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ORIGINAL ARTICLE

Impact of demographic and clinical factors on stroke incidence and recovery outcomes.

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ABSTRACT… Objective: To examine demographic characteristics, comorbidities, treatment patterns, and recovery outcomes among stroke patients, with a focus on associations between stroke type, recurrence, and pharmacological interventions. **Study Design:** Retrospective Observational study. **Setting:** Allama Iqbal Teaching Hospital, Dera Ghazi Khan. **Period:** May 2025. **Methods:** Using hospital records from 72 confirmed stroke patients admitted. Demographic data, comorbidities, stroke type, recurrence, treatment, and recovery outcomes were analyzed using SPSS version 23, with statistical significance set at $p < 0.05$. **Results:** Results reveal that ischemic stroke was more prevalent (76%) than hemorrhagic (24%). Stroke was most common in patients aged over 70 years. Recurrent strokes were more frequent in ischemic stroke (36%) than hemorrhagic (6%) ($p = 0.016$). Diabetes was significantly associated with ischemic stroke ($p = 0.001$), while hypertension was common across both types. Patients without hypertension and diabetes had the best recovery rates, while those with both had poorer outcomes and higher mortality (72%). Comorbidities significantly affected recovery outcomes ($p = 0.010$). Ischemic strokes were significantly more prevalent among older patients, whereas hemorrhagic stroke were more common in younger individuals ($p = 0.032$). Anti-platelets and statins were effective in ischemic stroke, whereas anti-convulsants and osmotic diuretics were used more in hemorrhagic cases. **Conclusion:** Patients without comorbidities had shorter hospital stays, while those with both hypertension and diabetes had longer stays, and higher mortality. Ischemic stroke, more common in older adults and linked to diabetes, showed higher recurrence, whereas hemorrhagic stroke was less frequent, largely non-recurrent, and seen more in younger patients. Anti-platelets and statins were used more in ischemic stroke, whereas anti-convulsants and osmotic diuretics were more commonly used in hemorrhagic stroke.

Key words: Anti-convulsants, Anti-platelets, Comorbidities, Hemorrhagic, Ischemic, Patients, Recurrent, Stroke.

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INTRODUCTION

Stroke remains a leading cause of death and long-term disability worldwide, posing a major public health challenge as highlighted in the 2025 American Heart Association report with significant economic and healthcare burdens.[1] The World Health Organization (WHO) defines stroke as; rapidly developing clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin.[2]

Stroke is mainly classified into ischemic (85%) and hemorrhagic (15%) types.[3] Ischemic stroke is caused by interruption of blood supply, and hemorrhagic stroke is caused by bleeding within or around the brain.[2] Comparative studies show that certain populations; such as older adults, males, and individuals with metabolic risk factors, experience higher incidence rates and worse initial presentations.[4] The risk of recurrent stroke, major adverse cardiovascular events, and all-cause mortality rises with advancing age.[5] Hypertension and diabetes mellitus are well-established, independent, and combined risk factors for stroke, with hypertension being the most important determinant of stroke risk across ethnic groups.[6] Diabetes, especially when poorly controlled, significantly increases the risk of ischemic stroke by damaging blood vessels and contributing to vascular complications.[7]

The severity and location of the stroke, the patient's age, overall health, and timing and effectiveness of treatment all influence outcomes.[8]

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Antiplatelet therapy, such as low dose aspirin, reduces thrombotic complications including ischemic stroke in hypertensive patients.[9] Statins improve endothelial function and reduce oxidative stress, contributing to vascular protection and stroke prevention.[9] PPIs reduce gastrointestinal bleeding risk in stroke survivors on antiplatelet therapy without increasing mortality risk, according to recent findings.[10] Early administration of antibiotics (mostly within 24 hours of stroke onset) can reduce post-stroke infections and fever spikes, which may help manage complications during recovery, although functional outcomes remain unaffected.[11]

METHODS

This study employed a retrospective observational design based on recorded hospital data. Data was collected from patient records at Allama Iqbal Teaching Hospital, Dera Ghazi Khan, Punjab, Pakistan. Data collection was conducted throughout May 2025 and encompassed all three specialized medical units (Units 1, 2 & 3).

