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A multicenter prospective study on the prevalence of Post Stroke Delirium and associated risk factors in Addis Ababa, Ethiopia

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Abstract

Background Post-stroke delirium, a frequent and significant complication of stroke, manifests as a sudden onset of confusion, altered consciousness, and cognitive decline. Various factors contribute to its occurrence, including old age, multiple comorbidity, electrolyte abnormalities, and infections. The impact of post-stroke delirium on stroke recovery is substantial. It leads to prolonged hospital stays, heightened risk of institutionalization, increased dependence, and elevated mortality rates. As a result, early identification and prompt treatment of post-stroke delirium are imperative for optimizing outcomes in stroke patients.

Objective The objective of this study is to determine the Prevalence of post-stroke delirium and associated risk factors in hospitalized patients at TASH, Y12HMC, and YSC, Addis Ababa, Ethiopia from August to December 2023.

Method We performed a prospective observational study, including all the stroke patients admitted to the respective study areas during the study period from August to December 2023.

Participants who fulfilled the inclusion criteria were involved in this study. Data was collected using an interviewer-administered Questionnaire with a well-tested and validated tool, Patients were assessed for Delirium within 48 h of admission and subsequently screened every 12 h. Descriptive statistics was used to summarize the data in terms of frequency, proportion, mean, and standard deviation. Bivariate and multivariate logistic regression analyses were carried out to identify associated factors. Statistical significance was considered when the p-value was below 0.05.

Results Out of 101 patients 26(25.7%) had Post-Stroke Delirium. The majority 56 (55.4%) of the patients were females. The mean (SD) age of the study participants was 56.05 ± 15.38 years, and the mean time in days until the occurrence of delirium was 3 ± 1 days. Multivariable logistic regression analysis showed that, Age Greater than 60(AOR = 19.1, 95% CI (1.7–211) $p = 0.016$, Presence of Sepsis (AOR = 8.3, 95% CI (1.2–56) $P = 0.029$, Presence of Polypharmacy (AOR = 157, 95% CI (10.2–244) $P = 0.0001$, Presence of Electrolyte Derangement (AOR = 65.2, 95% CI (3.4–124.1) $P = 0.005$ were statistically significant risk factors.

Conclusion Our Study showed that Post Stroke Delirium occurs in a quarter of patients admitted with a Diagnosis of Acute Stroke, and the Identified risk factors were Age greater than 60, Polypharmacy, Presence of Sepsis

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and Electrolyte Derangement. Medical professionals responsible for caring for acute stroke patients should be vigilant in identifying those at higher risk of developing post-stroke delirium.

Additionally, they should focus on preventing and treating possible precipitating factors such as infections or electrolyte abnormalities. Incorporating delirium screening into routine patient assessments is crucial.

Keywords Delirium, Stroke, Tikur Anbessa Specialized Hospital, Yekatit 12 Hospital and Medical College, Yehulshet Specialty Center

Introduction

Background

Delirium and confusional states

These conditions frequently manifest in patients with medical illnesses, particularly among the elderly [1–4].

Delirium is a sudden alteration in mental state marked by irregular and varying levels of attention. It involves a disruption in consciousness levels and a decreased capacity to concentrate, guide, change, and maintain attention [5].

Consciousness requires both arousal and attentiveness. The brainstem and diencephalon's reticular activating system mediates arousal. Attentiveness depends on the cerebral cortex, especially polymodal association areas [6–8].

Delirium (also known as acute Confusional state) is an organically caused decline from a previous baseline of mental function that emerges swiftly, typically hours to days.

A variety of terms are used to describe delirium, including acute brain failure, encephalopathy, acute Confusional state, and postoperative or intensive care unit (ICU) psychosis [9–11]. Delirium is a significant clinical problem across various medical settings including stroke units, intensive care units [9–13] and emergency departments [12, 14–18].

Based on the DSM-5 Criteria Delirium is marked by a disturbance in attention, where individuals find it difficult to direct, focus, sustain, and shift attention, alongside impaired awareness. It typically develops rapidly, over a few hours to days, and presents as a deviation from the individual's baseline cognitive function, with fluctuations throughout the day. In addition to attention disturbances, there are cognitive impairments, such as deficits in memory, orientation, language, visuospatial abilities, or perception. Delirium is not attributable to another neurocognitive disorder and does not occur during severe reductions in arousal, such as a coma. The condition's etiology is supported by a history, physical examination, or laboratory findings related to a medical condition, substance use, or medication side effects [19, 20].

