

Clinical, Epidemiological and Etiopathogenic Study of Ischemic Stroke

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ABSTRACT: Introduction: We conducted a retrospective study on patients who were diagnosed with ischemic stroke and hospitalized in Neurology I Neuropsychiatric Hospital of Craiova, Romania, between 2010-2014. We based our study on 6391 patients admitted with ischemic stroke. Material and Methods: We evaluated patients based on demographic data (age, sex, environment); neurological and cardiological examination; risk factors and comorbidities. Results: After analyzing the results the most of the patients included in our study by origin of country, most of them were from rural areas (61%-4201 cases), and the rest were from urban areas (39%-2730 cases). From the risk factors the most common was high blood pressure present in about 70% of all patients. The most common etiopathogenic mechanism was due to cerebral artery thrombosis 86% followed by cerebral artery embolism 11%. Conclusions: The high blood pressure was found to be significantly associated with risk of ischemic stroke. Regarding etiopathogenicity in our study cerebral artery thrombosis was present in most cases.

KEYWORDS: ischemic stroke, high blood pressure, artery thrombosis

Introduction

Stroke is one of the most important public health problems, and a major cause of disability in highly developed countries. Worldwide strokes annually kill five million lives and cause severe disabilities to five million people [1].

Several prospective studies have shown that both incidence and prevalence, this clinical syndrome is on the rise, partly because of the high frequency of atherosclerosis and high blood pressure (the main causes of cerebral vascular disease).

In Europe, the incidence of brain injuries varies from one country to another, with an estimated 100 to 200 new strokes per 100,000 inhabitants a year, representing a huge burden for the economy. Currently, there are approximately 800,000 stroke patients.

Romania is among the top ten in the world in the incidence of stroke. Stroke mortality is three to four times higher in our country than in EU countries and six to seven times higher than the United States. These negative statistics do not necessarily depend on the economic level of our country, but on the Romanian health system, where the secondary prevention is missing.

Recent data on the prevalence of stroke in Romania appear in a study by a colleague of authors in Bucharest [2], they show that the prevalence of stroke is 0.1% for the age group under 40, 1.8% For the 40-55 age group, 4.3% for the age group 55-70 years and 13.9% for the over-70s.

Statistics show that the maximum incidence of stroke occurs in 75% of cases after age 65 [3,4], age associated, with a much more difficult recovery after vascular accident [5,6,7].

The most common causes of ischemia and cerebral infarction are atherosclerosis with thromboembolism and cardiogenic embolism. Atherosclerosis usually affects the origin of the internal carotid artery and the origin of the major arterial branches of the brain.

Embolisms occur when the ulcerous atherosclerotic plaque breaks and the necrotic material (cholesterol crystals, connective tissue remains, etc.) is dislocated and released into circulation, thus obstructing the blood vessels.

Atherosclerotic plaque rupture causes arterial stenosis, resulting a hemodynamic obstruction of blood flow.

The effects of hypoxia on neurons depend on how it is installed at the brain level, the duration and intensity of reducing oxygen.

The time interval during which behavioral or cognitive disturbances can be noted is usually much shorter (in the order of seconds) than is necessary for histopathological changes that usually require a few minutes [8].

Materials and Methods

Our clinical-statistical study was an epidemiological retrospective study conducted over a 5-year period, respectively, between 2010-2014.

We have investigated all cases of ischemic stroke admitted to the Clinical Neuropsychiatry Hospital in Craiova.

The main elements that were used in the study and which are found in the observation sheet are represented by:

Demographic and historical data: age, environmental origin, history of known cardiac disease, history of cerebrovascular events (defined or very probable), disability pre-stroke, living and working conditions (smoking, alcohol consumption);

Clinical neurological examination data: on admission and in the follow-up period (acute): presence and location of motor disorders, speech and speech disorders, sensory disturbances, visual field disturbances, new neurological signs or worsening of pre-existing, involuntary movements, trophic and vegetative disorders, state of consciousness, etc.;

Identifying risk factors for stroke and comorbidities: HTA (known or recently diagnosed), FA (persistent or history of paroxysmal), history of myocardial infarction or angina, history or clinical evidence of impairment cardiac history, history of diabetes or in recent exploration, obesity, a history of systemic embolic events (stroke, AIT or peripheral embolism), old valvulopathy or valvular prosthesis;

Common clinical cardiology evaluation;

Paraclinical assessment with current methods for stroke diagnosis: CT (on admission and in progress) and / or MRI, electrocardiogram, transthoracic or transesophageal echocardiography;

Common laboratory investigations: complete blood count, blood glucose, urea, creatinine, cholesterol and its fractions, triglycerides, total lipids, transaminases, ionogram;

Data on the progression of neurological status and other apparatus and systems for the period of hospitalization: regression or progression of neurological features, major neurological complications-imaging verified, general medical complications, number of days for hospitalization to assess social efforts to treat such a condition, Evolution towards exitus and causes of mortality.

