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Clinical and Epidemiological Characteristics of Cerebral Stroke in Uzbekistan According to the Stroke Registry in Tashkent and Andijan Cities

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Resume

Aim. To assess the clinical and epidemiological situation due to cerebral stroke among the population of Tashkent and Andijan cities and their regions based on the study of medical statistics and the "Uzbek National Stroke Registry".

Materials and methods. The data of medical statistics of the Ministry of Health of the Republic of Uzbekistan, as well as 493 case histories of stroke patients were taken from the city clinical hospital No. 5 in Tashkent, or "city T" (298 stories), and the Andijan branch of the Republican Scientific Center for Emergency Medical Care, or "city A" (195 stories), from 2016 to 2020. Patients' data were entered into the computer program "Uzbek National Stroke Registry". The analysis of primary and general morbidity, the frequency of stroke types, mortality and disability rates, risk factors with an assessment of the quality of medical care was carried out.

Results. There was an increase in the incidence of stroke in the study areas by 4% in 2020 compared to 2017, with multidirectional fluctuations in individual years. The main risk factors for stroke were arterial hypertension (87.9%), atrial fibrillation (25.1%), hypercholesterolemia (28.2%), a history of myocardial infarction (22.0%), smoking (24.1%), diabetes (17.3%). The initial mean score on the modified Rankin scale was 1.57 (95% CI, 1.52-1.63), the proportion of patients with disabilities was 40.7%. The ratio of ischemic to hemorrhagic stroke in city T was 6:1, while in city A it was 3:1. The proportion of neuroimaging studies performed on patients was 63.1% and 47.7%, respectively, in city T and city A.

Conclusions. For the first time, for a comparative assessment of the quality of medical care for patients with stroke in hospitals of the Republic of Uzbekistan, a new analysis mechanism was applied using the Uzbek National Stroke Registry based on a unified data collection methodology. The analysis of data from the "hospital stroke registry" of two medical institutions confirmed the adequacy of the developed indicators of the quality of medical care, which allows them to be used to assess the work of specialized departments, identify defects in the work of hospitals and formulate specific recommendations for their elimination.

Key words: acute cerebrovascular disorders, stroke, stroke registry, epidemiology

Introduction.

The problem of neurological diseases is quite high. Over the past 25 years, neurological diseases, including strokes, occupy the 7th place, the mortality rate after stroke of all diseases of the circulatory system occupies the 2nd place, and it has been increasing in recent years [1, 2, 3]. Post-stroke disability has reached 92%, of which 76% are severely disabled [4]. According to the WHO article, the mortality rate after stroke is in second place and increased from 5.41 million in 2000 to 6.24 million in 2015 (i.e. by 13%) [1].

The problem of cerebrovascular diseases (CVDs), including the problem of stroke, is particularly urgent in Uzbekistan and not only medical, but also socio-economic issue. This is due to the prevalence of vascular pathology of the brain mainly in the working-able population, its reproduction and the development of chronic and acute cerebral ischemic insufficiency [5, 6, 7]. The problem discussed for consideration is that chronic cerebral ischemia is one of the main causes of mortality, which currently plays an important role in the structure of cardiovascular diseases (CVD) affecting the overall mortality rate [8]. First of all, this is

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due to high-risk risk factors (hypertension, diabetes mellitus (DM), atherosclerosis, heart disease, obesity, stomach disorders, malnutrition, chronic stress and harmful habits) [5, 6, 7, 9].

The medical and social consequences of acute cerebral circulatory disorders (ACCD) are estimated worldwide on the basis of a number of data. These include medical statistics on morbidity (primary morbidity), prevalence (general morbidity), disability and mortality of the population, as well as hospital and population registers of stroke [10, 11].

Information on the incidence and prevalence of ACCD and its consequences in the Republic of Uzbekistan is based on the data on medical care, which are reflected in the corresponding lines of the state statistical reporting form of the Ministry of Health of the Republic of Uzbekistan.

Goal.

In this sudy, we analyzed the morbidity and mortality rates of the population of Tashkent and Andijan cities and their regions due to cerebral stroke and cerebrovascular diseases for 2016-2020 based on the study of medical statistics and the Uzbek National Stroke Registry.

Materials and methods.