The study included only patients with a confirmed diagnosis of stroke, resulting in a total of 72 participants. The dataset includes demographic information such as age and gender, along with clinical details including stroke type, treatment modalities, recurrence status (recurrent or non-recurrent), and the presence of comorbidities (e.g., hypertension, diabetes). Recovery outcomes such as hospital stay duration and expiries were also recorded.

Patient data were anonymized to ensure confidentiality and analyzed using SPSS V-23 to identify patterns, correlations, and subgroup differences.

This study was conducted after obtaining official permission from Allama Iqbal Teaching Hospital, Dera Ghazi Khan, where the data was collected (1008/137 dated 26/04/2025). The research protocol was reviewed and approved by the hospital's ethical committee. All data were anonymized to ensure patient confidentiality, and no personally identifiable information was used in the analysis.

RESULTS

Table-I presents the demographic and clinical characteristics categorized by gender. The results indicate that the majority of stroke patients were over 70 years of age, comprising 39% of females and 32% of males. A greater proportion of females (25%) were <50 years, compared to 16% of males, though age distribution by gender was not statistically significant ($\chi^2 = 2.497$, $p = 0.476$). Ischemic stroke predominated in both sexes (82% in females, 73% in males), while hemorrhagic stroke was more frequent in males (27%) than females (18%), without statistical significance ($\chi^2 = 0.841$, $p = 0.359$).

Recurrent strokes occurred more in females (36%) than males (25%), whereas non-recurrent strokes were more common in males (75%) than females (64%); however, recurrence rates did not differ significantly by gender ($\chi^2 = 0.951$, $p = 0.330$).

Most patients recovered within 1–3 days (50% females, 59% males), while mortality was higher in females (14%) than males (7%). Differences in recovery by gender were not statistically significant ($\chi^2 = 1.449$, $p = 0.694$).

Table-II shows that there is a statistically significant association between stroke type and recurrence ($\chi^2 = 5.840$, $p = 0.016$). Recurrent strokes were notably more common among patients with ischemic stroke (36%) compared to those with hemorrhagic stroke (6%). In contrast, non-recurrent strokes were predominantly seen in the hemorrhagic group (94%).

Hypertension was common in both stroke types (65% hemorrhagic, 60% ischemic), but the difference was not significant ($\chi^2 = 0.121$, $p = 0.728$). A significant relationship was identified between stroke type and the presence of diabetes mellitus ($\chi^2 = 10.446$, $p = 0.001$). None of the patients with hemorrhagic stroke had diabetes (0%), whereas (42%) of those with ischemic stroke were diabetic.

Duration of hospital stay (1–3 days) was common across both stroke types (53% hemorrhagic, 57% ischemic). Mortality was slightly higher in hemorrhagic stroke (12%) than ischemic (9%), without statistical significance (χ^2 = 0.128, p = 0.988).

A significant correlation was found between stroke type and age group (χ^2 = 8.807, p = 0.032). Hemorrhagic strokes were more frequently observed in younger individuals, particularly those under 50 years of age (41%), whereas ischemic strokes were more prevalent among older adults, with the highest proportion seen in those aged over 70 years (42%).

