AGE AND GENDER STRUCTURE OF STROKE INCIDENCE IN THE CITY OF ANDIJAN: ANALYSIS OF LONG-TERM OBSERVATIONAL DATA

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Abstract

Stroke remains one of the leading causes of mortality and long-term disability worldwide. Understanding regional age and gender characteristics of stroke incidence is essential for optimizing prevention and healthcare planning. **Objective:** To analyze the dynamics and age–gender structure of stroke incidence in the city of Andijan based on a three-year retrospective study (2023–2025). **Materials and Methods:** A retrospective epidemiological analysis included 6,842 cases of first-ever stroke registered in Andijan from 2023 to 2025. Diagnoses were verified clinically and by neuroimaging (CT/MRI). Incidence rates per 100,000 population, age- and sex-specific distribution, and the proportion of ischemic and hemorrhagic strokes were assessed. Stroke severity was evaluated using the NIH Stroke Scale (NIHSS). Statistical analysis was performed using SPSS v.26.0 with linear trend and correlation analysis; differences were considered significant at $p < 0.05$. **Results:** Stroke incidence increased from 265.1 ± 2.3 per 100,000 population in 2023 to 291.4 ± 2.8 in 2025 (9.9% increase, $p < 0.05$). Ischemic stroke predominated (82.4%), followed by hemorrhagic stroke (14.8%) and subarachnoid hemorrhage (2.8%). Among individuals under 55 years, men predominated (1.8:1), while in those over 75 years women predominated (1:2.4). The peak incidence occurred at 60–69 years in men and 70–79 years in women. The mean age was higher in ischemic stroke compared to hemorrhagic stroke (68.4 ± 1.2 vs. 61.5 ± 1.8 years, $p < 0.001$). A significant positive correlation was found between age and stroke severity ($r = 0.64$, $p < 0.001$). Acute mortality was higher among working-age men compared to women of the same age group (15.4% vs. 12.1%, $p < 0.05$). **Conclusions:** Stroke incidence in Andijan shows a steady upward trend with pronounced age and gender differences. Men of working age and elderly women represent key risk groups. The association between advanced age and greater stroke severity underscores the need for specialized stroke units and targeted preventive strategies to reduce morbidity and mortality.

Keywords

stroke, epidemiology, age structure, gender differences, ischemic stroke, hemorrhagic stroke, incidence, Andijan.

Introduction. Stroke remains one of the leading causes of mortality and long-term disability worldwide. According to the World Health Organization, cerebrovascular diseases account for a significant proportion of global deaths and are a major contributor to neurological disability. The burden of stroke continues to increase due to population aging, urbanization, and the growing prevalence of risk factors such as arterial hypertension, diabetes mellitus, obesity, and unhealthy lifestyle patterns.

The study of age and gender characteristics of stroke incidence is of particular importance for understanding epidemiological trends and improving preventive strategies. Numerous studies demonstrate that stroke incidence increases with age, while gender differences are associated with biological, hormonal, and social factors influencing risk exposure and disease outcomes. In many regions, men have a higher incidence of stroke at younger ages, whereas women demonstrate increased rates in older age groups, often accompanied by higher disability and mortality.

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Despite global data, regional epidemiological features may significantly differ depending on demographic structure, socioeconomic conditions, healthcare accessibility, and preventive measures. In this context, analyzing long-term observational data in the city of Andijan allows for the identification of local patterns in stroke incidence and the determination of high-risk population groups.

A comprehensive assessment of age and gender structure provides a scientific basis for optimizing preventive programs, improving early diagnosis, and planning medical and social support services for patients with stroke.

Aim of the Study. The aim of the study was to investigate the dynamics and specific characteristics of the age and gender structure of stroke incidence among the population of Andijan city based on a retrospective analysis of three-year data. Particular attention was paid to identifying temporal trends, determining high-risk demographic groups, and assessing the relationship between age and clinical severity of stroke in order to improve regional preventive and organizational healthcare strategies.