A retrospective analysis of medical documentation was carried out (archival material: medical histories of patients who were treated in the departments of neurology, intensive care and intensive care of the Tashkent City Clinical Hospital No. 5, or “city T”, and the Andijan branch of the Republican Scientific Center for Emergency Medical Care, or “city A”, from 2016 to 2020. 493 case histories were processed (from city T – 298, from city A – 195 histories). The data of patients were filled in a special registration card of a patient with a stroke (patent for industrial design No. SAP from 2021 was obtained) with further introduction into the computer program “Uzbek National Stroke Registry” (a certificate for a computer product from 2019 was obtained).

According to medical statistics, the analysis of primary and general morbidity by class of circulatory system disease among the population of the Republic of Uzbekistan for the period from 2016 to 2020 was carried out. The primary incidence of ACCD among residents of the studied regions was determined per year in terms of 100,000 inhabitants. In addition, the relative frequency (specific gravity as a percentage of all cases) of each of the four types of stroke was determined ((International Classification of Diseases Tenth Revision, CI I63): subarachnoid hemorrhage (SAH-I60); intracerebral hemorrhage (ICH-I61); cerebral infarction (CI-I63); stroke, not specified as hemorrhage or infarction (CI-I64). Mortality from cerebral stroke was defined as the number of deaths from diseases according to the I60, I61, I63, I64 ICD-10 codes among the population of the studied regions for 12 months (2018) in terms of 100,000 inhabitants. The mortality rate from ACCD was calculated as the number of deaths from diseases according to the I60-I69 ICD 10 revision codes for 12 months in terms of 100,000 inhabitants [1, 3, 12].

The following disability indicators were calculated. Primary disability due to stroke is the number of persons recognized as disabled for the first time by codes I60-I64, I69.0-I69.4 ICD-10 in residents of the studied zones per year in terms of 10,000 inhabitants. Total (accumulated) disability due to ACCD is the sum of persons recognized as disabled for the first time and repeatedly according to codes I60-I64, I69.0-I69.4 ICD-10 among residents of the studied zones per year in terms of 10,000 inhabitants.

When analyzing medical statistics data, the variability, dynamics, direction of changes and the relationship between the values of morbidity, mortality and disability due to stroke were considered.

Results and Discussion.

The analysis of the primary and general morbidity by the class of circulation system diseases among the population of the Republic of Uzbekistan for the period from 2016 to 2020 allowed to identify the corresponding patterns in their dynamics and structure (Fig. 1).

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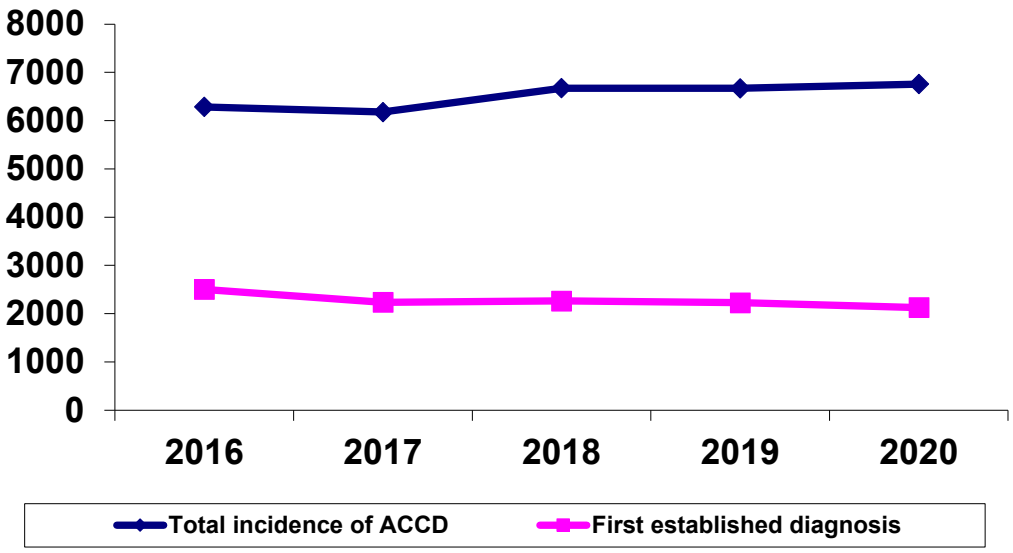

Figure 1. Dynamics of primary and total incidence of acute cerebral circulation disorders in the studied regions for the period from 2016 to 2020 (per 100,000 population) in Uzbekistan

Table 1 demonstrates a steady increase in morbidity in all the studied zones for four years. Particularly high rates were obtained in Andijan city and Andijan region. Thus, if in 2016 these indicators amounted to 173 and 302 per 100,000 inhabitants, then in 2020 they increased almost 2 times. In Tashkent city, the opposite picture was noted. Thus, the average annual primary incidence of stroke per 100,000 inhabitants decreased 1.3 times in relation to the indicators of 2019.

