International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 08 Issue 12 December 2025
DOI: 10.47191/ijcsrr/V8-i12-44, Impact Factor: 8.048
IJCSRR @ 2025
www.ijcsrr.org

Clinical Spectrum of Neurological Emergencies: A Retrospective Analysis from a Tertiary Care Center in Mizoram

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ABSTRACT:
Background: Neurological emergencies are a major cause of morbidity and mortality worldwide. In resource-limited settings, trauma, stroke, and infectious causes remain leading contributors.
Objective: This study aims to analyze the distribution of neurological emergency cases by category, age, and gender in a hospital-based cohort.
Methods: A retrospective analysis of 61 patients admitted with neurological emergencies was conducted. Data were categorized into trauma-related, cerebrovascular accidents (CVA), seizures, fever-related, post-surgical, and other causes. Demographic patterns were also assessed.
Results: Trauma-related emergencies constituted 50% of cases, followed by cerebrovascular accidents (25%) and seizures (13%). The majority of patients were males (64%) and young adults aged 11–40 years (33%). Elderly patients (61+) contributed to 26% of cases, largely due to stroke.
Conclusion: Trauma and stroke remain the leading causes of neurological emergencies. Preventive strategies targeting road traffic accidents, stroke awareness, and timely intervention are essential to reduce disease burden in resource-limited regions.

KEYWORDS: Neurological emergencies, trauma, stroke, seizures, resource-limited setting

INTRODUCTION

Neurological emergencies represent a broad spectrum of acute conditions that demand immediate recognition and management to prevent death or long-term disability. Globally, they account for a significant share of emergency department visits, intensive care admissions, and overall hospital mortality [1,2]. Common presentations include traumatic brain injury (TBI), stroke, seizures, central nervous system (CNS) infections, and post-surgical complications, each of which poses unique diagnostic and therapeutic challenges [3,4].

In developed nations, improved trauma systems, widespread availability of neuroimaging, and specialized stroke units have contributed to better outcomes. However, in resource-limited settings, the situation is more alarming. Limited access to CT or MRI scans, delayed referrals, scarcity of neurosurgical expertise, and inadequate rehabilitation facilities often result in poorer survival and higher disability rates [5,6].

Among these emergencies, trauma—particularly from road traffic accidents (RTA)—remains the leading cause of neurological admissions in younger populations. According to the World Health Organization (WHO), RTAs are projected to become the seventh leading cause of death by 2030, with the highest burden in low- and middle-income countries [7]. Falls and assault-related injuries further add to the trauma-related neurological caseload [8].

Stroke is another major contributor to neurological emergencies. Globally, it is the second leading cause of death and the third leading cause of disability [9]. The burden is rapidly rising in Asia due to aging populations, increased prevalence of hypertension, diabetes, and lifestyle-related risk factors [1]. Unlike trauma, stroke predominantly affects middle-aged and elderly populations, with ischemic stroke being more common than hemorrhagic stroke. Early recognition and treatment (e.g., thrombolysis, thrombectomy) are critical, but often unavailable in resource-constrained hospitals [10,11].

Seizures and epilepsy also constitute an important subset of neurological emergencies. Infections, head injuries, stroke, and metabolic disturbances are frequent causes of seizures in developing regions [12]. Recurrent seizures and status epilepticus can be life-threatening if not promptly managed [3]. Similarly, CNS infections such as meningitis, encephalitis, and tuberculosis-related

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neurological complications continue to be significant in endemic areas, especially in children and immunocompromised individuals [13].

Post-surgical neurological complications, including shunt blockages, burrhole infections, or post-craniotomy complications, although less common, also require urgent care [14]. Finally, other causes such as syncope, generalized weakness, tumors, and respiratory-associated neurological presentations highlight the wide variety of acute neurological conditions seen in practice [15].

This study was undertaken to provide a hospital-based descriptive analysis of neurological emergency cases, categorizing them into clinical groups and assessing demographic trends. By analyzing the distribution by age, gender, and type of emergency, the study aims to identify priority areas for preventive health strategies and to strengthen hospital preparedness in resource-limited contexts. Such data are essential to guide policy, improve emergency response systems, and ultimately reduce the burden of neurological emergencies in vulnerable populations [5,9].

MATERIALS AND METHODS

This study was designed as a retrospective, hospital-based case analysis conducted in a tertiary care hospital. Data were collected from the medical records of patients admitted to the emergency department and neurology/neurosurgery wards with acute neurological conditions over the study period.