Furthermore, delirium may exhibit psychomotor disturbances (hypoactivity, hyperactivity) and variable emotional states (fear, depression, euphoria, perplexity).

The biological basis of delirium and confusion is not well understood in part because it is difficult to study severely ill patients, but humoral and Neurotransmitter mechanisms have been hypothesized [21, 22].

Delirium is a multifactorial disorder. Factors that increase the risk for delirium and Confusional states can be classified into those that increase baseline vulnerability and those that precipitate the disturbance [6, 23].

The most commonly identified risk factors are underlying brain diseases such as stroke, dementia, or Parkinson's disease; these are present in nearly one-half of older patients with delirium [7, 8].

Stroke is one of the leading causes of mortality worldwide, and delirium is recognized as a significant determinant of patient outcomes. Despite its importance, there is a substantial gap in understanding the prevalence and impact of delirium in stroke patients in Ethiopia. This study aims to address this critical issue by investigating the occurrence and risk factors of delirium in this population, ultimately contributing to improved patient care and outcomes [6, 23, 24].

Numerous and diverse factors can cause delirium; some prominent ones are infection, dehydration, immobility (including the use of restraints), malnutrition, Polypharmacy (especially psychoactive medicines), and the use of bladder catheters. There are multiple Drugs believed to cause or prolong delirium or Confusional states like Anticholinergic, Analgesics, and other varied Medications [6, 23].

Delirium occurs rapidly and typically persists for days and even months [25]. The most useful characteristic for distinguishing delirium from dementia is the acuteness of the presentation.

In addition, the features of delirium are not stable, typically becoming worse in the evening and at night. It is not unusual for a patient with delirium to appear relatively lucid during morning rounds [23, 26].

As mentioned previously, clinicians often fail to recognize delirium; in some reports, this happens in more than 70% of cases. Behavioral problems or cognitive

impairment may be readily apparent but wrongly attributed to the patient's age, dementia, or other mental disorders [27–29].

Methods

Study area and period

Study area

1. Tikur Anbessa Specialized Hospital: Being a multifunctional tertiary care university-affiliated hospital, it serves as a pivotal location for conducting the study. The presence of a dedicated Stroke unit, complete with an organized team consisting of senior neurologists, residents, and trained nurses, illustrates a substantial infrastructure for stroke patient care.
2. Yekatit 12 Hospital Medical College: As another prominent hospital in the capital city, it provides additional resources and networks for the study. The availability of key departments, including Emergency, ward, and Outpatient services, broadens the scope for potential collaboration and patient recruitment.
3. Yehulshet Specialty Center: with its specialty in neurological and internal medicine, offers a unique setting that complements the capabilities of the hospitals. The specialty center's focus on neurological specialties and wide range of medical services adds diversity and depth to the study's potential participant pool.

In addition to the individual strengths of each location, the collective impact of incorporating diverse clinical settings into the study has the potential to yield comprehensive insights into the prevalence of delirium in stroke patients and associated risk factors. The robust setup of the stroke unit at TASH, combined with the broader medical services at both hospital locations and the focused expertise of YSC, presents a network of resources and knowledge that can enhance the study's outcomes.

Study period

The Study will be conducted at TASH, Y12HMC, and YSC in Addis Ababa, Ethiopia from August 1, 2023 to December 31, 2023.

Study design

A 5-month Observational Prospective Cohort study from August 1 2023 to December 31 2023.

Source population

All Acute Stroke Patients Admitted to the Ward, ER, and Stroke Unit at TASH, Y12HMC, and YSC.

Sampled population

Patients Admitted during the study period were considered as sample Population.

Inclusion criteria

Present ischemic or hemorrhagic stroke including patients with cerebral venous thrombosis.

Exclusion criteria

Absence of consent for research by the patients themselves or legal representatives;

Patients with initial stroke-like symptoms that could not be confirmed as stroke.

Patients who have underlying Cognitive disorders like Dementia, Psychosis and Intellectual disability.

Patient with an unstable medical condition requiring immediate medical or surgical management.

Patients with Richmond Agitation Sedation Scale (RASS) [30] score −3 to −5 and patients who are unable to be assessed for delirium.

Acute Stroke Patients with Wernicke's Aphasia.