Table 1. The average annual primary incidence of stroke per 100,000 inhabitants in Andijan city, Andijan region, Tashkent city and Tashkent region in 2017-2020

Region	*2017*	*2018*	*2019*	*2020*
Andijan city	173	283	267	337*
Andijan region	302	255	514*	230
Tashkent city	251	262	342	261
Tashkent region	255	253	268	281

Note: * - reliability of data to the lowest indicator by year (P<0.05)

The specific frequency of cerebral stroke types on average by zones varied in 2017-2018 within the following limits: SAH 3.5-5.1%, ICH 11.5-17.2%; CI 65.7-77.7%, stroke, not specified as hemorrhage or infarction - 6.2-12.1% (Fig. 2).

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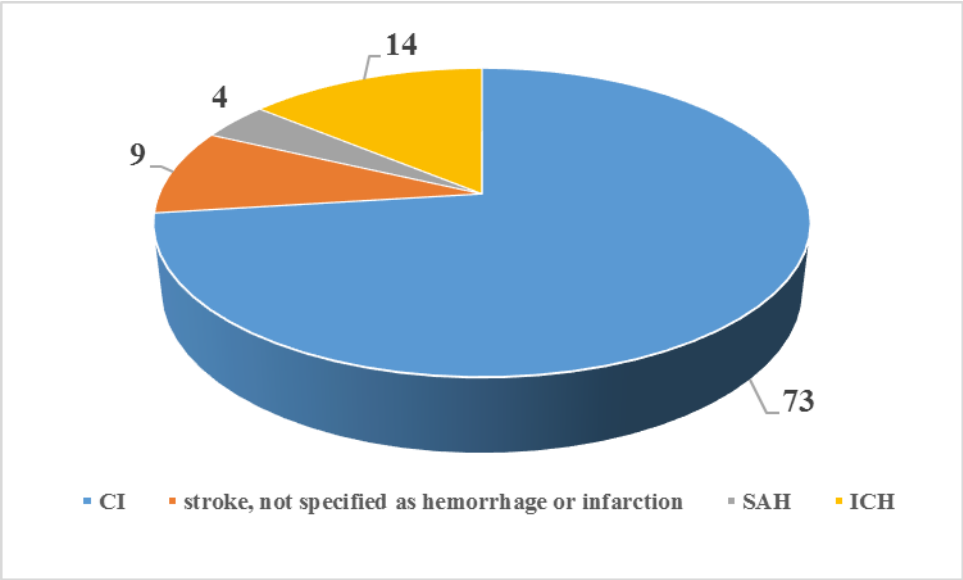

Figure 2. The specific weight of types of cerebral stroke in the studied regions in 2017-2020.

Notes: SAH - subarachnoid hemorrhage; ICH - intracerebral hemorrhage; CI - cerebral infarction.

In addition, for four years, i.e. 2017-2020, the ratio of specific frequencies of stroke types [CI] > [ICH] > [SAH] was maintained (Table 2), characteristic of the vast majority of literature data on stroke epidemiology published in the last decade [12, 13, 15, 16]. It should be noted that there are significant fluctuations in the frequency of ICH (the differences for the period 2017-2020 reached 1.5 times), as well as the frequency of stroke, not specified as hemorrhage or infarction (the indicators differed by 2 times).