The paraclinical neurological and cardiological assessment of patients in the study was made mandatory with CT (at least one exploration), at least one route electrocardiogram; And the cerebral MRI was limited in number and will not be analyzed in the study.

Results

Between 2010-2014, at the Clinical Neuropsychiatry Hospital from Craiova there were hospitalized 6931 patients diagnosed with ischemic stroke.

In terms of the home environment, most of the patients included in our study were rural areas (61%-4201 cases), and the rest were from urban areas (39%-2730 cases) (Fig. 1). The incidence of stroke increases exponentially with age, but our study revealed that the distribution of 6931 cases of cerebral ischemia occurred in people aged between 25 to over 85 years old registering the following situation: in the age between 35-44 years old was 90 cases (0.1%), the percent start to grow and between 45-54 years old we have 553 cases (1%). An important number of cases were registered between 55-64 years old (1867 cases-7%), 65-74 years old (2457 cases-33%) and 75-84 years old (2270 cases-30%). Significantly low is the incidence over 85 years old (326 cases representing approximately 3.9%) compared to other age groups, probably also due to the average life span under this age (Fig. 2).



Fig.1 Distribution of patients with stroke by the place of origin

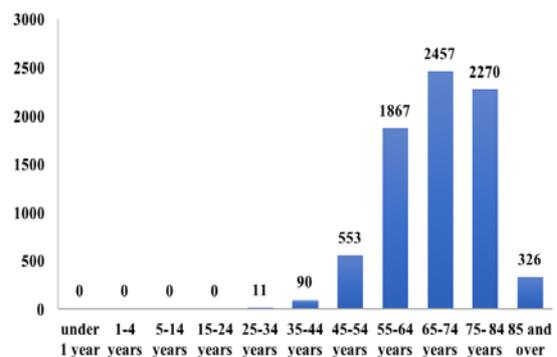


Fig. 2. Distribution of stroke patients by age group

Analyzing the risk factors we concluded that the highest number of cases (5056 cases-73%) had high blood pressure (Fig. 3). The other risk factors that were present at a fairly high number of cases were ischemic infarction (4298 cases-62%), rhythm disturbances most often found was atrial fibrillation in a number of 1891 cases-27.2%. Diabetes mellitus was also a risk factor associated with ischemic stroke and was found in 1167 cases-16.8%. Dyslipidemia is closely associated with atherosclerosis, being the main cause in the development of ischemic diseases, in our study 2434 cases-35% had dyslipidemia, from which 169 cases-6,9% had hypercholesterolemia, 132 cases-5,4% had hypertriglyceridemia and 2133 cases-87,63% had mixed dyslipidemia (Fig. 4).

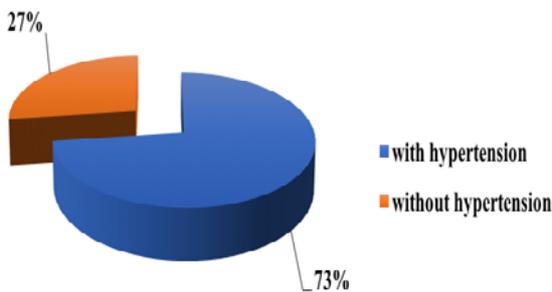


Fig. 3 Percentage distribution of patients with hypertension between 2010-2014

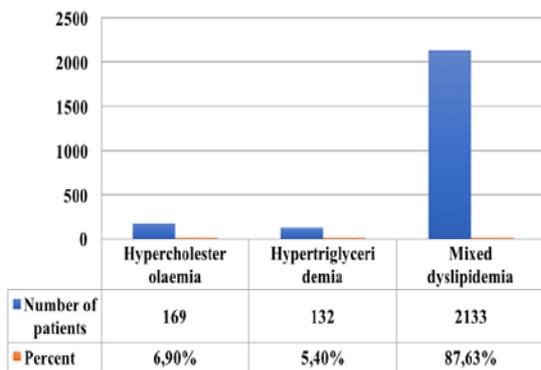


Fig. 4. Distribution of stroke according to the fractures of dyslipidemia

In terms of the ischemic stroke modifiable risk factors for both women and men, 2645 cases-38% of those investigated were smokers, 820 cases-11.8% were former smokers and 3465-50.2% they had never smoked. In the studied group, excess alcohol consumption was determined in 1864 cases- 26.8%, occasionally in 2807 cases-40.4%, and 2260 cases-32.6% claimed that not consumed at all.