A total of 61 patients met the eligibility criteria and were included in the study. Medical case records, admission registers, and discharge summaries were reviewed to extract relevant clinical and demographic information. Variables recorded included presenting symptoms, provisional diagnosis, final diagnosis, age, gender, and type of neurological emergency.

Inclusion Criteria:

- Patients of all age groups and both genders who presented with acute neurological symptoms requiring immediate evaluation and emergency care.
- Patients admitted through the emergency department and managed either conservatively or surgically during their hospital stay.

Exclusion Criteria:

- Outpatients presenting with chronic neurological conditions that did not require urgent admission.
- Patients admitted for elective neurosurgical or neurological procedures such as scheduled tumor resections, planned shunt revisions, or follow-up seizure management.

Case Categorization:

For uniformity, the cases were grouped into six major categories based on the primary diagnosis at admission and clinical course:

1. Trauma-related cases – Patients presenting with neurological emergencies due to road traffic accidents, falls from height, or physical assault. These included head injuries, traumatic brain injury, and associated complications.
2. Cerebrovascular accidents (stroke) – Patients diagnosed with ischemic or hemorrhagic stroke, identified clinically and confirmed through imaging where available.
3. Seizures and other neurological disorders – Patients presenting with new-onset seizures, recurrent epilepsy, or acute symptomatic seizures secondary to other neurological conditions.
4. Fever with neurological symptoms – Patients who developed neurological manifestations in the context of systemic or central nervous system infections, such as meningitis, encephalitis, or febrile seizures.
5. Post-surgical neurological cases – Patients admitted with complications following neurosurgical procedures, including craniotomy, burrhole evacuation, or ventriculoperitoneal (VP) shunt surgery.
6. Other causes – Patients presenting with miscellaneous neurological complaints, such as syncope, generalized weakness, shortness of breath with neurological association, or suspected intracranial tumors.

Data Analysis:

All collected information was systematically entered into a structured database for consistency and accuracy. Each patient's record was coded according to diagnostic category, age group, and gender. To minimize errors, the entries were cross-verified against admission registers and discharge summaries before analysis.

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The data were primarily analyzed using descriptive statistical methods, focusing on the distribution of cases across diagnostic categories, age groups, and gender. Frequencies (number of cases) and relative proportions (percentages) were calculated for each variable. This approach allowed for a straightforward assessment of the burden and pattern of neurological emergencies in the study population.

The results were presented in tabular form, summarizing the number and percentage of patients in each category. Tables were constructed for:

Diagnostic categories (trauma-related cases, cerebrovascular accidents, seizures, fever with neurological symptoms, post-surgical cases, and other causes)

Age group distribution (0–10 years, 11–40 years, 41–60 years, and 61+ years)

Gender distribution (male and female)

RESULTS

Table 1: Distribution of Neurological Emergencies by Category

Category	Number of Cases	Percentage (%)
Trauma-Related (RTA, Falls, Assault)	30	50%
Cerebrovascular Accidents (Stroke)	15	25%
Seizures & Neurological Disorders	8	13%
Fever with Neurological Symptoms	5	8%
Post-Surgical Cases	3	5%
Other Causes	5	8%
Total	61	100%

Table 2: Age Group Distribution

Age Group (Years)	Number of Cases	Percentage (%)
0–10 (Children)	7	11%
11–40 (Young Adults)	20	33%
41–60 (Middle-Aged)	18	30%
61+ (Elderly)	16	26%
Total	61	100%