Sample size and sampling technique

The actual sample size was determined by using the single population proportion formula, where the following assumptions were considered: 95% confidence interval and 5% margin of error. All patients admitted to the stroke unit and respective wards during the period of data collection were selected to be included in the study. To determine sample size a p-value of 50% was taken since there was no previous study conducted in our country, 10% non-responder rate was added to the calculated sample size. The sample size was deducted by the finite population correction formula because our source of population was less than 10,000 patients. Making the final sample size 101.

All Patients admitted to the stroke unit, ward at TASH, Y12HMC, and YSC in the study period were included in the study if they didn't have one of the Exclusion criteria, RASS was used to assess the arousability of the patient and to check the premorbid cognitive disturbances respectively [30], we used the RASS score of 1 to 4 to define hyperactive delirium and Hypoactive delirium of 0 to −3, patients were assessed for delirium using the well-validated CAM tool as soon as they are admitted to the stroke unit and they were screened for any of the Risk factors that are listed and they were followed in the stroke unit and were be screened every 8–12 h until they are discharged or transferred to another inpatient setting, Additionally,

the total duration of admission and the Outcome of each patient was followed [31].

Data collection instrument, procedure and method

Data was collected using an interviewer-administered questionnaire which was adapted from previously published studies with some modifications to ensure applicability to our current study, after it was checked for validity and reliability after pretesting. The questionnaire consists of questions on sociodemographic factors, medical history,

Study variables

Independent

Age, Gender, Education, Address, Diagnosis at admission, Comorbidities, Nutritional Status, Type of Stroke and Severity, Administered Medication during hospitalization, The presence of psychiatric disorders or Dementia before admission, Hearing and visual impairment, History of Alcohol abuse, Immobilization, Use of Physical restraints, Environmental conditions, History of catheterization and Urinary Retention, Constipation, Surgical Procedures, Electrolyte Imbalance Polypharmacy, Poor pain control, Sleep Deprivation, and Place of admission.

Dependent

Prevalence of delirium in Patients admitted to the stroke unit, ward at TASH, Y12HMC, and YSC.

Operational definitions

Constipation—Fewer than three bowel movements (BMs) per week.

Polypharmacy – The Concurrent use of 5 or more medications prior to the index stroke.

Sleep Deprivation – defined as less than 6 h of sleep per night.

Alcohol abuse is defined as > 21 units per week for males and 15 units per week for females.

Stroke of Undetermined Etiology – 2 more potential causes of stroke were identified, but no identified etiology was identified despite extensive investigation or incomplete diagnostic evaluation.

Unstable medical condition –state which requires immediate medical or surgical management like resuscitation, airway protection or Neurosurgical intervention.

Data quality control

The Investigator has examined the appropriateness of the methodologies followed. The questionnaire was reviewed for completeness and pre-testing was done.

The questionnaires were pre-tested on 5% of the sample in a similar setting, which was not part of the study.

Filled questionnaires were checked for completeness and consistency of information once weekly during data collection by the investigator.

The template was checked for internal consistency and any inconsistency or ambiguity was addressed in time.

The authors confirm that the data supporting the findings of this study are available within its supplementary materials.

Ethical clearance

All information collected was used solely for the intended purpose. Personal Identifier Information (PII), including names of patients, was not included in the questionnaire. Codes were used instead and completed questionnaires were stored safely by the Investigator.

Data from the research is Available with the Primary investigator for purposes of Publication or additional Scrutiny.

Proposal approval was obtained before the beginning of data collection from Addis Ababa University College of Health Science IRB and Research and Publication Committee (RPC) of the Department of Neurology, College Health Sciences (CHS) TASH.

Additionally Ethical clearance was approved by Ethics committee of TASH.

This research received no specific grant from any funding agency in the public, commercial, or nonprofit sectors.

All authors declare that they have no conflicts of interest.

Consent was asked from all participating individuals and only those who consented were included in the study.

Result

Socio-demography

A total of 101 patients were included in the study. The majority of the study subjects' age is greater than 60, with the mean (SD) age of the study participants being 56.05 ± 15.38 years, with the youngest patient being 22 and the oldest patient being 88 years. 40.6% of the cases were from TASH, 31.7% were from Y12HMC and 27.7% were from YSC. The majority of Patients 87.1% were from Addis Ababa and 12.9% of the participants were from Different regions of Ethiopia like Oromia, Amhara, and SNNPR. The majority 56 (55.4%) of the patients were females. The majority of the participants 76.2% were Orthodox Christians. 80.2% were married and 41.6% had Primary School as their Level of education (Table 1).

