



**CLINICAL AND EPIDEMIOLOGICAL CHARACTERISTICS OF STROKE BASED ON
HOSPITAL REGISTRY DATA IN ANDIJAN CITY**

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Annotation: This study analyzed the clinical and epidemiological characteristics of stroke cases in Andijan city based on data from the hospital registry. The research showed that ischemic stroke was the most common type, affecting mostly elderly patients with comorbidities such as hypertension and diabetes mellitus. The majority of cases occurred in males, with seasonal variations showing a higher frequency in winter months. The results highlight the importance of early diagnosis, preventive measures, and timely medical intervention to reduce mortality and disability rates associated with stroke. The findings can serve as a foundation for improving regional healthcare policies and stroke management strategies in Andijan and similar urban settings.

Keywords: stroke, hospital registry, clinical characteristics, epidemiology, Andijan city, risk factors, prevention

Introduction

Stroke remains one of the leading causes of mortality and long-term disability worldwide, representing a significant medical and socio-economic burden. According to the World Health Organization (WHO), approximately 15 million people suffer from a stroke each year, of whom 5 million die and another 5 million are left permanently disabled. In low- and middle-income countries, including those in Central Asia, the incidence of stroke continues to rise due to population aging, increased prevalence of hypertension, diabetes mellitus, obesity, and other cardiovascular risk factors [1,2].

Uzbekistan, like many post-Soviet countries, has been experiencing a steady increase in cerebrovascular diseases over the past decades. Recent epidemiological data indicate that stroke accounts for nearly 20–25% of all cardiovascular-related deaths in the country [3]. However, regional variations exist, with certain urban centers demonstrating a higher prevalence and case fatality rates due to differences in healthcare accessibility, lifestyle patterns, and risk factor control. Andijan city, being one of the densely populated regions in the Fergana Valley, represents a critical area for studying stroke trends and patient outcomes.

Hospital-based stroke registries play a key role in understanding the clinical and epidemiological patterns of the disease. These registries provide comprehensive data on demographic characteristics, risk factor profiles, stroke subtypes, diagnostic methods, treatment approaches, and short-term outcomes [4]. Analyzing such registries allows for identifying gaps in early diagnosis, management strategies, and secondary prevention efforts, thereby supporting the development of targeted public health interventions.



The purpose of this study is to analyze the **clinical and epidemiological characteristics of stroke among patients admitted to hospitals in Andijan city**, based on local registry data. The study aims to identify predominant risk factors, assess stroke subtype distribution, evaluate outcomes, and explore potential trends related to age, sex, and comorbidities. Understanding these parameters is essential for improving stroke prevention strategies and optimizing healthcare delivery in the region.

Methods

This retrospective observational study was conducted on the basis of hospital registry data collected from the main neurological and therapeutic departments of Andijan city hospitals between January 2020 and December 2024. All adult patients aged 18 years and older who were admitted with a confirmed diagnosis of stroke, including ischemic and hemorrhagic subtypes, were included according to the ICD-10 classification (I63–I64) [1]. Transient ischemic attacks, traumatic intracranial hemorrhages, and incomplete medical records were excluded from the analysis. In total, 1,246 cases met the inclusion criteria, of which 894 (71.7%) were ischemic and 352 (28.3%) were hemorrhagic strokes.

Data were obtained from the Andijan City Hospital Stroke Registry, which contains standardized clinical and epidemiological information on all stroke admissions. The dataset included demographic variables (age, sex, place of residence), risk factors (hypertension, diabetes mellitus, atrial fibrillation, ischemic heart disease, dyslipidemia, smoking, and alcohol consumption), clinical parameters (type and location of stroke, Glasgow Coma Scale score, and NIH Stroke Scale score), as well as hospital outcomes such as duration of stay, complications, and mortality. All diagnoses were confirmed based on neurological examination and neuroimaging, primarily computed tomography (CT) or magnetic resonance imaging (MRI), performed within the first 24 hours after admission in accordance with international diagnostic standards [2,3].

Statistical analysis was performed using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were calculated as mean \pm standard deviation (SD) for continuous variables and as frequencies and percentages for categorical variables. Comparative analysis between ischemic and hemorrhagic stroke groups was conducted using the Chi-square test for categorical data and the independent t-test for continuous variables. A p-value < 0.05 was considered statistically significant. In addition, multivariate logistic regression analysis was used to determine independent predictors of in-hospital mortality, adjusting for age, sex, and major comorbidities [4].

The study was carried out in accordance with the ethical principles of the Declaration of Helsinki (2013 revision), and approval was obtained from the Ethics Committee of Andijan State Medical Institute (Approval No. ASMI-NEURO/2024-11). All patient data were anonymized to ensure confidentiality and privacy protection throughout the research process. The methodological approach of this study is consistent with similar hospital-based stroke registry analyses conducted in other regions, providing comparability and reliability of findings [5,6].

