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Original Research Article

STUDY OF CLINICAL PROFILE IN NONTRAUMATIC ADULT PATIENTS WITH ALTERED SENSORIUM AND ITS CORRELATION WITH THE OUTCOME AT EMERGENCY ROOM OF A TERTIARY CARE HOSPITAL, DEVDAHA, RUPANDEHI

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ABSTRACT

Background

Altered sensorium accounts for approximately 4–10% of all emergency visit presentations worldwide, posing a major challenge to emergency doctors. At Devdaha Medical College and Research Institute (DMCRI), 115 non-traumatic adult cases were studied. Early clinical assessment helps timely management and predicts outcomes.

Objectives

This study aimed to assess the clinical profile and outcome assessment (mortality, morbidity) of non-traumatic patient of altered sensorium.

Methods

This prospective observational hospital-based study was conducted in the emergency department of DMCRI from April to September 2025. Adult patients (≥18 years) with non-traumatic altered sensorium were included. Data were collected using questionnaire, analyzed using descriptive statistics, including frequency, percentage, and range. Convenience sampling was used after ethical approval (Reference No: 1924/o81/082).

Results

In 115 patients (age 18–83 years), 64 (55.6%) were male. Most patients (n = 33, 28.6%) were aged 61–70 years. Common presenting complaints were headache (77.3%), nausea / vomiting (70.4%) and focal neurological deficit (61.7%). Cerebrovascular accident (CVA) was the commonest cause (n = 38, 33%), followed by metabolic disorders (n = 29, 25.2%) and substance-related intoxication (n = 24, 20.9%). Overall mortality was 20% (n = 23); mortality was highest among metabolic causes (47.8% of deaths), followed by CVA (21.7%) and substance poisoning (13%). At discharge, 48 (41.7%) patients had complete recovery and 44 (38.2%) had residual disability.

Conclusions

Altered sensorium predominantly affected elderly patients, with stroke and metabolic disturbances. Early recognition helps to reduce poor outcome. Strengthening emergency and inpatient care can significantly improve outcomes.

Keywords: *Altered mental status, Cerebrovascular accident, Emergency, Metabolic encephalopathy, Outcome*

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INTRODUCTION

Altered mental status (AMS) is a broad clinical term describing an acute disturbance in consciousness, cognition, or behavior that requires urgent medical evaluation [1]. It encompasses a spectrum ranging from confusion and disorientation to coma and may arise from diverse etiologies, including metabolic, toxic, vascular, infectious, neoplastic, and seizure-related causes [2].

Assessment of altered sensorium is commonly performed using standardized tools such as the Glasgow Coma Scale (GCS) and the AVPU scale, which help determine severity and guide management decisions [3, 4]. Globally, AMS accounts for approximately 4–10% of emergency department visits, making it a significant contributor to morbidity, mortality, and healthcare burden [5]. Neuroimaging, particularly computed tomography (CT), plays a crucial role in identifying structural causes, while metabolic and systemic conditions such as hepatic or uremic encephalopathy must also be considered [6-7].

Previous studies have demonstrated considerable variation in the etiological spectrum of AMS across different regions. Another study reported neurological, toxicological, and trauma-related causes as the most common in the United States, [8] while another researcher observed a predominance of neurological disorders in Turkey [9]. Similarly, a German study identified stroke as the leading cause in Germany [10]. These differences may be attributed to variations in disease burden, healthcare access, environmental exposures, and diagnostic resources.

Despite the clinical importance of AMS, there is a lack of region-specific data from Nepal regarding its etiological spectrum, clinical presentation, and outcomes. Differences in healthcare infrastructure and disease patterns necessitate local evidence to support effective clinical decision-making.

Therefore, this study was conducted to evaluate the demographic profile, clinical presentation, etiological spectrum, and outcomes of adult patients presenting with non-traumatic altered sensorium in a tertiary care hospital in Western Nepal.