Medical comorbidities

As shown in Fig. 1, from a total of 101 patients, 63.4% of them have Hypertension, 20.8% of them have

Table 1 Socio-demographic and behavioral characteristics of the study participants at TASH, Y12HMC, and YSC from August 1-December 31, 2023

Socio-demographic and behavioral characteristics		Frequency
Age	18–34	11.90%
	35–59	41.60%
	60–80	42.50%
	>80	3.96%
Gender	Male	44.60%
	Female	55.40%
Educational Status	Unable to Read and Write	9.90%
	Primary School	41.60%
	Secondary School	23.80%
	Diploma and Above	24.80%
Marital Status	Married	80.20%
	Single	10.90%
	Divorced	4.00%
	Widowed	5.00%
Religion	Christian	76.20%
	Muslim	16.80%
	Other	6.90%

Diabetes and around 30.7% of them have Cardiac comorbidity which is predominantly chronic rheumatic valvular heart disease. 4% of them had a history of known malignancy and 18.8% of them Developed Sepsis through their stay in the Hospital. And when we see their History of substance use 9.9% of the participants have recent Alcohol abuse, 4% of them smoked Cigarettes and 5.9% chewed Khat.

The Data also showed that Polypharmacy is as high as 31.7% and there was Benzodiazepine use in 5% of the Participants because they developed a complication of seizure during their stay at the Hospital. And 15% of the Participants Have Developed Electrolyte Derangement like Hyponatremia and Hypernatremia (Table 2).

Type of stroke

Concerning the type of stroke, 66.3% of them developed Acute ischemic stroke, 26.7% of them had Hemorrhagic stroke and the remaining 6.9% of them developed CVT, And from the Acute ischemic strokes 47.5% of the participants had large artery stroke, 34.6% Cardio embolic stroke, 10.8% small vessel occlusion, 1.9% had stroke of other determined Etiology and 6.9% had stroke of undetermined etiology and when we see the laterality of the stroke majority of them 53.5% had Right sided Stroke, 41.6% of them were Left-Sided and 5% had no laterality (Table 3).

Prevalence of post stroke delirium, types of delirium and associated risk factors

Out of 101 patients, 26(25.7%) had Post-Stroke Delirium, concerning the type of Delirium Hypoactive Delirium leading (12.9%) followed by Mixed Delirium (6.9%) and 5.9% hyperactive delirium. Pertaining the associated risk factors Age, Gender, Type of stroke, history of hypertension, history of Diabetes, history of Cardiac illness, history of alcohol abuse, smoking cigarette and chewing Khat, Presence of Polypharmacy, presence of sepsis, presence of electrolyte imbalance, sleep deprivation, Benzodiazepine use, constipation was individually