Materials and Methods. A retrospective epidemiological study was conducted covering the period from 2023 to 2025. The study was carried out in Andijan city, Uzbekistan. Data sources included statistical reports of the City Neurological Center, inpatient medical records from hospital departments, and emergency medical service call registries.

A total of 6,842 cases of first-ever stroke (acute cerebrovascular accident, ACVA) were included in the analysis. Only patients with a first lifetime diagnosis of stroke were considered to avoid duplication and ensure epidemiological accuracy. The diagnosis was verified based on clinical neurological examination and neuroimaging findings, including computed tomography (CT) and/or magnetic resonance imaging (MRI), performed according to standard diagnostic protocols.

Inclusion criteria comprised confirmed cases of ischemic stroke (IS) and hemorrhagic stroke (HS) among permanent residents of Andijan city during the study period. Recurrent strokes and transient ischemic attacks were excluded from the primary incidence analysis.

Incidence rates were calculated per 100,000 population using official demographic data. Age-specific and gender-specific incidence rates were determined, and patients were stratified into standard age groups (18–44 years, 45–59 years, 60–74 years, and ≥75 years). The proportion and ratio of ischemic and hemorrhagic strokes were assessed annually to identify structural changes in stroke types over time.

The severity of stroke at admission was evaluated using the NIH Stroke Scale (NIHSS). Correlation analysis was performed to assess the relationship between patient age and stroke severity scores.

Statistical analysis was performed using SPSS version 26.0. Descriptive statistics included calculation of means, standard deviations, percentages, and 95% confidence intervals. Linear trend analysis was applied to evaluate changes in incidence over the three-year period. Differences between groups were considered statistically significant at $p < 0.05$. Correlation coefficients were calculated using Pearson or Spearman methods depending on data distribution.

The study design ensured confidentiality of patient data and complied with ethical standards for retrospective medical research.

Results and Discussion. During the observation period, the overall stroke incidence in Andijan demonstrated a statistically significant upward trend, increasing from 265.1±2.3 per 100,000 population in 2023 to 291.4±2.8 in 2025 (a 9.9% increase, p<0.05). The identified linear trend confirms a steady rise in primary stroke incidence over the three-year period, which may reflect population aging, increasing prevalence of cardiovascular risk factors, improved detection rates, or a combination of these factors.

In the structure of stroke types, ischemic stroke (IS) predominated, accounting for 82.4% (n=5,638) of all registered cases. Hemorrhagic stroke (HS) constituted 14.8% (n=1,012), while subarachnoid hemorrhage (SAH) accounted for 2.8% (n=192). The predominance of ischemic stroke corresponds to global epidemiological patterns reported by the World Health Organization and other international stroke registries, where IS typically represents 70–85% of all stroke cases.

Age and Gender Structure. The age- and sex-specific analysis revealed distinct demographic patterns. Among patients younger than 55 years, men predominated significantly (male-to-female ratio 1.8:1). This may be associated with a higher prevalence of modifiable risk factors in men of working age, including smoking, arterial hypertension, alcohol consumption, and occupational stress.

In the 55–64-year age group, the gender ratio became nearly equal (1.1:1), indicating a gradual increase in stroke incidence among women approaching postmenopausal age. In patients older than 75 years, a marked predominance of women was observed (male-to-female ratio 1:2.4). This shift is likely related to longer life expectancy in women as well as postmenopausal hormonal changes contributing to vascular remodeling, endothelial dysfunction, and increased susceptibility to cerebrovascular events.

The mean age of patients with ischemic stroke was significantly higher than that of patients with hemorrhagic stroke (68.4±1.2 vs. 61.5±1.8 years, p<0.001). This finding is consistent with the known pathophysiological differences between stroke subtypes: ischemic stroke is more commonly associated with atherosclerosis and chronic vascular pathology, whereas hemorrhagic stroke more often occurs at a younger age, frequently linked to poorly controlled hypertension or vascular malformations.

Among men, the peak incidence occurred in the 60–69-year age group (34.2% of all male cases), while among women, the highest proportion of cases was observed in the 70–79-year age group (38.5%). These differences further emphasize the gender-specific temporal shift in stroke occurrence, with women experiencing cerebrovascular events approximately one decade later than men.