METHODS

This was a prospective observational hospital-based study conducted in the Emergency Department of Devdaha Medical College and Research Institute (DMCRI), a tertiary care referral hospital serving both urban and rural populations of Lumbini Province, Western Nepal, with a high emergency patient load, from April 2025 to September 2025. This setting was considered appropriate as it receives a high volume of emergency cases, including patients with altered sensorium, allowing comprehensive evaluation of clinical profiles and outcomes.

The study included adult patients (≥18 years) presenting to the emergency department with non-traumatic altered mental status (AMS). AMS was defined as any acute disturbance in consciousness or cognitive function, including confusion, disorientation, decreased responsiveness, or Glasgow Coma Scale (GCS) <15 at presentation.

Patients with head injury, transient syncope without persistent altered sensorium, primary psychiatric illness, those brought dead, those who refused consent or investigations, and patients with incomplete clinical records were excluded.

A convenience sampling technique was used, where all eligible patients presenting during the study period were included consecutively.

Sample Size Calculation:

The required sample size was calculated using the formula:

$N = (Z^2 \times P \times (1 - P)) / d^2$

Where Z = 1.96 (95% confidence interval), P = 0.05 (expected prevalence), and d = 0.04 (margin of error). The calculated sample size was 115 patients.

Data were collected using a structured and pretested questionnaire administered by trained medical officers in the emergency department. The questionnaire included demographic details, presenting complaints, clinical findings, GCS at admission, relevant investigations (including CT head in patients with focal neurological deficits, reduced GCS, or suspected intracranial pathology) final diagnosis (etiology), and hospital outcomes.

Recovery was defined as complete resolution of symptoms with return to baseline mental status at discharge.

Recovery with disability was defined as persistence of neurological or functional deficits at discharge requiring ongoing care.

Mortality was defined as death occurring during hospital admission.

GCS was assessed at admission by trained medical officers using standard guidelines to ensure consistency and minimize inter observer variability. Patients were categorized into mild (GCS 13–15), moderate (GCS 9–12), and severe (GCS 3–8) groups.

Data were entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics such as frequency, percentage, mean ± standard deviation, and range were used.

Associations between categorical variables (e.g., GCS severity and outcome) were assessed using the chi-square test, with a p-value <0.05 considered statistically significant. However, no significant association could be identified.

RESULTS

A total of 115 adult patients with altered sensorium were included in this study. The age of patients ranged from 18 to 83 years, with 64 (55.6%) males and 51 (44.3%) females, giving a male-to-female ratio of 1.25:1. The majority of cases, 33 (28.6%), were in the 61–70 years age group, comprising 19 males (57%) and 14 females (43%).

Age and Sex Distribution

Table 1: shows the age and sex distribution of the study population. The highest mortality occurred among patients aged over 70 years (30.0%), followed by those aged 61–70 years (24.2%). No deaths occurred below 30 years of age.

Table 1: Age and sex distribution of patients with altered sensorium (N = 115)

Age group (years)	Total, n (%)	Male, n	Female, n	Mortality, n (%)
18-30	7 (6.1)	4	3	0 (0.0)
31-40	11 (9.5)	6	5	3 (27.3)
41-50	21 (18.2)	11	10	2 (9.5)
51-60	23 (20)	14	9	4 (17.4)
61-70	33 (28.6)	19	14	8 (24.2)
>70	20 (17.3)	10	10	6 (30.0)
Total	115 (100)	64	51	23 (20.0)

Note: Values are expressed as number (percentage). Mortality indicates the number and proportion of deaths within each age group.

Etiological Spectrum:

The different causes of altered sensorium are shown in Table 2.

The most common etiology was Cerebrovascular Accident (CVA) in 38 (33%) patients, followed by Metabolic causes (n = 29, 25.2%) and Substance intoxication (n = 24, 20.9%). Among CVA cases, Ischemic stroke (n = 25, 65.7%) was more frequent than Hemorrhagic stroke (n = 13, 34.3%). Mortality was higher in patients with Hemorrhagic stroke (n = 4, 17.3%) compared to Ischemic stroke (n = 1, 4.3%).