Table 3: Gender Distribution

Gender	Number of Cases	Percentage (%)
Male	39	64%
Female	22	36%
Total	61	100%

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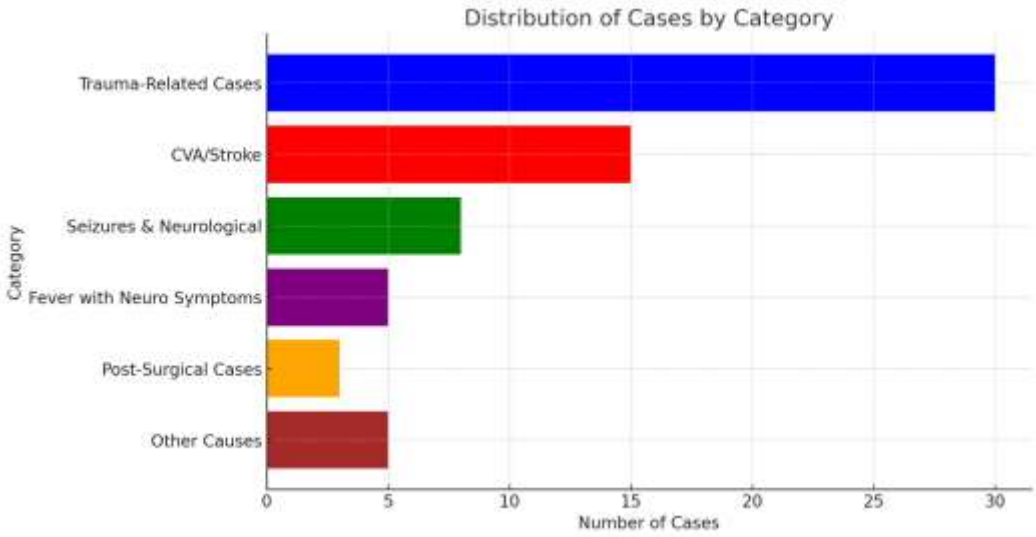

Figure 1: Age Group Distribution – Categorizing patients into different age ranges.

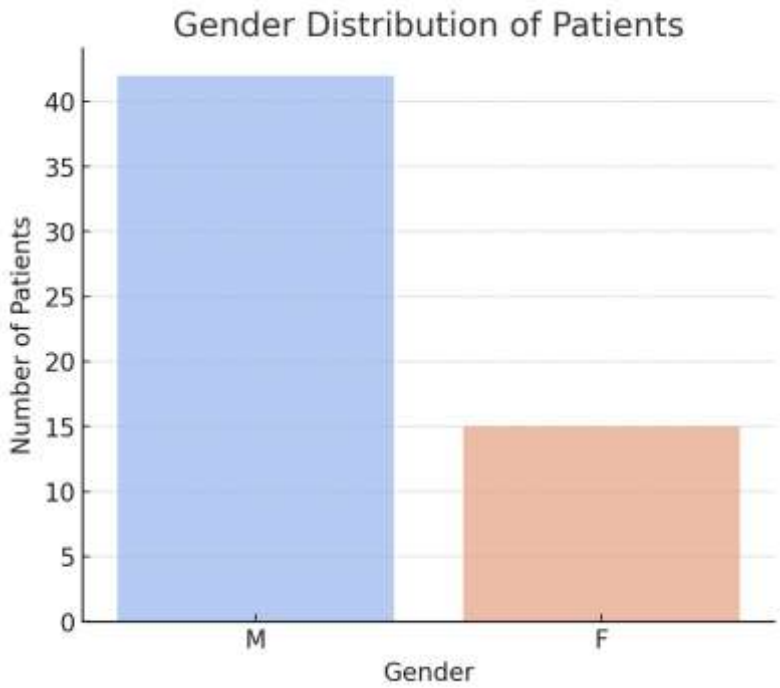

Figure 2: Gender Distribution – Comparing the number of male and female cases.

DISCUSSION

The predominance of trauma-related cases in this study (50%) underscores the substantial burden of head injuries in resource-limited settings. Road traffic accidents (RTAs), falls, and assault were the leading contributors, reflecting regional patterns where inadequate road safety measures, poor enforcement of traffic regulations, and lack of protective gear such as helmets contribute to high incidence rates [1,2]. This finding is consistent with global estimates, which suggest that traumatic brain injury accounts for a significant proportion of neurological emergency admissions, particularly among young adults [3,4]. Preventive measures such as stricter traffic law enforcement, road infrastructure improvements, and community education programs on injury prevention could substantially reduce this burden.

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Stroke represented the second most common emergency in this cohort (25%), with the majority of cases occurring in elderly patients. This aligns with international data indicating that stroke is the second leading cause of death and the third leading cause of disability worldwide [9]. In many developing regions, the growing prevalence of hypertension, diabetes, and lifestyle risk factors has led to a sharp rise in cerebrovascular accidents [1,6]. The lack of specialized stroke units, limited access to CT or MRI imaging, and unavailability of thrombolytic therapy further exacerbate poor outcomes in these settings [10,11]. Early recognition and intervention remain critical, but are often delayed due to gaps in prehospital care and referral pathways [6].