Table 2. Distribution of the frequency of stroke types (in % of all cases) in Tashkent, Andijan cities and their regions in 2017-2020

Region		Andijan city	Andijan region	Tashkent city	Tashkent region
2017	SAH	14±0,1*	11±0,1	3±0,02	5±0,01
	ICH	0±0,0	4±0,01	29±0,1	17±0,12
	CI	61±0,13	64±0,15	55±0,24	66±0,21
	stroke, not specified as hemorrhage or infarction	25±0,05*	21±0,05	13±0,12*	12±0,13*
2018	SAH	7±0,12	7±0,1	4±0,14	5±0,13
	ICH	14±0,2	23±0,16*	11±0,11*	12±0,18
	CI	71±0,18*	35±0,21	84±0,22*	74±0,21*
	stroke, not specified as hemorrhage or infarction	8±0,19	35±0,22	1±0,01	9±0,05
2019	SAH	7±0,04	8±0,03	3±0,01	4±0,01
	ICH	11±0,12	10±0,11	17±0,12	14±0,12
	CI	80±0,24	75±0,22	77±0,21	76±0,23
	stroke, not specified as hemorrhage	2±0,01	7±0,02	3±0,01	6±0,03

ISSN NO: 2770-2936
Date of Publication:30-05-2022

	or infarction				
2020	SAH	10±0,04	5±0,05	4±0,02	4±0,04
	ICH	8±0,03	7±0,04	10±0,03	12±0,05
	CI	72±2,5	78±2,3	81±2,4	78±1,8
	stroke, not specified as hemorrhage or infarction	10±1,8	10±1,5	5±0,05	6±0,04

Note: * - reliability of data to the lowest indicator by year (P<0.05)

The specific weight of stroke types in the studied zones varied to a greater extent, exceeding the above limits of the literature data, while in certain years some types of stroke were not recorded at all.

The relative frequency of SAH ranged from 3% (Tashkent city, 2017) to 10% (Andijan city, 2019). The frequency of ICH varied from 0% (Andijan city, 2016) to 23% (Andijan region, 2017). CI was recorded with a relative frequency of 55% (Tashkent city, 2016) to 84% (Tashkent city, 2017). The frequency of stroke, not specified as hemorrhage or infarction ranged from 1% (Tashkent region, 2017) to 35% (Andijan region, 2017).

The analysis of the above indicators indicates that, according to medical statistics, the incidence of ACCD in the studied areas in 2017-2020 was at the level of national indicators with a slight (4%) increase in 2020, compared with 2017.

Thus, during this period, both an increase and a decrease in the incidence of stroke were observed in the studied zones, as well as multidirectional fluctuations in the indicator in individual years.

Table 3. Average annual mortality from cerebral stroke and cerebrovascular diseases (CVD) per 100,000 inhabitants in Tashkent, Andijan cities and their regions in 2017-2020

Region	*2017*		*2018*		*2019*		*2020*	
	stroke	*CVD*	*stroke*	*CVD*	*stroke*	*CVD*	*stroke*	*CVD*
Tashkent city	491±1,6	164±1,6	151±1,8	176±1,6	144±1,7	154±1,5	171±1,8	191±1,6
Andijan city	121±1,1	140±1,5	124±1,7	126±1,4	147±1,7	152±1,5	152±1,7	159±1,5
Andijan region	160±1,2	192±1,6	158±1,8	203±1,7	168±1,8	213±1,7	165±1,7	212±1,6
Tashkent region	146±1,2	203±1,7	150±1,8	199±1,7	146±1,7	198±1,7	144±1,6	204±1,6
Total	918	699	583	704	605	717	632	766

Indicators of the specific weight of stroke types varied significantly: the maximum spread of values for stroke, not specified as hemorrhage or infarction was from 1% to 35%. Mortality from ACCD in the studied zones in 2017-2020 varied slightly from 158 to 168 per 100,000 inhabitants (Table 3), while there was a slight increase in this indicator in 2020 compared to 2017 (by 3.2%). The value of the coefficient b of the linear regression equation of the regional average for 2017-2020 was +2.5.

In some areas, stroke mortality ranged widely – from 121 per 100,000 inhabitants in Andijan city to 491 in Tashkent city (the difference is 4 times).

The dynamics of indicators over the four years (2017-2020) in most districts was multidirectional. In Tashkent city during the specified period there was a decrease in mortality by 33%.

A direct comparison of morbidity and mortality rates for 4 years in the studied areas with cerebral stroke showed that the mortality rate exceeded the morbidity rate.

The analysis of the indicators presented above indicates that, in 2017-2020, the dynamics of indicators in most districts were multidirectional, there was a significant variation in mortality rates, reaching fourfold values

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Date of Publication:30-05-2022

Risk factors, analysis of causes, frequency of repeated cases and social consequences of stroke.

