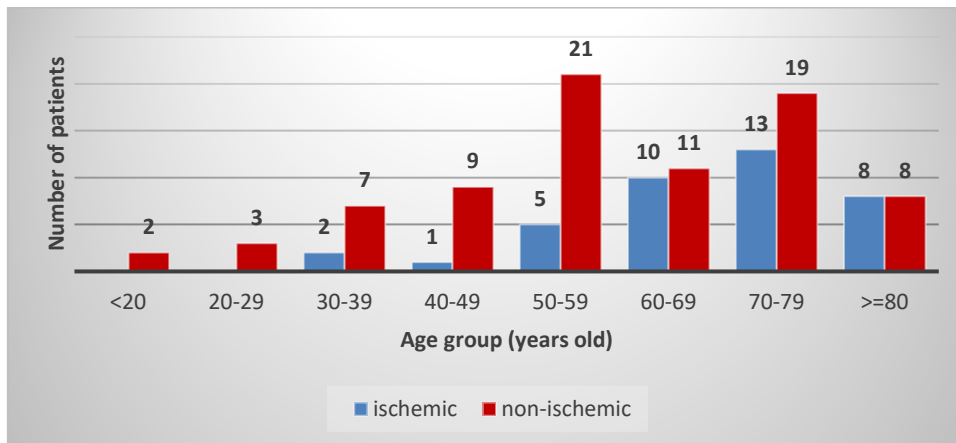


Figure 2. Distribution of stroke types by age.

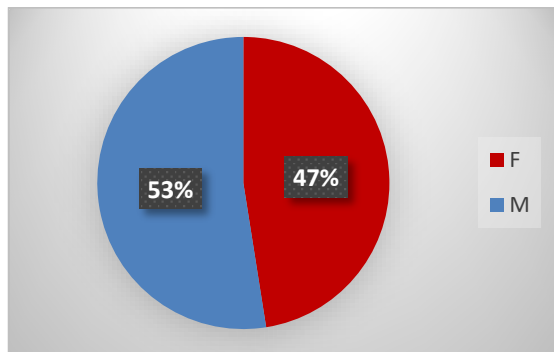


Figure 3. Distribution of stroke patients depending on sex (F=females; M=males).

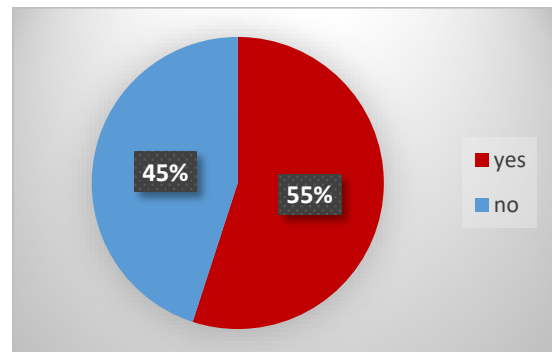


Figure 5. Association between CVA-stroke and HBP.

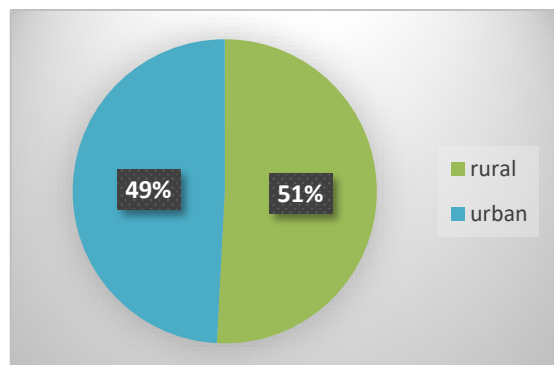


Figure 4. Distribution of stroke patients depending on the social environment.