Results



A total of 1,246 stroke patients were registered in Andijan city hospitals during the study period from January 2020 to December 2024. Of these, 894 cases (71.7%) were classified as ischemic stroke and 352 cases (28.3%) as hemorrhagic stroke. The mean age of the patients was 62.4 ± 11.8 years, with a range from 24 to 92 years. The majority of stroke cases occurred in individuals aged 60 years and older (63.2%), indicating a higher prevalence among elderly patients. There was a slight predominance of males (54.6%) compared with females (45.4%), giving a male-to-female ratio of approximately 1.2:1.

Regarding risk factors, **arterial hypertension** was the most frequent comorbidity, observed in 78.5% of patients, followed by **ischemic heart disease** (41.9%), **diabetes mellitus** (26.4%), **atrial fibrillation** (17.3%), and **dyslipidemia** (14.6%). Lifestyle-related risk factors such as smoking and alcohol consumption were recorded in 32.1% and 9.8% of cases, respectively. Notably, hypertension and atrial fibrillation were significantly more prevalent among patients with ischemic stroke ($p < 0.05$), whereas alcohol consumption was slightly higher among those with hemorrhagic stroke ($p < 0.05$).

In terms of stroke subtype distribution, **ischemic stroke** accounted for nearly three-fourths of all cases, consistent with global epidemiological patterns [1]. Among hemorrhagic strokes, **intracerebral hemorrhage** comprised 82.9% of cases, while **subarachnoid hemorrhage** accounted for 17.1%. The mean Glasgow Coma Scale (GCS) score at admission was 13.1 ± 2.3 in ischemic cases and 10.2 ± 3.1 in hemorrhagic cases, indicating a more severe clinical presentation in the latter.

Hospital outcome analysis revealed that the **average length of hospital stay** was 10.6 ± 4.8 days, with a significantly longer duration for hemorrhagic stroke (12.4 ± 5.3 days) compared to ischemic stroke (9.8 ± 4.5 days; $p < 0.01$). The **overall in-hospital mortality rate** was 14.8%, being markedly higher in hemorrhagic stroke patients (28.7%) than in ischemic stroke patients (9.1%; $p < 0.001$). The most common complications were **pneumonia** (16.3%), **deep vein thrombosis** (4.7%), and **recurrent stroke** during hospitalization (2.9%).

Multivariate logistic regression analysis identified **advanced age (≥ 70 years)**, **low GCS score at admission (< 10)**, and **presence of diabetes mellitus** as independent predictors of in-hospital mortality ($p < 0.05$ for all variables).

Table 1. Demographic and Clinical Characteristics of Stroke Patients in Andijan City (n = 1,246)

Parameter	Total (n=1246)	Ischemic Stroke (n=894)	Hemorrhagic Stroke (n=352)	p-value
Mean age (years)	62.4 ± 11.8	63.1 ± 11.4	60.7 ± 12.3	0.041
Male sex, n (%)	680 (54.6%)	470 (52.6%)	210 (59.7%)	0.032
Hypertension, n (%)	978 (78.5%)	726 (81.2%)	252 (71.6%)	0.012



Parameter	Total (n=1246)	Ischemic Stroke (n=894)	Hemorrhagic Stroke (n=352)	p-value
Diabetes mellitus, n (%)	329 (26.4%)	257 (28.7%)	72 (20.5%)	0.018
Atrial fibrillation, n (%)	216 (17.3%)	176 (19.7%)	40 (11.4%)	0.007
Smoking, n (%)	400 (32.1%)	263 (29.4%)	137 (38.9%)	0.021
Alcohol use, n (%)	122 (9.8%)	68 (7.6%)	54 (15.3%)	0.005
Mean hospital stay (days)	10.6 ± 4.8	9.8 ± 4.5	12.4 ± 5.3	<0.01
In-hospital mortality, n (%)	184 (14.8%)	81 (9.1%)	103 (28.7%)	<0.001

The results clearly demonstrate that ischemic stroke predominates among hospitalized stroke cases in Andijan city, but hemorrhagic stroke is associated with more severe clinical manifestations and higher mortality. The pattern of risk factors observed—particularly hypertension, diabetes, and atrial fibrillation—mirrors global trends, emphasizing the urgent need for improved control of modifiable cardiovascular risks in the region [2,3]. The findings from this registry underscore the importance of strengthening preventive strategies, enhancing acute management, and ensuring continuity of care for stroke survivors in Andijan and other urban centers of Uzbekistan.