The age of stroke patients ranged from 36 to 96 years, the average age was 66.1±11.2 (M±o) years (63.2±11.0 in men, 68.9±10.7 in women).

The proportion of stroke cases in people of working age was 23.7% (of which 74.6% were men and 25.4% were women) (Fig. 3).

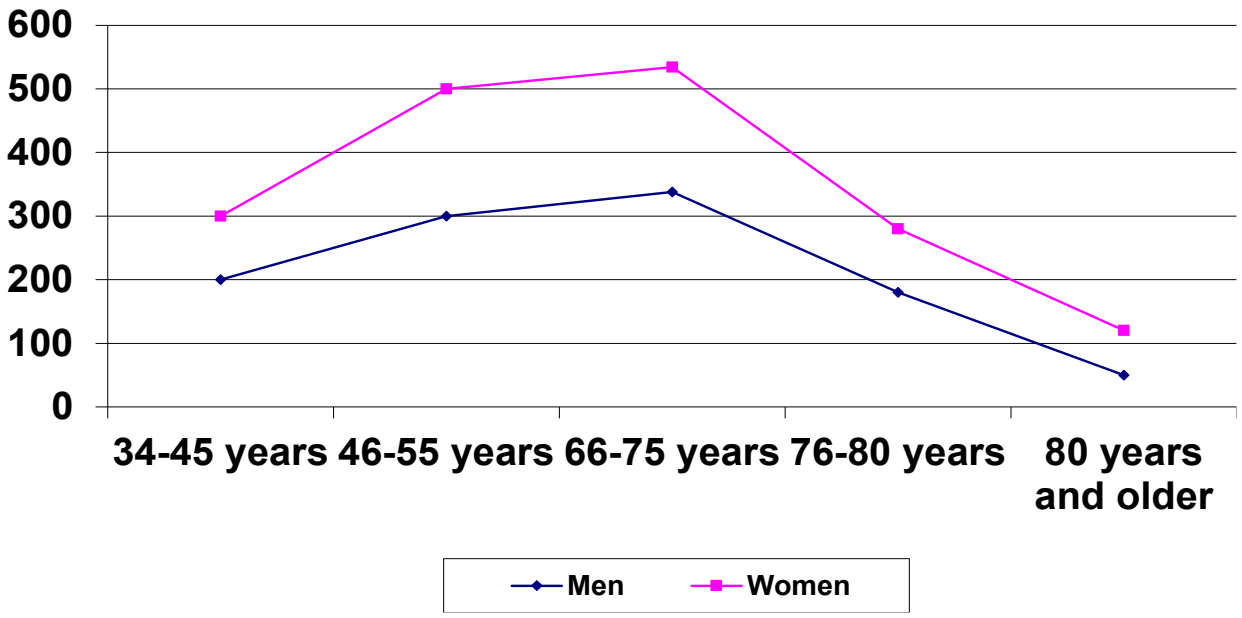

Figure 3. The frequency of occurrence of acute cerebral circulation disorders in residents of the surveyed areas, depending on age

The maximum absolute number of cases of ACCD was observed in the age group of 70-74 years in women, and in the group of 60-64 years – in men. In 85 cases, stroke developed in young people (up to 45 years old), which accounted for 3.1% of all cases of ACCD. We found no significant differences in age and sex gradation among the surveyed cities.

The analysis of the prevalence of risk factors showed (Fig. 4) that hypertension was registered in 87.9% of cases of CI, diabetes – in 17.3% of cases, hypercholesterolemia – in 28.2% of cases, atrial fibrillation – in 25.1% of cases, smoking – in 24.1% of cases, a history of myocardial infarction – in 22.0% of cases. Many patients before the registered stroke had a certain degree of disability. The initial average score on the modified Rankin scale was 1.57 (95% confidence interval (CI), 1.52-1.63), the proportion of patients with disabilities was 40.7%