Seizures and epilepsy accounted for 13% of cases, a proportion that is comparable to other hospital-based studies in sub-Saharan Africa and South Asia [12,13]. Infections, post-traumatic epilepsy, and stroke-related seizures are common precipitants in such regions. Status epilepticus, if untreated, carries a high mortality rate, making rapid recognition and management essential [3]. Furthermore, fever-associated neurological symptoms (8%) highlight the continuing importance of infectious etiologies such as meningitis, encephalitis, and tuberculosis-related CNS involvement, which remain prevalent in tropical and resource-constrained countries [13].

The demographic distribution revealed a male predominance (64%), which is in line with earlier findings that men are disproportionately affected by neurological emergencies, particularly trauma [2,4]. This can be attributed to higher exposure to occupational hazards, increased risk-taking behaviors, and greater involvement in road traffic and outdoor activities. In contrast, elderly populations showed higher rates of stroke, reflecting the age-related increase in vascular risk factors [9].

In resource-limited healthcare systems, the challenges are further magnified by delayed presentation, limited diagnostic infrastructure, and shortages of specialized healthcare personnel [5,6]. The absence of standardized emergency protocols for neurological conditions, coupled with financial constraints faced by patients, often results in suboptimal outcomes [14]. Addressing these systemic barriers requires a multifaceted approach, including investment in imaging and intensive care facilities, workforce training, and development of locally adaptable emergency guidelines.

Implementing preventive strategies such as road traffic safety campaigns, hypertension and diabetes screening, and public awareness on early stroke symptoms could reduce the incidence and severity of neurological emergencies [7,9]. Strengthening hospital preparedness through the establishment of dedicated stroke pathways, trauma care systems, and epilepsy management programs is equally essential. In addition, community-level interventions, such as educating families to recognize seizures and stroke warning signs, may play an important role in reducing delays in seeking care.

CONCLUSION

This study underscores the high prevalence of trauma and stroke as the leading causes of neurological emergencies in a hospital-based cohort. Trauma, largely driven by road traffic accidents, accounted for half of all admissions, emphasizing the urgent need for road safety enforcement, helmet use, and injury-prevention strategies [1,2]. Similarly, stroke, which was the second most common emergency, particularly among elderly patients, highlights the growing burden of vascular risk factors such as hypertension and diabetes in low- and middle-income countries [6,9].

The findings suggest that preventive measures at the community and policy level—including public education on safe driving practices, widespread awareness campaigns on stroke recognition, and screening for non-communicable diseases—are crucial steps to reduce the incidence and severity of neurological emergencies [7,9,11].

In addition, strengthening hospital preparedness through emergency imaging access, dedicated stroke pathways, and adequately trained healthcare personnel can significantly improve patient outcomes [5,10,14]. Addressing systemic challenges such as delayed presentation, inadequate prehospital services, and shortage of neurocritical care specialists remains a priority for health systems in resource-limited settings [6,15].

Overall, the results of this study highlight the dual importance of prevention and capacity building: reducing avoidable neurological emergencies through targeted public health initiatives while simultaneously enhancing healthcare infrastructure to manage unavoidable cases more effectively.

ACKNOWLEDGEMENTS

The authors would like to thank the Department of Medical Sciences, Shri Venkateshwara University, Gajraula, Uttar Pradesh, for providing laboratory facilities and technical support assistance in data collection.

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Competing Interests

The authors declare that they have no competing interests or financial relationships that could influence the work.

Authors' Contributions

1.Lalruatfela, PhD Scholar: Conceptualization, data collection, data analysis, manuscript drafting.

2. Dr. K. Ramadas K. Chennamsetty: Supervision, critical review, guidance, and final approval of the manuscript.

Consent

Written informed consent was obtained from all participants prior to inclusion in the study. Participants were informed about the study objectives, procedures, potential risks, and benefits, and they voluntarily agreed to participate.

Ethical Approval

The study was approved by the Institutional Ethics Committee of Shri Venkateshwara University (Approval No. SVU/Ph.D/RDC/1286). All procedures were performed in accordance with the ethical standards of the institutional research committee and the 1964 Helsinki Declaration and its later amendments, including all relevant local and national regulations regarding human subjects research.

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Cite this Article: Lalruatfela, Chennamsetty, K.R.K. (2025). Clinical Spectrum of Neurological Emergencies: A Retrospective Analysis from a Tertiary Care Center in Mizoram. International Journal of Current Science Research and Review, 8(12), pp. 6327-6333. DOI: https://doi.org/10.47191/ijcsrr/V8-i12-44