The presence of transient ischemic accidents in the history of ischemic stroke patients was in only 797 cases-11.4% had signs or symptoms suggestive of such an event, while 1495 cases-21.5% of the patients under study had one or more past history of stroke (Fig. 5).

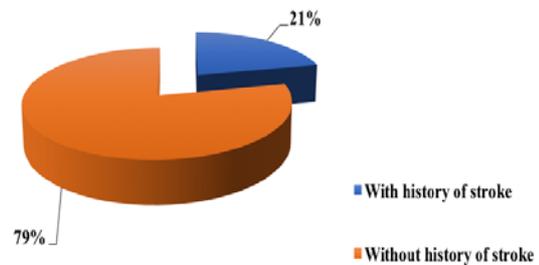


Fig. 5. Patients with a history of stroke

Another parameter that we investigated was distribution of patients with stroke according to the etiopathogenic classification 5995 cases-86.49% of patients in the study showed stroke by cerebral artery thrombosis, 827 cases-11.9% cerebral artery embolism and only 30 cases (0.4%) cerebral infarction by occlusion or stenosis of cerebral artery. A total of 64 cases (0.9%) were cerebral infarctions whose etiology could not be specified (Table 1).

Table 1. Etiopathogenic distribution of stroke patients

	Number of patients	Frequency
Cerebral atherosclerosis	108	1,5%
Occlusion or stenosis of the cerebral arteries	30	0,4%
Cerebral artery embolism	827	11,9%
Cerebral artery thrombosis	5995	86,49%
Etiology undefined	64	0,9%

Analyzing the main clinical manifestations of ischemic stroke, the most common clinical manifestations in the study group were: motor deficits-52.5% (3641 cases); language and speech disorders-31.1% (2159 cases); sensory disorders-4.8% (334 cases); disturbances suggesting the posterior territory-6.5% (452 cases); visual field disorders-2.2% (153 cases); altered state of consciousness-2.3% (162 cases); other disorders-1% (70 cases) (Fig. 6).

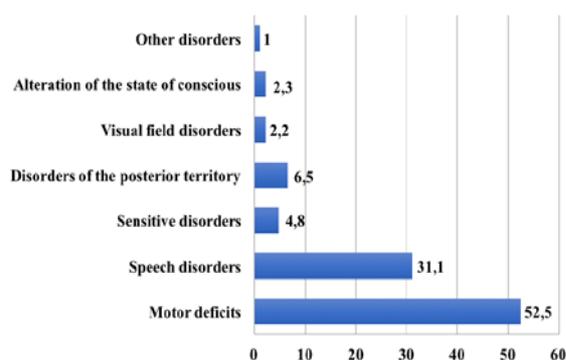


Fig. 6. The main clinical manifestations in stroke

Most of the CT experiments were performed at the hospitalization, (5436 cases explored). In patients included in the study, lesions were absent for more than half of the individuals (3034 cases-56%). Brain sequelae images were found in 1495 cases-21.5%. The most frequent CT changes were found in the territory of the middle cerebral artery (6134 cases-88.5% of the total cerebral infarction). Cerebral infarctions of the posterior territory were found in 605 cases-8.7% of total cerebral infarctions (Table 2).

Table 2. Tomographic Aspects

	Total number	Percent %
No injuries at hospitalization	3034	56%
Sequelae at admission	1495	21,5%
Location		
The internal carotid artery	109	1,57%
Anterior cerebral artery + middle cerebral artery	6134	88,5%
The posterior cerebral artery	605	8,7%
Hemorrhagic transformation	30	0,4%
Lacunar stroke	291	4,19%
Leukoaraiosis	1450	20,9%

Discussion

We conducted a 5 year retrospective study on patients who were diagnosed with ischemic stroke and hospitalized in Neurology I Neuropsychiatric Hospital of Craiova.

As far as the home environment is concerned, most of the patients included in our study were from rural areas. The explanation of this situation, where the rural environment is more affected by cerebral ischemia, may come from the fact that there is a poor prophylaxis, an unhealthy lifestyle, but also because people are very little informed and many diseases that favor stroke remain years undiscovered and untreated.