ISSN NO: 2770-2936
Date of Publication:30-05-2022

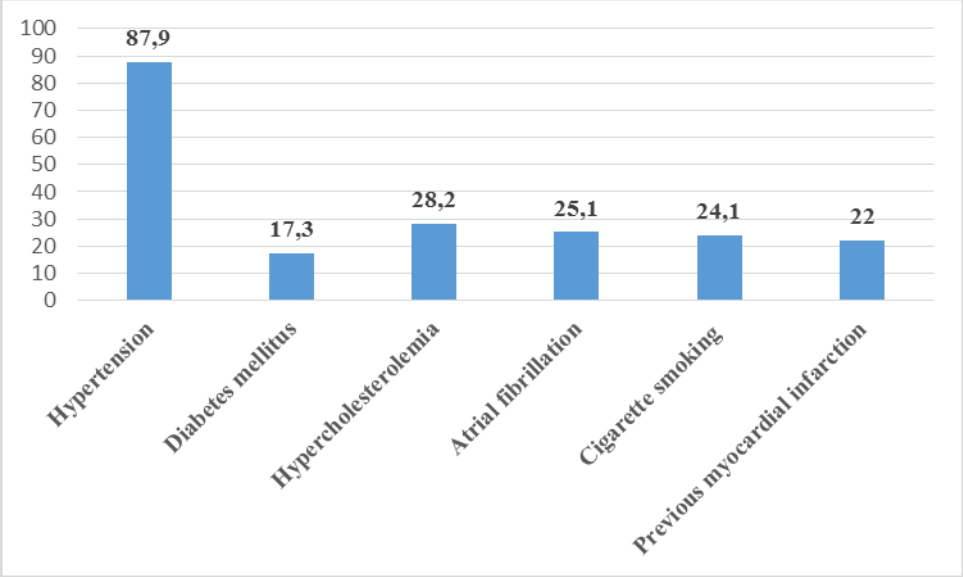

Figure 4. Prevalence of risk factors in stroke patients included in the registry

According to the presented data (Table 4), in comparison between the cities of T and A, a significant predominance of the frequency of hemorrhagic stroke was revealed in the city of T, where the ratio of ischemic and hemorrhagic stroke was 6:1, whereas in the city of A – 3:1.

At the same time, the proportion of neuroimaging studies performed on patients was insufficient and amounted to 63.1% and 47.7%, respectively, in city T and city A. This fact could cause difficulties in diagnosing intracerebral hemorrhages and an increase in the proportion of unspecified strokes (5.1% in city A), as well as unverified hemorrhagic strokes occurring under the "mask" of ischemia.

Table 4. Distribution of hospitalized patients depending on the type of stroke (n=493)

Diagnosis	Ischemic stroke		Intracerebral hemorrhage		Subarachnoid hemorrhage		Cryptogenic stroke	
	n	%	n	%	n	%	n	%
City T	225	75,5	66	22,2	7	2,4	0	0
City A	159	81,5	23	11,8	3	1,5	10	5,1
Total	384	77,9	89	18,1	10	2,0	10	2,0

Thus, without total neuroimaging, it is not possible to get a true picture of the distribution of patients by type of stroke.

An analysis of the quality of anamnesis indicates a frequent neglect of data on the most frequent and modified risk factors for stroke, which suggests that there is no possibility of influencing on them.

The detection of a large number of repeated strokes (T – 27.2%, 85/298; A – 23.1%, 45/195) confirms the need for adequate preventive measures, which has been proven because of numerous studies (PROGRESS, Antiplatelet Trialists Collaboration, European Atrial Fibrillation Trial, PERFORM, etc.).

The Registry data allowed to indirectly determining the severity of the condition of the admitted patients (the presence or absence of a symptom of "impaired consciousness" at admission). In accordance with this, a large proportion of "severe" patients were identified in City A compared to city T (39.6% (118/298) and 25.1% (49/195), respectively).

Data on the frequency of such neurological symptoms detected upon admission as bulbar / pseudobulbar syndrome and disorders of consciousness, the isolated or combined presence of which causes a high risk of pneumonia, allowed us to identify the total proportion of patients requiring increased measures to prevent this complication (T – 45.3% (135/493), A – 41.5% (81/195)).