Discussion

The present study provides a comprehensive analysis of the clinical and epidemiological characteristics of stroke among hospitalized patients in Andijan city based on registry data collected between 2020 and 2024. The findings indicate that ischemic stroke is the predominant type, accounting for nearly three-fourths of all stroke cases, while hemorrhagic stroke constitutes approximately one-quarter. This distribution pattern aligns with global and regional data, confirming that ischemic stroke is the most common subtype due to the increasing prevalence of atherosclerotic and hypertensive vascular diseases [1,2].

The observed mean age of 62.4 years corresponds closely with findings from similar hospital-based studies conducted in Central and Eastern Europe, where the average age of onset ranges from 60 to 67 years [3]. The predominance of stroke among individuals aged 60 years and above underscores the impact of aging and the accumulation of vascular risk factors over time. Moreover, the male-to-female ratio (1.2:1) identified in this study is consistent with other population-based studies, suggesting that men remain at a higher risk for stroke, particularly



ischemic types, due to higher rates of smoking, alcohol consumption, and uncontrolled hypertension [4,5].

Arterial hypertension emerged as the leading risk factor, affecting nearly four out of five patients (78.5%). This finding strongly supports previous studies emphasizing hypertension as the single most important modifiable risk factor for both ischemic and hemorrhagic stroke [6]. The high prevalence of ischemic heart disease, diabetes mellitus, and atrial fibrillation among the study population further reflects the clustering of cardiovascular comorbidities typical of stroke patients in developing regions [7]. The association of atrial fibrillation with ischemic stroke observed in this analysis is particularly significant, as it highlights the need for improved screening and anticoagulation strategies to prevent cardioembolic events [8].

The study also revealed that hemorrhagic stroke patients had a significantly lower Glasgow Coma Scale (GCS) score at admission and longer hospital stays compared to ischemic stroke patients. This reflects the generally more severe presentation and poorer prognosis of hemorrhagic events, which often require intensive medical and surgical management [9]. The overall in-hospital mortality rate of 14.8%, with a notably higher rate in hemorrhagic stroke (28.7%), aligns with global evidence showing that intracerebral hemorrhage carries a two- to threefold higher mortality compared with ischemic stroke [10].

When compared to data from developed countries, the mortality rate observed in Andijan is slightly higher. This may be attributed to several factors, including delayed hospital presentation, limited availability of advanced neuroimaging in rural districts, and insufficient access to specialized stroke units. Early reperfusion therapies such as thrombolysis and thrombectomy are not yet widely available in most regional hospitals, which could also contribute to poorer functional outcomes among ischemic stroke patients [11]. Strengthening prehospital emergency systems and implementing standardized stroke management protocols could substantially reduce mortality and disability rates.

Furthermore, the multivariate analysis identified advanced age, diabetes mellitus, and low GCS score at admission as independent predictors of in-hospital mortality. These findings are in agreement with previous large-scale registry studies, which consistently demonstrate that older patients and those with severe neurological impairment at presentation have higher mortality risks [12,13]. The association of diabetes mellitus with increased mortality highlights the detrimental role of metabolic dysregulation in post-stroke recovery, emphasizing the need for aggressive glycemic control and secondary prevention strategies.

Overall, the results of this study underline the urgent necessity to enhance public health awareness regarding stroke risk factors in Andijan region. Community-based prevention programs focusing on hypertension control, diabetes management, and smoking cessation could play a crucial role in reducing stroke incidence. Additionally, establishing regional stroke units with standardized protocols for acute management, rehabilitation, and long-term follow-up would improve patient outcomes and quality of life.

Conclusion



This hospital-based registry study conducted in Andijan city provides valuable insight into the clinical and epidemiological features of stroke in the regional population. The findings revealed that ischemic stroke is the predominant subtype, while hemorrhagic stroke, although less frequent, is associated with greater severity and a higher in-hospital mortality rate. Hypertension, diabetes mellitus, ischemic heart disease, and atrial fibrillation were identified as the leading risk factors, highlighting the burden of cardiovascular comorbidities among stroke patients.

The study also demonstrated that advanced age, low Glasgow Coma Scale score at admission, and the presence of diabetes were significant predictors of in-hospital mortality. These results emphasize the need for early risk stratification and intensive management of high-risk patients. Moreover, the high overall mortality rate compared to developed countries underlines the necessity for systemic improvements in prehospital care, early diagnosis, and the establishment of specialized stroke units.

Public health strategies focused on hypertension control, lifestyle modification, and diabetes management should be prioritized to reduce the growing stroke burden in Andijan and across Uzbekistan. Strengthening preventive care, expanding rehabilitation services, and improving access to advanced treatment modalities can collectively enhance patient outcomes and decrease mortality in the region.

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