Table-III shows duration of hospital stay by age and comorbidities (Hypertension = HTN and Diabetes = DM). No significant association was found between duration of hospital stay and age group (χ^2 = 9.291, p = 0.411). Most patients stayed 1–3 days in hospital, especially those aged >70 (38%) and 50–59 (35%). Mortality rates were consistent (~28%) across <50, 60–69, and >70 age groups. A statistically significant association was identified between recovery outcomes and the presence of comorbidities, namely hypertension and diabetes mellitus (χ^2 = 21.773, p = 0.010). Patients without either condition (HTN−, DM−) exhibited the most favorable outcomes, with 52% stayed 1–3 days in hospital and only 14% for 4–6 days. Patients with both hypertension and diabetes (HTN+, DM+) had significantly worse outcomes, with just 10% stayed 1–3 days in hospital and mortality rate was 72%. Those with hypertension alone (HTN+, DM−) demonstrated intermediate outcomes, with 33% stayed 1–3 days in hospital and 14% mortality. The subgroup with diabetes alone (HTN−, DM+) was limited in number (3%) but all stayed 1–3 days in hospital.

Table-IV describes Hemorrhagic Stroke and Ischemic Stroke recovery profile with multiple drug usage. Recovery was analyzed only for drugs administered to at least 60% of the patients; drugs given to fewer than 60% of patients were excluded from the recovery analysis.

Hemorrhagic Stroke

Among patients with hemorrhagic stroke, pharmacological treatment patterns differed based on recurrence status. Anti-convulsants were administered in 100% of non-recurrent cases, with 50% of patients stayed for 1–3 days and a mortality rate of 13%. Notably, no recurrent patients received anti-convulsants. The use of anti-platelets was minimal in non-recurrent patients (19%) and entirely absent in recurrent cases.

Antibiotics were widely used, administered to 81% of non-recurrent and 100% of recurrent patients. Among non-recurrent cases, 54% stayed for 1–3 days, while 15% expired. In contrast, all recurrent patients stayed for 1–3 days without any mortality. Statins were prescribed to only 13% of non-recurrent patients and not used in recurrent cases.

Proton pump inhibitors (PPIs) were utilized in 93% of non-recurrent and 100% of recurrent cases. In the non-recurrent group, 47% stayed for 1–3 days, and the mortality rate was 13%. All recurrent patients treated with PPIs stayed for 1–3 days, with no deaths reported. Osmotic diuretics were given to 62% of non-recurrent and all (100%) recurrent patients. Recovery outcomes among non-recurrent cases were varied: 40% stayed for 1–3 days, 50% for 4–6 days, and 10% expired. In contrast, all recurrent patients only stayed for 1–3 days without mortality.

Use of anti-hypertensives was noted in 75% of non-recurrent and 100% of recurrent hemorrhagic stroke patients. Among non-recurrent cases, 50% stayed for 1–3 days, with an 8% mortality rate, whereas all recurrent cases only stayed for 1–3 days and experienced no mortality.

Ischemic Stroke

In ischemic stroke patients, the administration of pharmacologic therapies demonstrated distinct usage trends and outcomes based on recurrence status. Anti-convulsants were prescribed in 20% of non-recurrent and 70% of recurrent patients. 43% of patients stayed for 1–3 days in hospital, and the overall mortality rate was 7%.

Anti-platelets were widely administered, received by 74% of non-recurrent and 75% of recurrent patients. Less duration of stay (1–3 days) was observed in 62% of non-recurrent cases and 40% of recurrent ones, with corresponding mortality rates of 0% and 7%, respectively.

TABLE-I

Demographic and clinical characteristics by gender

Variables	Female (%)	Male (%)	Total (%)	Chi Sq. (χ^2) P-value
Age				
<50	7(25)	7(16)	14(19)	χ^2 = 2.497 P = 0.476
50-59	7(25)	13(30)	20(28)	
60-69	3(11)	10(23)	13(18)	
>70	11(39)	14(32)	25(35)	
Total	28(100)	44(100)	72(100)	
Type				
Hemorrhagic	5(18)	12(27)	17(24)	χ^2 = 0.841 P = 0.359
Ischemic	23(82)	32(73)	55(76)	
Total	28(100)	44(100)	72(100)	
Recurrence				
Non-recurrent	18(64)	33(75)	51(71)	χ^2 = 0.951 P = 0.330
Recurrent	10(36)	11(25)	21(29)	
Total	28(100)	44(100)	72(100)	
Duration of hospital stay (days)/ Expiries				
1-3days	14(50)	26(59)	40(56)	χ^2 = 1.449 P = 0.694
4-6days	8(29)	13(29)	21(29)	
7-9days	2(7)	2(5)	4(5)	
Expired	4(14)	3(7)	7(10)	
Total	28(100)	44(100)	72(100)	