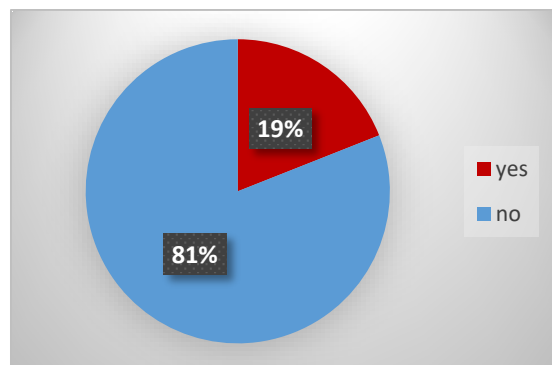
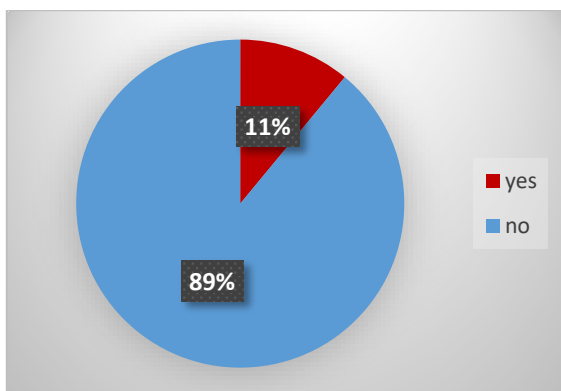
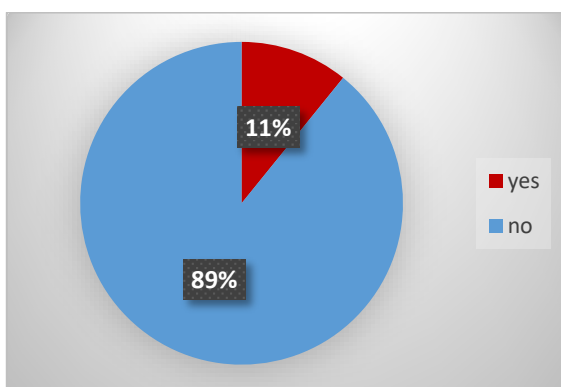


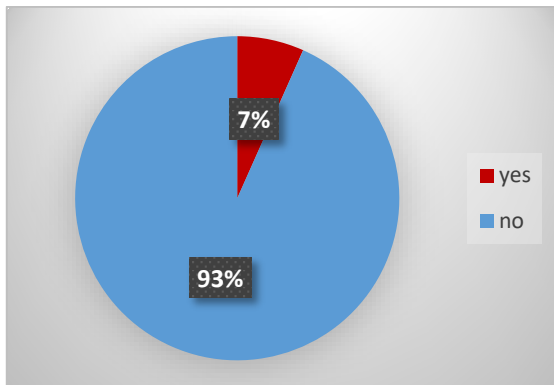
Figure 6. Association between CVA-stroke and obesity.



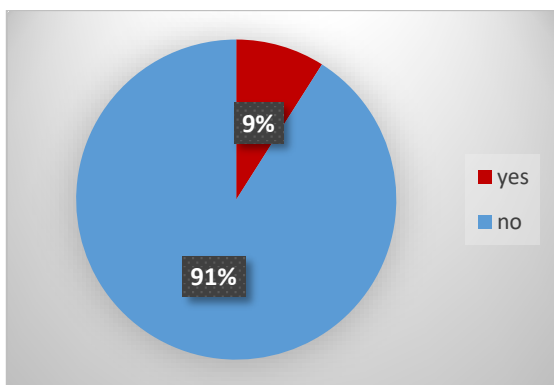
**Figure 7. Association between CVA-stroke and atherosclerosis.**



**Figure 8. Association between CVA-stroke and diabetes mellitus.**



**Figure 9. Association between CVA-stroke and kidney failure.**



**Figure 10. Deaths in hospital.**

## Discussion

Stroke became a major public health problem, currently being the second leading cause of death and the third leading cause of disability worldwide.

In the last two decades, the annual prevalence of stroke and deaths associated with this disease increased substantially [10,11].

The large increase in the global burden of stroke was partly attributed to the aging of the population.

The data we obtained confirmed that advanced age is a risk factor, the majority of stroke patients (79.83%) being over 50 years old.

Most stroke patients (26.89%) were registered in the age group of 70-80 years old.

A stroke represents a drama for the individual, family and society.

In addition to the high costs, necessary for each hospitalized patient with an acute stroke, it must be mentioned that most often the stroke leaves various sequelae and disabilities that require special material funds and human resources for the recovery of this category of patients.

According to some studies, 26% of stroke patients remain with disabilities that make basic activities of daily living difficult, and 50% have reduced mobility due to hemiparesis [12].

Incidence and mortality from stroke differ from one country to another, from one geographic area to another, and from one ethnic group to another [2].