Severity and Early Mortality. Analysis of stroke severity revealed a significant positive correlation between age and baseline neurological deficit as measured by the NIH Stroke Scale (NIHSS) (r=0.64, p<0.001). Older patients tended to present with more severe neurological impairment, which may be explained by reduced cerebrovascular reserve, a higher burden of comorbidities, and decreased neuroplasticity.

Acute-period mortality was higher among men of working age (18–60 years) compared with women of the same age group (15.4% vs. 12.1%, p<0.05). This difference appears to be associated with a higher proportion of hemorrhagic strokes among younger men, which are typically characterized by more severe clinical presentation and poorer early outcomes. Additionally, delayed medical presentation and lower adherence to preventive care among men may contribute to increased mortality.

Overall, the results demonstrate a clear age-related increase in stroke incidence and severity, as well as pronounced gender differences across age groups. These findings highlight the need for targeted preventive programs focusing on men of working age and elderly women, alongside improved hypertension control, lifestyle modification strategies, and early detection of cerebrovascular risk factors in the Andijan population.

Conclusions:

1. Over the three-year period (2023–2025), stroke incidence in the city of Andijan demonstrated a stable upward trend, increasing from 265 to 291 cases per 100,000 population. The identified growth indicates a progressive epidemiological burden of cerebrovascular

diseases in the region and highlights the need for strengthening primary prevention, early detection of risk factors, and optimization of outpatient monitoring of high-risk groups.

2.   The age structure of stroke incidence shows a bimodal distribution pattern. In men, the peak incidence occurs in the 60–69-year age group, whereas in women it shifts to 70–79 years. In the senile age group (75+), women predominate significantly with a ratio of 2.4:1. This gender shift reflects demographic characteristics, including higher female life expectancy, as well as biological and hormonal factors influencing vascular aging.

3.   Men of working age (under 60 years) have a 1.8-fold higher risk of stroke compared to women of the same age group. In this population, hemorrhagic forms are more prevalent and are associated with higher acute mortality. These findings emphasize the importance of targeted preventive programs among working-age men, particularly focusing on arterial hypertension control, reduction of harmful habits, and timely medical screening.

4.   The identified positive correlation between age and stroke severity ($r=0.64$) confirms that older patients present with more pronounced neurological deficits at admission. This underscores the necessity of organizing specialized stroke units equipped with intensive care facilities, particularly oriented toward elderly patients with severe neurological impairment. Development of multidisciplinary stroke care teams, implementation of standardized treatment protocols, and expansion of early rehabilitation services are essential for reducing disability and mortality.

5.   Overall, the obtained results provide a scientific basis for improving regional healthcare planning in Andijan. Strengthening preventive strategies, optimizing emergency response systems, enhancing neuroimaging accessibility, and expanding specialized stroke care infrastructure are crucial measures to reduce the growing burden of stroke in the population.

References:

1. World Health Organization. Global Health Estimates: Leading Causes of Death and Disability. Geneva: WHO; 2023.

2. World Stroke Organization. Global Stroke Fact Sheet 2022. Geneva: WSO; 2022.

3. GBD 2021 Stroke Collaborators. Global, regional, and national burden of stroke and its risk factors, 1990–2021: results from the Global Burden of Disease Study 2021. The Lancet Neurology. 2023.

4. Feigin VL, Brainin M, Norrving B, et al. World Stroke Organization (WSO): Global Stroke Fact Sheet 2022. International Journal of Stroke. 2022;17(1):18–29.

5. American Heart Association / American Stroke Association. Heart Disease and Stroke Statistics—2024 Update: A Report of the AHA. Circulation. 2024.

6. Hankey GJ. Stroke. The Lancet. 2017;389(10069):641–654.

7. Ministry of Health of the Republic of Uzbekistan. National statistical reports on cerebrovascular diseases, 2023–2025. Tashkent; 2025.

8. Benjamin EJ, Muntner P, Alonso A, et al. Heart Disease and Stroke Statistics—2023 Update. Circulation. 2023.