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The morbidity rate of acute stroke among adult population in both Moldova and India

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Abstract

Background: According to the WHO, over 15 million people worldwide suffer from stroke annually, 5.5 million die and 5 million become permanently disabled. According to the latest WHO data published in 2017, Stroke Deaths in the Republic of Moldova made up 15.87% of total deaths.
Material and methods: A retrospective hospital-based study was conducted at the clinics of the Department of Emergency Medicine of *Nicolae Testemitanu* SUMPh and at the tertiary Care Hospital of Assam Medical College, the Republic of India, during January 01, 2019 – December 31, 2019. Two groups of patients were enrolled in the research, viz. lot 1 (80 patients) treated in the Institute of Emergency Medicine of the Republic of Moldova and lot 2 (80 patients) treated at the tertiary Hospital of Assam Medical College, India. The purpose of the study was to assess the major risk factors for developing ischemic stroke, as well as to evaluate the impediments in providing patients with modern treatment strategies among adult population.
Results: The study group included 44 (55.0%) males and 36 (45.0%) females. 66 patients (83.0%) suffered an ischemic stroke and 14 patients (17.0%) had hemorrhagic stroke. The risk factor providing access to modern treatment strategies in acute stroke cases is taken in consideration.
Conclusions: The high incidence of stroke suggests that primary prevention strategies used in the Republic of Moldova and the Republic of India are either not widely implemented or not sufficiently effective.
Key words: ischemic stroke, thrombolysis, incidence, risk factors.

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Introduction

According to the WHO, over 15 million people worldwide suffer from stroke annually, 5.5 million die and 5 million become disabled. The ischemic strokes commonly account for about 80% of stroke cases while hemorrhagic strokes make up 20% but the actual occurrence of stroke types depend on the population [1]. Approximately 1.1 million inhabitants of Europe suffer a stroke each year due to the aging population, the absolute number of stroke is expected to increase by 2025 to 1.5 million people [2]. According to the latest WHO data published in 2017, Stroke Deaths in the Republic of Moldova (RM) reached 6638 cases or 15.87% of total number of deaths. The age-adjusted Death Rate is 121.53 per 100 000 of Moldovan population and ranks 39 in the world. 33% of strokes occur in working age population. Stroke mortality is three to four times higher in RM than in the EU [3-6].

The Republic of India has been experiencing significant demographic and epidemiological transition during the past two decades. These have resulted in an increase in life expectancy and consequently led to an increase in aging population. Reliable stroke-related morbidity and morta-lity rate assessment in India is very limited. The cumulative incidence of stroke ranged from 105 to 152/100 000 persons per year, whereas the estimated prevalence of stroke ranged from 44.29 to 559/100 000 persons within different parts of the country during the past decade [7, 8]. In India, 1.5 million people suffer from acute stroke every year and 1880 people die every day. The cerebrovascular diseases prevalence accounts for 400-625 per 100 000 persons, an incidence of 145 per 100 000 and a 1-month case-fatality of 41% [8].

Almost half of stroke-related mortality may be attributed to variable risk factors (i.e. hypertension, diabetes, dietary risks, impaired glucose intolerance, obesity, smoking, air pollution, alcohol use, hypercholesterolemia, and physical inactivity), which are mostly due to poor clinical management, limited access to health care, and late detection of underlying risk factors [9, 10]. This requires resource allocation to those variable risk factors that show the highest impact on stroke for each region. Moreover, social and economic policies to reduce inequalities in stroke care should become a health priority, particularly in less developed countries. These policies should focus on the treat-

ment of early predisposing factors and on early educational programs since childhood, which have long-lasting impacts on adulthood health [11]. Likewise, improving worldwide primary healthcare services may have an important impact on post-stroke outcomes. It is essential to improve stroke awareness among socio-economically deprived individuals and societies and provide equitable post-stroke medical care [11].

The high burden of strokes suggests that primary preventive strategies in the Republic of Moldova and the Republic of India are either not widely implemented or not sufficiently effective. Moreover, the behavioral risk factors and an effective screening for conditions that increase stroke risk, such as hypertension, atrial fibrillation, and diabetes mellitus should also be considered[12].