When analyzing the main vital signs at admission indicated in the Stroke Registry, it was revealed that the average levels of blood pressure and glycemia exceeded the normal limits in patients of both cities, especially in City A (Table 5)

ISSN NO: 2770-2936
Date of Publication:30-05-2022

Table 5. Average levels of individual indicators at admission to the hospital

Parameter	City A	City T	p
Systolic BP (mm Hg)	164.40±36.34	154.18±29.25	<0.0001
Dyastolic BP (mm Hg)	95.93±18.42	89.32±14.78	<0.0001
Mean BP (mm Hg)	118.78±23.35	110.97±18.55	<0.0001
Heart rate (beats per minute)	80.04±16.70	78.97±12.97	0.247
Body temperature (°C)	36.50±0.59	36.15±0.54	<0.0001
Glycemia (mmol/l)	7.15±2.93	6.276±2.96	<0.0001

Hyperglycemia (>5.5 mmol/l) was detected at admission in the city of A in 70.3% (137/195), in the city of T – in 50.3% (150/298) of patients. Among this category, the proportion of patients with diabetes mellitus was only 22.1% (43/195) and 32.9% (98/298), respectively. Taking into account the literature data on the dependence of blood glucose levels in the acute period of stroke and the degree of recovery of impaired neurological functions, it was possible to assume a larger percentage of patients with a poor rehabilitation prognosis in the city of A.

Hospital mortality rates were within the average statistical data for Uzbekistan (A – 30.8% (60/195), T – 23.8% (71/298)).

Thus, for the first time for a comparative assessment of the quality of medical care for stroke patients in hospitals of the Republic of Uzbekistan, a new analysis mechanism was applied using the "Uzbek National Stroke Registry" based on a unified data collection methodology. The data obtained can be used in planning measures to improve medical care for stroke patients in the hospitals under study, and allow us to make specific recommendations taking into account the identified deviations in treatment.

Conclusions:

1. The proportion of stroke types in the studied regions varied to a greater extent, the incidence of stroke in 2017-2020 was at the level of republican indicators with a slight (4%) increase in the indicator in 2020, compared with 2017. During this period, both an increase and a decrease in the incidence of stroke were observed in the studied regions, as well as multidirectional fluctuations of the indicator in individual years.

2. Hypertension was registered in 87.9% of cerebral stroke cases, diabetes mellitus – in 17.3% of cases, hypercholesterolemia – in 28.2% of cases, atrial fibrillation – in 25.1% of cases, smoking – in 24.1% of cases, a history of myocardial infarction - in 22.0% of cases. Many patients before the registered stroke had a certain degree of disability. The initial average score on the modified Rankin scale was 1.57 (95% CI, 1.52-1.63), the proportion of patients with disabilities was 40.7%.

3. A significant prevalence of the frequency of hemorrhagic stroke was revealed in Tashkent city, where the ratio of ischemic and hemorrhagic stroke was 6:1, whereas in the city of Andijan – 3:1.

4. The proportion of neuroimaging studies performed on patients was insufficient and amounted to 63.1% and 47.7%, respectively, in Tashkent and Andijan cities. This fact could cause difficulties in the diagnosis of intracerebral hemorrhages and an increase in the proportion of unspecified (cryptogenic) strokes (5.1% in Andijan city), as well as unverified hemorrhagic strokes occurring under the "mask" of ischemia.

5. The analysis of the data of the "stroke registries" of two medical and preventive institutions, including 493 stroke patients, confirmed the adequacy of the developed indicators of the quality of medical care, which allows them to be used to evaluate the work of specialized departments, identify defects in the work of hospitals and formulate specific recommendations for their elimination.

6. The "Stroke Registry" allowed to determine the dominant factor of delays in hospitalization – late access to medical care due to insufficient awareness of the population, or lengthening of the time of transportation of patients, which requires active and widespread implementation of educational programs, both population–based for the population and professional – for emergency medical personnel.

7. The standard level of basic examination of patients upon admission to the hospital allows to verify the type of acute cerebrovascular accident and the pathogenetic variant of ischemic stroke, which determines the formation of tactics for the treatment of patients and individual secondary prevention programs.

ISSN NO: 2770-2936
Date of Publication:30-05-2022

8. A detailed analysis of inpatient treatment using data from the "Hospital Stroke Registry" allows us to assess the impact of the quality of care provided not only on the outcome of stroke, but also on the development of complications and the degree of recovery of impaired neurological functions.

9. The "Hospital Stroke Registry" allowed to evaluate the organization of the treatment and diagnostic process not only at the inpatient, but also at other stages, to identify the timeliness and adequacy of treatment measures, to verify deviations from the standard and the procedure for providing medical care with further targeted correction of identified violations, which dictates the need to introduce this method into the management and control system the quality of medical care in acute cerebrovascular diseases.

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