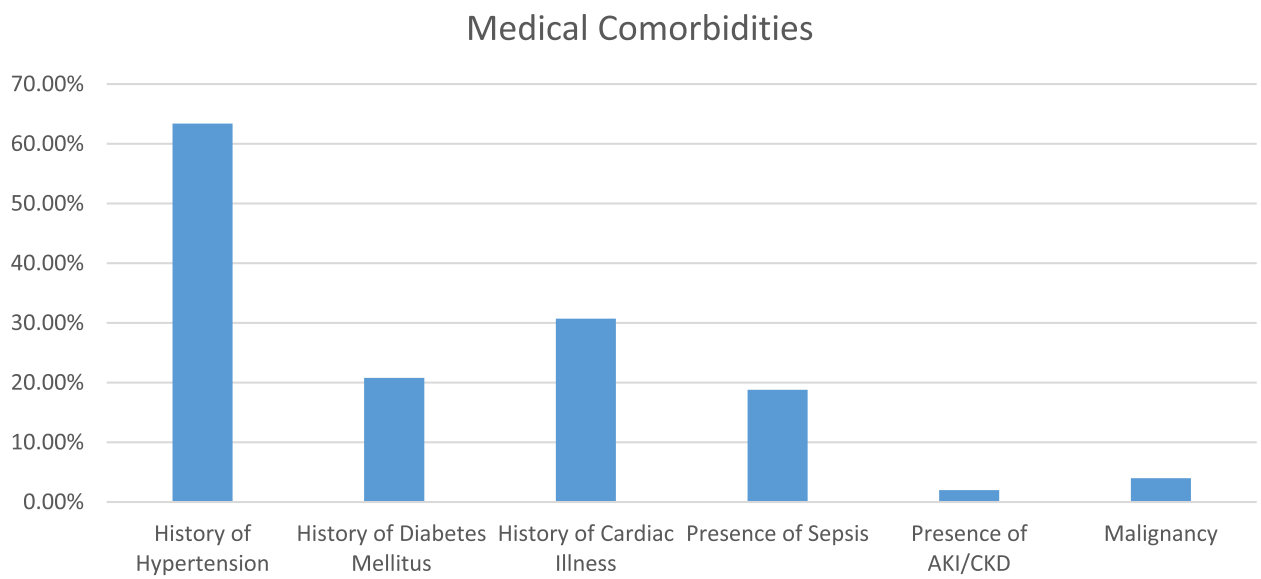

Fig. 1 List of associated Medical comorbidities among the acute stroke participants at TASH, Y12HMC, and YSC from August 1-December 31, 2023

Table 2 Substance use and iatrogenic risk factors for the development of Post stroke delirium in study participants at TASH, Y12HMC, and YSC from August 1-December 31, 2023

Substance use and iatrogenic risk factors		Frequency
Alcohol Abuse	Recent Use of Alcohol	9.9%
	No Use of Alcohol	90.1%
Current Smoker	Smoker	4.0%
	Non-Smoker	96.0%
History of chewing Khat	Chews Khat	5.9%
	Non Khat Chewer	94.1%
Presence of Polypharmacy	Polypharmacy Present	21.8%
	No Polypharmacy	78.2%
Presence of Visual impairment	Has Visual Impairment	5.9%
	No Visual Impairment	94.1%
Benzodiazepine use	Use of Benzodiazepine	5.0%
	No Benzodiazepine Use	95.0%
Presence of any Electrolyte derangements?	Have Electrolyte Derangement	15.0%
	No Electrolyte Derangement	85.0%

Table 3 Stroke Subtypes and Laterality of Stroke of the study participants at TASH, Y12HMC, and YSC from August 1-December 31, 2023

Stroke Subtypes and laterality of Stroke with Development of Delirium		Total patients Count/N (%)	Frequency of Delirium Count/N (%)
Stroke Type	Acute Ischemic Stroke	67(66.3%)	18(69.2%)
	Acute Hemorrhagic Stroke	27(26.7%)	8(30.8%)
	Cerebral venous thrombosis	7(6.9%)	0(0.0%)
Subtype of Ischemic stroke	Large Artery Stroke	48(47.8%)	14(53.8%)
	Cardio-embolic Stroke	35(34.3%)	8(30.7%)
	Small Vessel Occlusion	11(10.8%)	4(16.7%)
	Stroke of other Determined Etiology	2(1.9%)	0(0.0%)
	Stroke of Undetermined Etiology	7(6.9%)	0(0.0%)
Laterality of Stroke	Right Hemisphere	54(53.5%)	13(50.0%)
	Left Hemisphere	42(41.6%)	12(46.2%)
	Bilateral stroke	5(4.9%)	1(3.8%)

assessed with Bivariate analysis and those statistically significant were further put into multivariate logistic regression. 76.9% of patients with delirium had anterior circulation strokes, while 23.1% had posterior circulation strokes. Additionally, 84.6% of delirium cases were linked to supratentorial strokes, and 15.3% to infratentorial strokes. The average duration before the onset of delirium was found to be approximately 3 days, with a standard deviation of ± 1 day. Upon Multivariate Logistic Regression Age Greater than 60(AOR = 19.1, 95% CI (1.7–211) $p = 0.016$, Presence of Sepsis (AOR = 8.3, 95% CI (1.2–56) $P = 0.029$, Presence of Polypharmacy (AOR = 157, 95% CI (10.2–244) $P = 0.0001$, Presence of Electrolyte Derangement (AOR = 65.2, 95% CI (3.4–124.1) $P = 0.005$ were statistically significant (Table 4).

Discussion

Stroke is a global health challenge that often leads to death or impairment. The WHO warns that stroke will become a widespread crisis in the current century [22]. Delirium, a multifaceted mental disorder, has been linked to various conditions and interventions. Among these, strokes emerge as significant triggers for its onset [23].