Most guidelines are based on high-income countries data, uncertainty remains regarding best management of stroke of unknown type in low-and middle-income countries. For example, in low-and middle-income countries, 34% of strokes (versus 9% in high-income countries) are of haemorrhagic subtype. Current guidelines for the management of acute stroke recommend a course of treatment based on the diagnosis of ischaemic stroke (versus haemorrhagic stroke) using CT scanners. In low-resource settings, CT scanners are either unavailable or unaffordable, forcing clinicians to make difficult clinical decisions, such as whether to anticoagulate patients or not, and to what level to control their blood pressure without means of distinguishing between ischaemic and haemorrhagic stroke. These patient management challenges, combined with inadequate rehabilitation services, lack of preventive measures, as well as poor understanding of the possible unique risk factors 'ass'ociated with stroke in low-and middle-income countries, may account for the disproportionately large stroke burden borne by these countries [13, 14].

Material and methods

A retrospective hospital-based study was conducted at the clinic of the Department of Emergency Medicine of *Nicolae Testemitanu* State University of Medicine and Pharmacy and a tertiary care Hospital of Assam Medical College, the Republic of India. All the medical records with stroke diagnosis were identified based on the ICD, R- X, from January 01, 2019 to December 31, 2019. Two groups of patients were enrolled in the research, lot 1 (80 patients) treated in Institute of Emergency Medicine (Chisinau, the Republic of Moldova) and lot 2 (80 patients) treated in the tertiary Hospital of Assam Medical College, Dibrugarh, India.

Inclusion Criteria:
1. Subjects aged older than 20 years;
2. The diagnosis of acute stroke (ischemic/hemorrhagic) based on clinical and imaging (computed tomography (CT) – head/cerebral magnetic resonance imaging (MRI)) assessment;
3. Patient's written consent.

Exclusion Criteria:
1. Patients with stroke-like conditions due to systemic diseases, such as infections and trauma;
2. All hemorrhagic stroke patients who have posttraumatic, drug-induced (e.g., anticoagulant-induced), and those with bleeding diathesis-related etiologies;
3. Patients for whom the whole investigation protocol was not possible;
4. Patients with malignant tumors and end-stage organ failure;
5. Pregnant women in II-III trimester.

The purpose of the study was to estimate the clinical and epidemiological profile of acute stroke, prevalence of risk factors and impediments for providing access s to modern treatment strategies among the adult population of the Republic of Moldova and the Republic of India.

Objectives of research
1. To study the clinical-epidemiological trends of strokes in the population and the accessibility to modern treatment strategies in the acute phase;
2. To study the prevalence of risk factors for stroke in the adult population of the Republic of Moldova;
3. To study the major risk factors for developing stroke among the adult population of the Republic of India;
4. To assess the impediments for providing medical access for patients with ischemic stroke to modern treatment strategies. The statistical data processing was performed by using SPSS 22.0 (SPSS inc)programs.
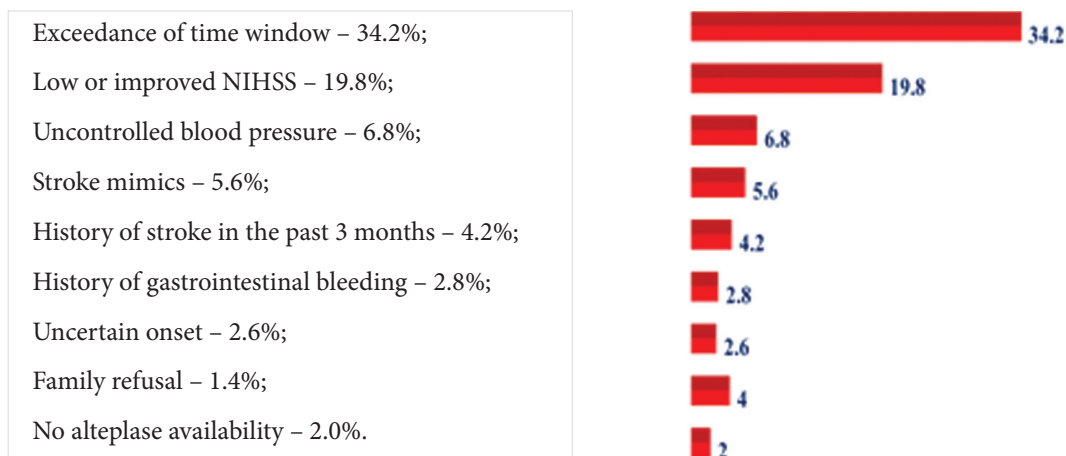
Two study groups were included in the research, lot 1(80 patients) treated at the Institute of Emergency Medicine, RM and Lot 2 (80 patients) treated in the tertiary Hospital of Assam Medical College, India. All the patients were clinically assessed by performing a detailed medical history and clinical examination. Various demographic variables were collected from the history, inclu-ding age, sex, history of transient ischemic attack/stroke, hypertension, diabetes mellitus, coronary artery disease, pre-stroke disability, smoking, and family history of stroke. Routine hematological and biochemical tests including Hb, total leukocyte count, erythrocyte sedimentation rate, blood sugar, and lipid profile were carried out. All patients underwent the electrocardiogram (ECG), echocardiography, CT, cerebral MRI, intracranial MR angiography, transthoracic echocardiography, and carotid Doppler study.