Antibiotics were also commonly used, administered to 86% of non-recurrent and 80% of recurrent ischemic patients. Among these, 60% of non-recurrent and 44% of recurrent patients stayed 1–3 days in hospital. Mortality was 10% in non-recurrent and 6% in recurrent cases.

Statin therapy was more prevalent in ischemic stroke, used in 63% of non-recurrent and 75% of recurrent cases. Among non-recurrent patients, 64% stayed for 1–3 days with no reported mortality. In recurrent cases, 47% stayed for same time frame, while mortality was reported at 6%. PPIs were nearly universally administered—94% in non-recurrent and 100% in recurrent patients. Less duration of stay (1–3 days) was seen in 64% of non-recurrent and 45% of recurrent patients, while mortality ranged from 6% to 10%.

Osmotic diuretics were less frequently used in ischemic stroke patients compared to hemorrhagic cases, with administration rates of 26% in non-recurrent and 30% in recurrent groups. Anti-hypertensives were prescribed to 54% of non-recurrent and 50% of recurrent ischemic stroke patients.

DISCUSSION

Stroke incidence increases with each decade of life, and the risk is particularly high in the elderly.[12] In our study, age was a significant factor in stroke cases, with older adults being the majority, particularly those over 70, but no significant gender based differences were observed. The study done in China, Germany, India and Iran found that, while younger females are more likely to experience strokes than males, these differences are not statistically significant when considering the overall age distribution.[13] Ischemic strokes were the most common type in both sexes, while hemorrhagic strokes were more common in males, but gender did not significantly vary in stroke type distribution.

TABLE-II				
Stroke Type, Comorbidities, and Recovery Outcome (Duration of hospital stay & Expiries)				
Recurrence	**Hemorrhagic (%)**	**Ischemic (%)**	**Total (%)**	**Chi Sq. (χ^2) P-Value**
Non-recurrent	16(94)	35(64)	51(71)	$\chi^2 = 5.840$ P = 0.016
Recurrent	1(6)	20(36)	21(29)	
Total	17(100)	55(100)	72(100)	
Hypertension				
No	6(35)	22(40)	28(39)	$\chi^2 = 0.121$ P = 0.728
Yes	11(65)	33(60)	44(61)	
Total	17(100)	55(100)	72(100)	
Diabetes				
No	17(100)	32(58)	49(68)	$\chi^2 = 10.446$ P = 0.001
Yes	0(0)	23(42)	23(32)	
Total	17(100)	55(100)	72(100)	
Duration of hospital stay (days) / Expiries				
1-3days	9(53)	31(57)	40(56)	$\chi^2 = 0.128$ P = 0.988
4-6days	5(29)	16(29)	21(29)	
7-9days	1(6)	3(5)	4(5)	
Expired	2(12)	5(9)	7(10)	
Total	17(100)	55(100)	72(100)	
Age				
<50	7(41)	7(13)	14(19)	$\chi^2 = 8.807$ P = 0.032
50-59	5(29)	15(27)	20(28)	
60-69	3(18)	10(18)	13(18)	
>70	2(12)	23(42)	25(35)	
Total	17(100)	55(100)	72(100)	