Although no prior studies on post-stroke delirium existed in our setting, our research revealed a remarkably high prevalence of post-stroke delirium at 25.7%. Hypoactive Delirium leading (12.9%) followed by Mixed

Table 4 Multivariate Logistic regression analysis between the development of Post-stroke delirium and significant risk factors from bivariate analysis

Associated Risk factors from Bivariate Analysis	df	*P*-Value	AOR	AOR with 95% C.I	
				Lower	Upper
Age greater than 60	1	0.016*	19.110	1.723	211.979
History of Hypertension	1	0.823	1.305	.127	13.371
History of Diabetes	1	0.160	4.162	.570	30.398
History Cardiac Illness	1	0.831	.818	.129	5.177
Presence of Sepsis	1	0.029*	8.373	1.244	56.366
Presence of Polypharmacy	1	0.000*	157.797	10.204	244.0
Presence of Electrolyte Derangement	1	0.005*	65.202	3.424	124.1

d.f degree of freedom, *AOR* Adjusted odds ratio, *C.I* Confidence interval, *represent statistically significant variables with *p*-value < 0.05

Delirium (6.9%). In comparison to studies conducted in Germany (10.7%) [32] and Egypt (20.3%) [33], our findings are notably higher. However, when compared to the study from King's College London, our result is slightly lower (28% vs. 25.7%) [34–36].

The mean (SD) age of our study participants was 56.05 ± 15.38 years, which is notably younger than the Egyptian study population with a mean age of 60.7 years**.** This finding underscores that our stroke patients tend to be relatively younger. The possible explanation lies in the prevalence of poorly controlled hypertension and a significant proportion of patients with cardio embolic stroke. The latter may be attributed to valvular heart disease resulting from rampant rheumatic fever.

Regarding the association between age and the development of post-stroke delirium, our results indicate that patients aged 60 or older are significantly linked (*P*-value = 0.016) to the occurrence of post-stroke delirium. This aligns with existing literature, which consistently emphasizes that advanced age is a risk factor for delirium development.

In our study, 45% of participants were male, while 55% were female, indicating a slight female predominance. This contrasts with the Egyptian study, where males were predominant (45.9% females vs. 54.1% males). The difference may be attributed to women's better health-seeking behavior in our setting.

Regarding the relationship between sex and incidence of delirium, we found no significant difference between male and female stroke patients. Interestingly, this aligns with existing literature, which consistently does not identify sex as a risk factor for the development of post-stroke delirium.

In the context of comorbid medical illnesses observed in participants who presented with stroke, several key findings emerged. Hypertension was notably prevalent, affecting 63.3% of the participants. Diabetes mellitus was present in 20.8%, and cardiac illness was identified in 30.7% of the cases. When comparing these three major comorbidities with data from an Egyptian study, our findings revealed lower prevalence rates in all 3 comorbidities.

This discrepancy can be attributed to several factors, but mainly our majority of patients lack preceding health checkups, leading to a higher incidence of undiagnosed hypertension, diabetes, and cardiac illnesses.

In our study, 69.2% of patients with delirium had acute ischemic stroke, contrasting with previous findings that favored hemorrhagic stroke. Regarding stroke laterality, 50% of the patients who developed Delirium Were Right Hemisphere strokes, Prior studies yielded conflicting results, with some favoring the Right Hemisphere and others implicating the Left Hemisphere in post-stroke delirium risk.

The prevalence of post-stroke delirium appears to be significantly higher in patients with supratentorial strokes (84.6%) compared to infratentorial strokes (15.3%). This could be due to the fact that supratentorial regions of the brain are more involved in cognitive functions and disruption in these areas could potentially lead to higher delirium incidences.

Similarly, a higher percentage of patients with anterior circulation strokes developed delirium (76.9%) compared to those with posterior circulation strokes (23.1%). This may indicate that anterior circulation strokes, which affect regions supplied by the carotid arteries, have a greater impact on the likelihood of developing delirium post-stroke.

In our study, we observed that sepsis is a notable complication in stroke patients, with a prevalence of 18.8%. This sepsis risk arises from various sources, including aspiration pneumonia, urinary tract infections, and other infectious processes. Furthermore, the

presence of sepsis is statistically associated with the development of delirium (p-value = 0.02).