Results and discussion
The morbidity rate of acute stroke among adult population in the Republic of Moldova

Out of 80 patients 44 (54.4%) were males and 36 (45.6%) were females; the patients' mean age was 59.8±17.4 years and the mean age at stroke onset was 58.4 ±15.9 years. The age range of the study group was 20-88 years.

The study group included 44 (55.0%) males and 36 (45.0%) females. 66 patients (83.0%) had ischemic stroke and 14 patients (17.0%) had hemorrhagic stroke. The mean age was 56.4 ± 14.38 years in ischemic stroke group and 53.24 ± 12.45 years in hemorrhagic stroke group.

Exceedance of time window – 34.2%;

Low or improved NIHSS – 19.8%;

Uncontrolled blood pressure – 6.8%;

Stroke mimics – 5.6%;

History of stroke in the past 3 months – 4.2%;

History of gastrointestinal bleeding – 2.8%;

Uncertain onset – 2.6%;

Family refusal – 1.4%;

No alteplase availability – 2.0%.

Fig. 1. Current status of intravenous thrombolysis for acute ischemic stroke patients who did not receive IV thrombolytic therapy in the Republic of Moldova

35 (53.0%) were males and 31 (47.0%) were females in ischemic stroke group, 9 (64.0%) were males and 5 (36.0%) were females in hemorrhagic group.

Stroke is predominantly a problem of aging population, the most affected categories being patients aged 61-70 years (23.0%), 71-80 years (33.0%) and patients over 80 years (17.0%), and patients over 70 years (50.0%). Our study of age distribution showed that 67.0% of stroke patients were in the 61-80-year age group, 17.0% patients were in 20-60-year age group, and 18.0% of patients were aged more than 80 years.

The analysis of prevalence of stroke-related risk factors and their distribution based on stroke subtypes among population of the Republic of Moldova showed that the incidence of different risk factors in ischemic stroke (IS) were as follows: 42.6% of cases are due to hypertension, 32.7% – smoking, 32.2% – alcohol intake, 24.8% – diabetes mellitus, 22.6% – coronary artery disease, 18.6% – dyslipidemia, 16.6% – dysrhythmia, 13.4% – previous stroke, 10% -inactivity, 8.8% – past transient ischemic stroke. The major risk factors for developing a hemorrhagic stroke (HS) included 57.0% of cases due to hypertension, 39.3% – smoking, 36 – alcohol intake, 26.8% – coronary artery disease, 26.3% – dyslipidemia, 21.2% – obesity, 26.3% – dysrhythmia, 20% – diabetes mellitus, and 19.8 % – inactivity. CT scan showed 83.0% (66) cases of ischemic stroke, while intracerebral hemorrhage was found in 17.0% of patients.

The present study revealed that the most common clinical presentation was motor weakness (90.0%) followed by headache (39.0%), speech involvement (35.0%), and impaired sensorium (33.0%). The ischemic stroke was characterized by motor weakness in 92.0%, speech involvement (38.0%), headache (33.0%), and impaired sensorium (20%). The hemorrhagic stroke incidence included patients with impaired sensorium in 93.0%, motor weakness in 79.0%, headache and vomiting in 64% of patients, that showed a statistically high significant value (p<0.001). In the present study, headache was present in 39.0% of the cases, headache was more common in ICH patients (64.0%) as compared to ischemic stroke patients (33.0%), showing significant statistical value (p<0.05). Vomiting was present in 20.0% of patients, including 11.0% of cases of ischemic stroke and 64.0% of cases with ICH. This result was highly significant (p<0.001). Seizures were present only in 4.0% of the total patients included in the study.

On clinical examination, right hemiparesis was found in 32 cases (40%), left hemiparesis in 36 cases (40%), facial nerve palsy in 35 cases (44%), aphasia in 23% and dysarthria in 28.0%, respectively [15]. In the RM, only 20.6% of ischemic stroke patients currently receive thrombolytic therapy (fig. 1).