TABLE-III						
Recovery outcome (Duration of hospital stay & Expiries) by age and comorbidities						
Duration of Hospital Stay/ Expiries	**1-3 Days**	**4-6 Days**	**7-9 Days**	**Expired**	**Total**	**Chi Sq. (χ^2) P-Value**
Age						
<50	6(15)	5(24)	1(25)	2(28)	14(19)	$\chi^2 = 9.291$ P = 0.411
50-59	14(35)	5(24)	0(0)	1(16)	20(28)	
60-69	5(12)	6(28)	0(0)	2(28)	13(18)	
>70	15(38)	5(24)	3(75)	2(28)	25(35)	
Total	40(100)	21(100)	4(100)	7(100)	72(100)	
HTN & DM						
HTN−, DM−	21(52)	3(14)	1(25)	1(14)	26(36)	$\chi^2 = 21.773$ P = 0.010
HTN+, DM−	13(33)	8(38)	1(25)	1(14)	23(32)	
HTN−, DM+	2(5)	0(0)	0(0)	0(0)	2(3)	
HTN+, DM+	4(10)	10(48)	2(50)	5(72)	21(29)	
Total	40(100)	21(100)	4(100)	7(100)	72(100)	

TABLE-IV				
Pharmacological interventions and recovery outcomes				
Drugs	**Hemorrhagic**		**Ischemic**	
	Non-Recurrent N=16 (%)	**Recurrent N=1 (%)**	**Non-recurrent N=35 (%)**	**Recurrent N=20 (%)**
Anti -convulsants	16(100)	0(0)	7(20)	14(70)
Anti-platelets	3(19)	0(0)	26(74)	15(75)
Antibiotics	13(81)	1(100)	30(86)	16(80)
Statins	2(13)	0(0)	22(63)	15(75)
PPIs	15(93)	1(100)	33(94)	20(100)
Osmotic Diuretics	10(62)	1(100)	9(26)	6(30)
Anti-hypertensives	12(75)	1(100)	19(54)	10(50)
Duration of hospital stay (days)/ Expiries				
Anti-convulsants	1-3 days(50) 4-6 days (31) 7-9 days (6) Expired (13)	-----	-------	1-3 days(43) 4-6 days(43) 7-9 days(7) Expired(7)
Anti-Platelets	-------	-----	1-3 days(62) 4-6 days(35) 7-9 days(3) Expired(0)	1-3 days(40) 4-6 days(46) 7-9 days(7) Expired(7)
Antibiotics	1-3 days(54) 4-6 days(23) 7-9 days (8) Expired(15)	1-3 days(100) 4-6 days(0) 7-9 days(0) Expired(0)	1-3 days(60) 4-6 days(27) 7-9 days(3) Expired(10)	1-3 days(44) 4-6 days(44) 7-9 days(6) Expired(6)
Statins	-------	-----	1-3 days(64) 4-6 days(36) 7-9 days(0) Expired(0)	1-3 days(47) 4-6 days(41) 7-9 days(6) Expired(6)
PPIs	1-3 days(47) 4-6 days(33) 7-9 days(7) Expired(13)	1-3 days(100) 4-6 days(0) 7-9 days(0) Expired(0)	1-3 days(64) 4-6 days(27) 7-9 days(3) Expired(6)	1-3 days(45) 4-6 days(35) 7-9 days(10) Expired(10)
Osmotic Diuretics	1-3 days(40) 4-6 days(50) 7-9 days(0) Expired(10)	1-3 days(100) 4-6 days(0) 7-9 days(0) Expired(0)	-------	-------
Anti Hypertensives	1-3 days(50) 4-6 days(34) 7-9 days(8) Expired(8)	1-3 days(100) 4-6 days(0) 7-9 days(0) Expired(0)	-------	-------

Similarly, recent national registry data and hospital-based studies also show ischemic strokes as the dominant subtype for both men and women[14] and males are more likely to experience hemorrhagic strokes due to risk factors like hypertension, smoking, and alcohol use, resulting in higher incidences of intracerebral hemorrhage.[14] Our study found that females were more likely to experience recurrent strokes, non-recurrent strokes were more common in males, but the difference was not statistically significant. A study conducted in 2023 shows no significant difference in stroke recurrence rates between females and males, with slight differences in males and females experiencing earlier recurrence.[15] Our study showed that most patients recovered quickly after stroke onset, regardless of gender, however female patients had slightly higher mortality rates, suggesting gender differences may not directly influence recovery outcomes. Female patients tend to have slightly higher unadjusted mortality rates following stroke, particularly in older age groups.[16]