In Europe, stroke causes more than 1 million deaths, and worldwide, about 6.5 million deaths every year [14].

Reducing the incidence and mortality of stroke can be achieved by controlling modifiable risk factors.

Thus, preventing and treating high blood pressure, diabetes, atrial fibrillation, dyslipidaemia, controlling smoking and excessive alcohol consumption, controlling obesity, encouraging physical activity, changing eating habits, etc., could contribute to reducing the incidence of stroke [15,16].

Of particular concern is the significant increase in the number of strokes in younger adults.

In our study, a number of 50 cases of stroke in patients under 60 years old were registered.

It seems that this phenomenon is happening all over the world [17,18].

In our study, the most common stroke-related comorbidity was high blood pressure.

Thus, 55.46% of stroke patients had elevated blood pressure values. Some authors showed that

HBP is present in 70% of patients with intracerebral haemorrhage [19].

Numerous studies highlighted that high blood pressure is a major risk factor for stroke, being present in 2/3 of strokes in developing countries and 1/3 in developed countries [20,21].

The reduction in the incidence of stroke in developed countries could be related to improved disease prevention measures, combating or reducing risk factors, greater identification of minor stroke cases through the wider use of advanced neuroimaging methods, and quick access to primary care methods [22-25].

Patients with pre-existing high blood pressure usually develop a more intense stroke with more severe heart failure compared to normotensive patients, with a more extended area of ischemic penumbra [26-28].

High blood pressure affects the structure of all brain vessels, including small vessels leading to lacunar strokes and cognitive decline.

The wall of the large and small arteries is remodelled towards their interior, which leads to a decrease in lumen diameters and a reduction in the vasodilator reserve, which can cause brain hypoperfusion and hemodynamically compromise brain circulation.

Repeated mechanical stress during high blood pressure leads to the damage of elastic fibers in the structure of the vascular wall and their replacement by collagen fibers, which strengthens the large arteries and transmits the pulsatile load to the brain parenchyma [29,30].

Moreover, high blood pressure increases shear stress on the vascular endothelium.

Under normal conditions, increased shear stress causes an adaptive vasodilator response through increased production of nitric oxide NO, which serves to normalize shear stress.

In HBP, a reduction in NO production affects the adaptive response to shear stress, which causes damage to the vascular endothelium, with the presence of atherogenic plaques, atherosclerosis and even occlusion of small vessels [31-33].

The second risk factor we identified in stroke patients was obesity.

As such, a number of 23 patients were identified, which represents 19.33% of the total group of patients with stroke.

Obesity is a chronic disease that currently manifests itself as a global epidemic threatening public health.

It is associated with an increased risk of cardiovascular diseases and a reduced life expectancy.

Obesity and overweight are associated with an increased risk of cardiovascular disease, ischemic stroke or myocardial infarction (MI) [34,35].

Most strokes are related to modifiable metabolic or behavioural risk factors and associated physiological changes, such as high systolic blood pressure, obesity, diabetes, dyslipidaemias, etc. [36,37].

Another risk factor highlighted in our study was diabetes.

Diabetes is a metabolic disease that is rapidly increasing in incidence and prevalence worldwide, especially in low-and middle-income countries.

Studies showed that hyperglycaemia is one of the most critical risk factors for stroke and also has a major impact on its long-term prognosis [38-40].

Strokes are frequently accompanied by abnormal glucose and lipid metabolism, especially in people with high blood pressure, and insulin resistance plays a vital role in this biological process.

Several studies showed that insulin resistance is mainly responsible for endothelial dysfunction and is therefore considered a key risk factor for the onset and development of stroke [41-43].

As we highlighted, many risk factors are involved in the etiopathogenesis of stroke. Knowing them, controlling them, treating comorbidities, improves stroke prognosis.

## Conclusion

Stroke mainly affects the elderly, over 60 years old, with the highest incidence being recorded in age decade 70-79 years old.

However, strokes were also recorded in young adults and even teenagers.

If hemorrhagic strokes were mainly recorded in young people, in elderly people the two main types of stroke were found in approximately equal proportions.

No significant differences were found between sexes or between social environments, which shows the presence of the same risk factors in both urban and rural environments, both in women and men.

Among the important risk factors, the most highlighted were: high blood pressure, obesity, atherosclerosis, diabetes, kidney failure.

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## Conflict of interests

None to declare

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