The most common reasons for not receiving thrombolytic therapy were the exceedance of time window 34.2%, low or improved NIHSS 19.8%, uncontrolled blood pressure 6.8%, stroke mimics 5.6% and history of stroke in the past 3 months 4.2%, history of gastrointestinal bleeding 2.8%, uncertain onset 2.6%; family refusal 1.4%, and no alteplase availability 2.0% [16, 17].

Morbidity rate of acute stroke among adult population in the Republic of India

The age range of the study group was 24-88 years. The study group included 49 (61.6%) males and 31 (38.4%) females (M:F = 1.75:1). 25 patients (31.0%) had ischemic stroke and 55 patients (69.0%) had hemorrhagic stroke. The mean age was 53.02 ± 14.38 years in ischemic stroke group and 52.84 ± 12.45 years in hemorrhagic stroke group. In ischemic stroke patients, 15(60.0%) were males and 10 (40.0%) were females. In hemorrhagic group, 36 (66.1%) were males and 19 (33.9%) were females. 74 (92.9%) patients came from rural and semi urban-areas.

Socio-demographic profile was represented by 66.7% of patients with none and primary school, whereas 78% of patients were self-employed or unemployed and 78.9% of pa-

76.3% of acute stroke patients did not receive thrombolysis in present study.
Hemorrhage on computed tomography (CT) scan – 42.3%.
Exceedance of time window – 24.1%.
Low or improved NIHSS score – 18.7%.
Family refusal – 10.9%.
Symptom onset is unknown, or if patient awoke with stroke – 17.2%.
Persistent elevated blood pressure – 12.6%.
Intracranial neoplasm – 2.7%.
Infective endocarditis – 0.4%.
GI malignancy or GI bleeding within 21 days – 3.7%.
Severe head trauma, or intracranial/intraspinal surgery within 3 months – 2.7%.
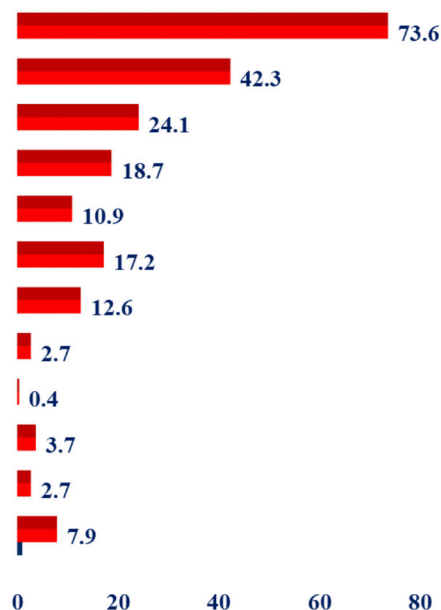No alteplase availability – 7.9%.

Fig. 2. Current status of intravenous thrombolysis for acute ischemic stroke patients who did not receive IV thrombolytic therapy in the Republic of India

tients from lower middle and poor classes. Age distribution of patients with ischemic stroke was the following: about half (55%) of stroke patients aged 30-60 years, 32.4% of patients aged 60-70 years, and 13% of patients aged over 70 years. Age distribution of patients with hemorrhagic stroke included about 56% of stroke patients aged 30-60 years, 29% of patients aged 60-70 years, and 15% of patients ages over 70 years.

Education status of patients with stroke: 69.8% of patients with ischemic stroke and 60.0% in the group of patients with hemorrhagic stroke were with none and primary school.

Risk factor assessment of ischemic stroke among ischemic stroke patients showed that 66.3% of patients were diabetic, 63.9% of patients – atrial fibrillation, 63.5% – ischemic heart angina, 61.3% of patients were hypertensive and 59.1% suffered from headaches. The risk factor assessment among ischemic stroke patients found that past history of stroke was present in 63.9% of cases, tabacco consumption in 36.4% and alcohol consumption in 66.0% of cases.

The risk factor assessment of hemorrhagic stroke among hemorrhagic stroke patients revealed that 39.9% had headache, 38.7% of patients were hypertensive, 35.5% of patients had atrial fibrillation, 35.5% of patients had ischemic heartangina, and 33.7% of patients were diabetic. The risk factor aassessment among hemorrhagic stroke patients, found that history of stroke was present in 35.5% of cases, tabacco consumption in 45.2% and alcohol consumption in 66.0% of cases.