Our study showed that stroke type significantly influences recurrence, with ischemic strokes often causing recurrent events, while hemorrhagic strokes are mostly non-recurrent. Similarly, a study says that ischemic strokes that are primarily caused by large artery atherosclerosis or cardioembolism, have higher recurrence rates than hemorrhagic strokes.[17] Hemorrhagic stroke survivors are at a higher risk of major vascular events, but stroke recurrence is less frequent compared to ischemic stroke.[18] In our study, hypertension came out to be a prevalent comorbidity in stroke patients, strongly associated with cerebrovascular events, regardless of stroke type. Stroke analysis in Mexican American and Non-Hispanic White Adults shows that hypertension is a prevalent comorbidity among them, affecting over 90% of survivors and despite antihypertensive medications, many still have uncontrolled blood pressure, with two-thirds exhibiting high levels within 90 days post-stroke.[19] In our study diabetes came out to be linked more strongly to ischemic strokes than hemorrhagic strokes, indicating a stronger association between metabolic disorders and cerebrovascular events. A study conducted on patients with acute ischemic stroke admitted to the Department of Medicine in a tertiary care center shows heightened risk of stroke is related to diabetes induced atherosclerosis, endothelial dysfunction, and prothrombotic states that predominantly contribute to ischemic type.[20] A focused review on diabetes and stroke conducted in 2024 shows the association between diabetes and hemorrhagic stroke is weaker and less consistent, likely due to differing underlying mechanisms such as vessel rupture driven primarily by hypertension.[21] Our study found that recovery outcomes for both hemorrhagic and ischemic stroke patients were similar, with recovery occurring within a few days of onset, despite slightly higher mortality rates in hemorrhagic stroke however these differences were not statistically significant. A study conducted in Denmark shows that hemorrhagic strokes have a higher early mortality rate compared to ischemic strokes, due to their severity and immediate brain damage.[22] A significant association was observed between stroke type and age group. Hemorrhagic strokes were more commonly seen in younger individuals, particularly those under the age of 50, while ischemic strokes were more prevalent among older adults, especially those over 70. This age-related distribution is supported by global epidemiological data showing that hemorrhagic stroke incidence is relatively higher in younger populations, often linked to risk factors such as hypertension and vascular malformations, whereas ischemic stroke incidence increases sharply with advancing age due to atherosclerosis and cardiac comorbidities.[23] Our study found no significant correlation between recovery duration and age group, with early recovery being most common in older adults. Mortality rates were uniform across age groups, indicating other factors may influence recovery trajectories. In 2025, Lindgren emphasizes that stroke recovery is a dynamic process influenced by initial stroke severity and biological factors rather than age alone, which explains why recovery duration may not correlate strongly with age group.[24] Our study found a significant association between recovery outcomes and comorbidities, specifically hypertension and diabetes. Patients without both conditions had favorable recovery profiles, while those with both experienced delayed recovery and higher mortality rates. A study conducted in Southwestern Ontario Hospital shows that combined presence of diabetes and hypertension exacerbates vascular dysfunction, leading to poorer post stroke recovery and increased mortality risk and hypertension, when uncontrolled, can delay physiotherapy and worsen rehabilitation outcomes, further complicating recovery trajectories.[25]