Among metabolic causes, Hepatic encephalopathy (n = 11) was predominant, with 7 deaths, representing the highest mortality within a single cause.

Table 2: Etiological factors in altered sensorium patients and associated mortality (N = 115)

Etiology (neurological / non-neurological)	Diagnosis	No. of cases (n = 115)	Mortality (n = 23, 20%)
CVA (n = 38, 33%) — Neurogenic	Hemorrhagic stroke	13 (34.4% of CVA)	4 (17.3% of total mortality)
	Intracerebral hemorrhage	8	
	Epidural hematoma	3	
	Subdural hematoma	2	
	Ischemic stroke	25 (65.8% of CVA)	1 (4.3% of total mortality)
Metabolic (n=29, 25.2%)	Hypoglycemia	7	0
	Hyponatremia	3	0
	Hepatic encephalopathy	11	7
	Uremic encephalopathy	5	3
	Diabetic ketoacidosis	3	1
Infection (n = 14, 12.17%)	Meningoencephalitis (viral)	2	1
	Septic encephalopathy	7	2
	Cerebral malaria	1	0
	Neurocysticercosis seizure	4	0
Substance intake (n = 24, 20.86%)	Alcohol intoxication	6	0
	OP poisoning	13	2
	Zinc sulphide poisoning	5	1
Type II respiratory failure (n = 6, 5.2%)	COPD with respiratory acidosis	6	1
Intracranial neoplasm (n=1)	Intracranial neoplasm	1	0
Heat stroke (n = 1)	Heat stroke	1	0
Others — Bradycardia (n = 2)	Bradycardia	2	0

Abbreviations: CVA – cerebrovascular accident; COPD – chronic obstructive pulmonary disease; OP – organophosphate.

Note: Mortality represents the number and proportion of total deaths (n = 23). Percentages for CVA subtypes are calculated relative to the 38 total CVA cases.

Outcome Based on Etiology:

Out of the 115 patients, 48 (41.7%) achieved complete recovery, 44 (38.2%) recovered with residual disability, and 23 (20%) expired.

Table 3: summarizes the patient outcomes according to etiological group. The highest mortality was observed among Metabolic causes (n = 11, 47.8%), followed by CVA (n = 5, 21.7%), and Substance intoxication (n = 4, 17.4%).

Table 3: Outcome of patients according to etiological category (N = 115)

Etiological Group	Frequency, n (%)	Recovery, n (%)	Recovered with Disability, n (%)	Mortality, n (%)
Cerebrovascular accident (CVA)	38 (33.0)	6 (15.8)	27 (71.1)	5 (21.7%)
Metabolic	29 (25.2)	8 (27.6)	10 (34.5)	11 (47.8%)
Infection	14 (12.2)	9 (64.3)	2 (14.3)	3 (13.0)
Substance abuse	24 (20.9)	19 (79.2)	2 (8.3)	3 (13.0)
Type II Respiratory failure	6 (5.2)	4 (66.7)	1 (16.7)	1 (4.3)
Intracranial neoplasm	1 (0.9)	0	1 (100.0)	0
Heat stroke	1 (0.9)	0	1 (100.0)	0
Other (bradycardia)	2 (1.7)	2 (100.0)	0	0

Note: Values are expressed as number (percentage).

Presenting Complaints

The most common presenting features were headache (n = 89, 77.3%), followed by nausea and vomiting (n = 81, 70.4%) and focal neurological deficit, including hemiparesis and facial palsy (n = 71, 61.7%) (Figure 1).