Regarding electrolyte derangement, 15% of our Acute Stroke patients exhibited abnormalities. Among these, Hyponatremia emerged as the major culprit, with a striking 86% proportion.

In our study, we investigated the temporal dynamics of delirium development following admission. Notably, the median day for delirium onset was found to be approximately 3 days, with a narrow range of variability (± 1 day). These findings underscore the importance of early monitoring and intervention to mitigate the impact of delirium in hospitalized patients. Additionally, Patients who developed delirium post-stroke had an average hospital stay of 11 days, compared to 9.2 days for those without delirium. This highlights the prolonged hospital stay associated with post-stroke delirium.

Conclusion

Our Study showed that Post Stroke Delirium occurs in a quarter of patients admitted with a Diagnosis of Acute Stroke, and the Identified risk factors were Age greater than 60, Polypharmacy, Presence of Sepsis and Electrolyte Derangement, Medical professionals responsible for caring for acute stroke patients should be vigilant in identifying those at higher risk of developing post-stroke delirium. Additionally, they should focus on preventing and treating possible precipitating factors such as infections or electrolyte abnormalities. Incorporating delirium screening into routine patient assessments is crucial.

Recommendation

Risk assessment and vigilance

Healthcare professionals caring for acute stroke patients should remain vigilant in identifying individuals at higher risk of developing post-stroke delirium.

Monitoring patients closely, especially those who are over 60 years old and those with a history of Polypharmacy, sepsis, or electrolyte derangement.

Preventive measures

Proactively address potential precipitating factors, such as infections or electrolyte imbalances.

Incorporate Delirium Screening into Routine Stroke care.

Weaknesses of the study

Some of the identified weaknesses of the study are lack of assessment on severity of stroke, few laboratory tests (no lipid profile, liver function test, GFR, HbA1c, C-reactive protein, etc.).

Abbreviations

AAU	Addis Ababa University
AAHB	Addis Ababa Health Bureau
AOR	Adjusted Odds Ratio
CAM	Confusion Assessment Method
CBC	Complete Blood Count
CI	Confidence interval
CT	Computed Tomography
CVT	Cerebral Venous thrombosis
DM	Diabetes Mellitus
DSM-5	Diagnostic Statistical Manual 5
ED	Emergency Department
Eg	Example
GC	Gregorian calendar
HTN	Hypertension
ICU	Intensive Care Unit
ID	Infectious Disease
LOS	Length of Stay
PI	Primary Investigator
RASS	Richmond Agitation-Sedation Scale
SD	Standard Deviation
SPSS	Statistical package for social science
TASH	Tikur Anbessa Specialized Hospital
TIA	Transient ischemic attack
Y12HMC	Yekatit 12 Hospital Medical College
YSC	Yehulshet Specialty Clinic

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12883-025-04114-7.

Supplementary Material 1.

Supplementary Material 2.

Supplementary Material 3.

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Authors' contributions

A) Dr Beruk Ketema Primary invesgator, responsible for project inception, data analysis and drafting of the main manuscript. B) Prof Getahun Mengistu critcally reviewed the manuscript and supervised the work. C) Dr Dereje Melka critically reviewed the manuscript and supervised the work. D) Dr Yared Zenebe critically reviewed the manuscript and supervised the work. E) Dr Mehila Zebenigus critically reviewed the manuscript and supervised the work. F) Dr Feryat Leul assisted in Data collection and writing manuscript. A,B,C,D Neurologist, Department of Neurology, College of Health Science, Addis Ababa University, Zambia Street, Addis Ababa, Ethiopia. E Neurologist, Yehulshet specialty Clinic. F Internsit, Department of Internal Medicine, College of Health Science, Addis Ababa University, Zambia Street, Addis Ababa, Ethiopia.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

Human Ethics and consent to participate declaration is attached. Proposal approval was obtained before the beginning of data collection from Addis Ababa University College of Health Science IRB and Research and Publication Committee (RPC) of the Department of Neurology, College Health Sciences (CHS) TASH. Additionally Ethical clearance was approved by Ethics committee of TASH. All experiments were performed in accordance with relevant guidelines and regulations.

Informed Consent was asked from all participating individuals and only those who consented were included in the study. All information collected was used solely for the intended purpose. Personal Identifier Information (PII), including names of patients, was not included in the questionnaire. Codes were used instead and completed questionnaires were stored safely by the Investigator.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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