In our study hemorrhagic stroke patients' treatment regimens were selective and aggressive, with anti-convulsants used in non-recurrent cases but not in recurrent cases however recovery outcomes vary, suggesting cautious seizure prevention in initial episodes. A Guideline from the American Heart Association/American Stroke Association shows that anti-convulsants are primarily used in patients with early or high-risk seizures, rather than in recurrent cases, to balance seizure prevention against potential side effects.[26] Recovery after hemorrhagic stroke depends on hematoma size, location, and seizure occurrence.[26] Our study found that anti-platelets were rarely used in hemorrhagic stroke, while antibiotics were widely administered, resulting in full recovery without mortality in recurrent cases. A guideline from the American Heart Association says that anti-platelets are rarely used in hemorrhagic stroke due to bleeding risk, while antibiotics are widely administered.[27] Our study found that statins use in hemorrhagic stroke was minimal, while proton pump inhibitors (PPIs) were extensively used. A meta-analysis and trial sequential analysis conducted in 2019 shows that statin therapy in hemorrhagic stroke patients is controversial due to bleeding risk, but some studies suggest cardiovascular benefits outweigh risks, leading to cautious use.[28] Effective hemodynamic management was found crucial for recurrent hemorrhagic strokes, with osmotic diuretics and anti-hypertensives more frequently used, whereas non-recurrent patients showed variable recovery. The 2022 American Heart Association guidelines on spontaneous intracerebral hemorrhage (ICH) emphasizes that acute blood pressure lowering with regimens that limit variability and achieve smooth, sustained control reduces hematoma expansion and improves functional outcomes.[26]

In our study anti-convulsants were more frequently prescribed in recurrent cases, but recovery outcomes remain similar in recurrent and non- recurrent however mortality remained low, suggesting their impact on overall outcomes is limited. A study conducted in tertiary care centre of Thailand shows that anti-convulsants are more common in recurrent stroke patients, but their outcomes remain consistent across groups, with seizure prophylaxis and treatment more common in recurrent cases.[29] In our study anti-platelets and statin therapy were crucial in ischemic stroke management, with non-recurrent patients experiencing better early recovery (shorter duration of hospital stay) and no mortality, while recurrent cases have lower recovery (longer duration of hospital stay) and some mortality. Both drugs have vascular benefits, especially in improving prognosis after initial ischemic events. A similar study shows anti-platelets and statins are key therapies for non-recurrent stroke, reducing recurrent events and reducing mortality, but may increase new-onset diabetes risk over long-term use.[30] Antibiotics were widely used in both groups, with robust recovery rates in non-recurrent patients. A study conducted in 2020 says that prophylactic antibiotics reduce the rate of post-stroke infections, including fever spikes, but do not significantly improve functional neurological outcomes or reduce mortality.[11]

CONCLUSION

This study highlights distinct patterns in stroke types, patient demographics, and associated comorbidities, demonstrating that stroke outcomes are significantly influenced by comorbidities such as hypertension and diabetes, as well as by pharmacological management. Patients without comorbidities had better recovery (shorter hospital stays), while those with both hypertension and diabetes experienced delayed recovery (longer hospital stays), and higher mortality. Ischemic stroke was more prevalent, especially among older adults, and was strongly associated with diabetes and higher recurrence rates. Hemorrhagic strokes, though less common, were predominantly non-recurrent and occurred more frequently in younger patients. Pharmacological treatments varied by stroke type: anti-platelets and statins were used more in ischemic stroke, while the use of anticonvulsants and osmotic diuretics was more prevalent and beneficial in patients with hemorrhagic stroke. These findings emphasize the critical role of comorbidities and demographic factors in determining stroke recurrence, type, and recovery outcomes, offering guidance for targeted treatment strategies and improved patient outcomes. Stroke care strategies must be individualized to patient profiles, especially in resource-limited settings.

Ethical Approval

Ethical approval was obtained from ethical review board/committee under letter no. 1008/137 dated 26/04/2025.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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2	**Areeba Rashid:** Study design.
3	**Khuzaima Maaz:** Research design.
4	**Muhammad Aminullah:** Data interpretation.
5	**Muhammad Hassaan Rasheed:** Drafting.
6	**Durish Fatima:** Review.
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