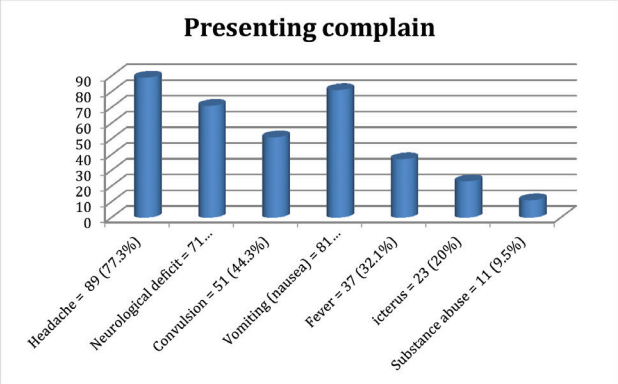

Figure 1: Distribution of common presenting complaints among patients with altered sensorium (N = 115). Y-axis shows percentage and X-axis showing complaints

Level of Consciousness:

Level of Consciousness: According to the Glasgow Coma Scale (GCS) at presentation, 21 (18.3%) patients had mild AMS (GCS 13–15), 69 (60.0%) had moderate AMS (GCS 9–12), and 25 (21.7%) had severe AMS (GCS 3–8) **(Figure 2)**.

Among the 23 deaths, mortality was highest in the severe GCS group (n = 17, 73.9%), followed by moderate GCS (n = 3, 13.0%), while no deaths occurred in the mild GCS group. The remaining 3 deaths (13.0%) occurred in patients for whom GCS at admission was not documented.

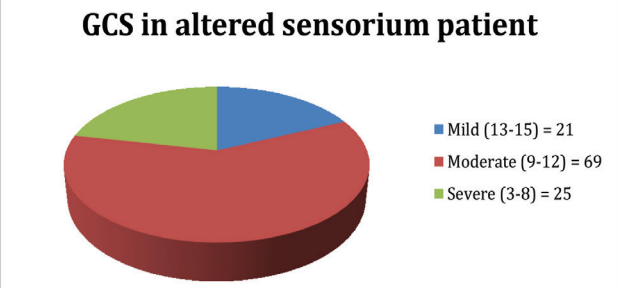

Figure 2: Distribution of patients according to Glasgow Coma Scale (GCS) categories and associated mortality (N = 115). The respective color grading are labelled.

DISCUSSION

In this prospective observational study of 115 adult patients presenting with non-traumatic altered sensorium, cerebrovascular accident (CVA) and metabolic disturbances emerged as the leading etiologies, with an overall mortality rate of 20%. The findings highlight the significant burden of acute neurological and systemic conditions contributing to altered sensorium in emergency settings and underscore the importance of early identification and targeted management to improve outcomes.

Trends in Demography

The study population ranged from 18 to 83 years, with a male predominance (55.6%) and a male-to-female ratio of 1.25:1. Similar gender trends were reported by previous studies [9,11,12]. with male predominance. The higher proportion of males in our study may be related to greater occupational exposure, alcohol and substance use, and a higher prevalence of chronic diseases such as liver and cardiovascular conditions.

The most affected age group was 61–70 years (28.6%), followed by 51–60 years (20%) and >70 years (17.3%). This pattern aligns with findings from previous study [9]. who reported that 47.1% of AMS case in patients older than 65 years. Conversely, Another study [13]. observed a higher prevalence among younger adults (20–29 years, 40%). which may reflect differences in infection rates, pesticide exposure, and substance abuse across regions. The predominance of older patients in our study likely reflects the cumulative effect of comorbid conditions such as hypertension, diabetes, and cerebrovascular disease, which increase vulnerability to both neurological and metabolic causes of altered sensorium. This highlights the need for heightened clinical vigilance in elderly patients presenting with acute changes in mental status.

Clinical Symptoms:

The most common presenting complaints were headache (77.3%), nausea and vomiting (70.4%), and focal neurological deficit (61.7%). Similar findings have been reported by two studies [14,13]. who found headache and focal neurological deficit to be the most frequent symptoms in AMS patients. The predominance of neurological symptoms suggests a central nervous system (CNS) origin in many cases.

In contrast, Another researcher [15]. reported focal neurological deficit (42.5%), vomiting (18.5%), and fever (11%) as leading symptoms, while headache was less common (10%). Such variations may arise from geographic differences, local disease burden, and study population diversity. The high frequency of neurological symptoms further supports the predominance of central nervous system involvement in this population, reinforcing the importance of early neurological assessment and timely neuroimaging in the emergency setting.