Clinical signs and symptoms of ischemic stroke were featured by history of TIA (64.1%), disphagia (63.9%),speech problems (61.9%),ocular/visual impairment (63.8%), weakness of the face/limbs (56%)and impaired conscio-

usness (50%). Clinical signs and symptoms of hemorrhagic stroke were characterized by impaired consciousness (49.3%), weakness of the face/limbs (43.6%), history of TIA (36.0%), speech difficulties (39.1%), ocular/visual impairment (36.2%), and disphagia (32.0%). CT scan showed 30.7% (24) of patients had ischemic stroke, while intracerebral hemorrhage and subarachnoid hemorrhage were found in 69.3% (55) and 4.0% (3) of cases, respectively. The most common reason for not receiving thrombolytic therapy in the Republic of India were the following: presence of hemorrhage on computed tomography (CT) scan (42.3%), exceedance of time window (24.1%), low or improved NIHSS score (18.7%), family refusal (10.9%), unknown symptom onset, or if patient awoke with stroke (17.2%), persistent elevated blood pressure (12.6%), intracranial neoplasm (2.7%), infectious endocarditis(0.4%) GI malignancy or GI bleeding within 21 days (3.7%), severe head trauma, or intracranial/intraspinal surgery within 3 months (2.7%), and no alteplase availabi-lity (7.0%).

76.3% of acute stroke patients did not receive thrombolysis in present study, (fig. 2).

The hospital-based retrospective study conducted in Kolkata, reported approximately equal numbers of hemorrhagic (399) and ischemic stroke (393) in 792 patients who underwent CT scan. Hypertension was registered in 77.3% of ICH cases. The unusual finding of this study was a remarkably high number of ICH among the admitted patients. The possible cause of very high hemorrhagic stroke (69.3%) in our population study may be a feature of lifestyle rather than genetics and possibly linked with economic transition of the general population [18-21].

The Indian Government launched National Program for Prevention & Control of Cancer, Diabetes, Cardiovascular

ORIGINAL RESEARCH

G. Ciobanu et al. Moldovan Medical Journal. November 2020;63(5):39-44

Diseases and Stroke to address high prevalence of non-communicable diseases. Risk factor control requires, multidisciplinary approach, which includes approaching social determinants of health, health-care financing, improving medical education, and health system strengthening [22, 23].

Conclusions

Stroke remains one of the leading causes of death and the largest cause of disability in the RM. According to the latest WHO data published in 2017, Stroke Deaths in RM reached 6638 cases or 15.87% of total death number. The age-adjusted Death Rate is 121.53 per 100000 of Moldovan population and ranks 39 in the world. However, no exact estimation of the incidence and clinical consequence of stroke in India is unavailable, the epidemiological survey covering 52577 people reported an estimated standardized prevalence of 545 per 100000, an annual incidence of 145 per 100000 and a 1-month case-fatality of 41%.

In India, the Stroke-related age onset is the highest in 40–49 year-old population, which is the most productive period of life. Hemorrhagic stroke showed the commonest occurrence in our study. Our population is younger and mostly come from a lower social and economic strata. The possible cause of very high hemorrhagic stroke (69.3%) in our population study might be due to the lifestyle rather than genetics and possibly linked with economic transition of the general population. In the Republic of Moldova, stroke is a predominant problem of aging population, the most affected being persons aged 61-70 years (23.0%), 71-80 years (33.0%) and patients over 80 years (17.0%), patients over 70 years (50.0%). The analysis of different risk factor incidence in ischemic stroke (IS) was as follows: 42.6% – hypertension, 32.7% – smoking, 32.2% – alcohol abuse, 24.8% – diabetes mellitus, 22.6% – coronary artery disease, 18.6% – dyslipidemia, 16.6 % – dysrhythmia, 13.4% – previous stroke, 10% – inactivity, 8.8% – transient ischemic stroke in the past. Risk factor aassessment of ischemic stroke among ischemic stroke patients in the RI showed: 66.3% of patients had diabetes mellitus, 63.9% – atrial fibrillation, 63.5% – ischemic heart disease, 61.3% – hypertension, history of stroke – in 63.9% of cases, tabacco consumption in 36.4% and alcohol consumption in 66.0% of cases.

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Authors' contribution
GC interpreted the data and revised the manuscript critically; VM designed the study; NN drafted the first manuscript; All the authors revised and approved the final version of the manuscript.

Ethics approval and consent to participate
The research was approved by the Research Ethic Board of *Nicolae Testemitanu* State University of Medicine and Pharmacy (protocol No 5 of November 20, 2017).

Conflict of Interests
No competing interests were disclosed.