As we have seen in our study, the incidence of ischemic stroke is indeed quite rare until the age of 35 but steadily increasing, especially in recent years, among the factors that could contribute to an increase of stroke at young people are unbalanced lifestyle and drug use. Significantly low is the incidence of stroke in patients over 85 years of age compared to other age groups, probably due to the average life span of this age. Our statistical data highlights the fact that cerebral ischemia correlates with age, most of which are found in people aged 65-74 years.

High blood pressure is the most important risk factor for stroke. Epidemiological studies show that the risk of stroke changes continuously and progressively with increasing systolic / diastolic pressure values. Both systolic and diastolic hypertension are correlated with the incidence of stroke, and long-term hypertension control reduces the risk of atherothrombotic infarction.

Among the arrhythmias, atrial fibrillation is the most common cause of cerebral embolism, being a more important risk factor for vascular accidents in carotid territory, where reach about 80% of the embolisms that go from the cord. Atrial fibrillation may increase about 5 times the risk of stroke.

Diabetes mellitus accelerates the process of atherosclerosis in both large and small arteries, diabetic angiopathy, a major factor in vascular disease determinism, is interested in all arteries but with high affinity for small vessels. In diabetic patients, cerebral infarction may occur at younger age and the number of deaths in these cases is higher.

Our study showed that dyslipidemia was present in 35% of our patients, is a metabolic disorder that along with other pathologies increases ischemic stroke determinism.

Smoking is a modifiable risk factor for ischemic stroke, both for women and men. The risk of stroke is 2 times higher in smokers than non-smokers, increasing with the number of cigarettes smoked daily, our study reported that 2645 (38%) of the investigated patients were smokers. Alcohol is another modifiable stroke risk factor, and consumed in the long term and in large quantities, can multiply by 3 the risk of cerebral infarction by increasing blood pressure.

Transient ischemic stroke is a reversible neurological disorder resulting from a cerebral ischemic episode, usually lasting less than 24 hours (several minutes-tens of minutes, up to 1 hour). The risk of stroke increases over time (3% over the next two days, 5% over the next

seven days, 8% over the next 30 days, and 10% after three months), but most occur within the first 72 hours.

It is noted that 1495 (21.5%) of the patients undergoing the study also experienced one or more past history of stroke, which is also a risk factor for a new stroke. Patients with a history of stroke have a 8-10 times higher than the general population to have a new ischemic episode in the future.

As we have already mentioned, in the vast majority of cases the origin of ischemic necrosis is an arterial lesion. Generally, the arterial lesion that causes a decrease in cerebral blood flow is occlusive lesion. Thrombotic or embolic arterial occlusion coexists with a series of systemic and cardiac arterial lesions.

The most frequent clinical manifestations in patients in the study group were: motor deficits were the most common neurological manifestations in stroke patients in the study group (52.5%); language and speech disorders were sensory aphasia, motor aphasia, mixed aphasia, and dysarthria; sensory disturbances (paresthesia, hypoaesthesia, astereognosis) most often unilateral were commonly associated with motor deficits and dysarthria, with 4.8% of the cases studied; altered consciousness (somnolence, obnubilation, coma) is a neurological disorder with a major impact and an unfavorable prognosis and was revealed in 2.3% of the patients studied.

Native cerebral examination by CT scan is the most common brain imaging in our clinic, this was performed at least once, in the patients under study and was the standard diagnosis. On admission, the majority of CT explorations were performed (5436 patients surveyed), the results obtained show mainly the early 24 hour changes. In the case of patients undergoing study, the lesions were absent in over half of those surveyed (3,034 patients-56%). These data underline the limits of CT diagnosis in early investigation in a cohort of patients with very varied neurological manifestations at the first clinical examination.

Conclusions

Ischemic stroke in our study represent a real health problem with a strong socio-economic impact worldwide, it is also a major cause of disability in highly developed countries. The age mostly affected was between 65-74 years old (2457 cases-33%). Of all the risk factors involved in the studied group, high blood pressure was the most important one; almost 73% of the people were found with high blood pressure. Etiopathogenic classification of patients in the study showed stroke by cerebral artery thrombosis in 86.49% of patients. Analyzing the main clinical manifestations of ischemic stroke, the most common clinical manifestations in the study group were: motor deficits-52.5%. The most frequent CT changes were found in the territory of the middle cerebral artery 88.5% of the total cerebral infarction.

Conflict of interests

The authors declare that they have no conflict of interests.

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