Etiology and Outcome:

The etiological spectrum of AMS in this study showed that Cerebrovascular Accident (CVA) was the most frequent cause (33%), followed by metabolic causes (25.2%), substance intoxication (20.9%), and infections (12.2%). Among CVA cases, ischemic stroke (65.7%) was more common than hemorrhagic stroke (34.3%), consistent with the findings of two researchers [9,15]. Our results are in line with another researcher [14]. who reported CVA (39%), metabolic (25%), and septic (18%) causes, by another study [16] which described exogenous toxins (29.8%), CVA (13.2%), and hepatic coma (3.4%) as major etiologies.

The metabolic group included cases of hepatic encephalopathy (n = 11), diabetic ketoacidosis (n = 3), and uremic encephalopathy (n = 5). Hepatic encephalopathy was the most common and deadliest metabolic cause, with seven deaths. This is comparable to another study [12]. who also reported high mortality in hepatic encephalopathy.

In contrast, a researcher [17]. found hyponatremia (45.3%) and hypoglycemia (29.8%) as predominant metabolic causes in Indian patients. Similarly, A study [18]. from Japan observed systemic infections (28.6%) and metabolic disturbances (22.4%) as leading etiologies.

Differences among studies may be explained by regional disease prevalence, healthcare access, and socioeconomic conditions. In tropical countries, infections such as malaria, typhoid, and viral encephalitis are frequent causes, whereas stroke, diabetes, and liver disease dominate in higher-income settings. Nutritional deficiency (thiamine) and alcohol-related disorders also contribute to AMS in South Asia. The predominance of cerebrovascular accidents and metabolic causes in this study reflects a dual burden of non-communicable diseases and systemic illnesses in the study population. While stroke represents an acute vascular event requiring rapid intervention, metabolic causes such as hepatic and uremic encephalopathy are potentially reversible if identified early. This distinction is clinically important, as delays in recognizing reversible causes may significantly increase morbidity and mortality.

Mortality and Prognosis

The overall mortality rate of 20% in our study is similar another study [9] (20.1%). These variations may reflect differences in sample size, patient acuity, and available critical care facilities.

Most deaths (60.8%) occurred in patients aged above 60 years, a finding consistent with two studies [20,21] who reported mortality rates of 62.5% and 55.6% respectively in elderly populations. Similarly, A study [11]. observed a death rate of 10.8% among those above 60 years, compared with 6.9% in younger patients.

The high mortality among elderly patients may be due to reduced immunity, electrolyte disturbances, multiple comorbidities (such as chronic kidney disease and cardiac dysfunction), nutritional deficiency (vitamin B12 and thiamine), and delayed presentation.

Among etiologies, metabolic causes accounted for the highest proportion of total deaths (11 deaths, 47.8%), followed by CVA (5 deaths, 21.7%) and substance intoxication (3 deaths, 13.0%). However, when analyzing condition-specific mortality rates, metabolic causes showed the highest mortality risk (11/29 cases = 37.9%), followed by CVA (5/38 cases = 13.1%) and substance intoxication (3/24 cases = 12.5%).which parallels the findings of two reports [15,20]. These outcomes highlight the importance of early recognition of reversible metabolic derangements to reduce death rates. The strong association between low GCS scores and increased mortality observed in this study emphasizes the prognostic value of early neurological assessment. Incorporating GCS-based risk stratification in emergency triage protocols may help prioritize high-risk patients and guide timely interventions.

Comparison with Previous Studies

When compared with international data, etiological trends of altered mental status (AMS) demonstrate considerable variation across different regions. Neurological causes, particularly cerebrovascular accidents (CVA), predominate in most tertiary care centers, as reported by two studies [9, 15]. Metabolic etiologies, especially hepatic encephalopathy, remain common in developing countries where infections and chronic liver disease are highly prevalent [12,17]) In contrast, infectious causes continue to account for a significant proportion of AMS cases in tropical regions, as observed by [14,18]. These variations highlight that the etiological profile of AMS is largely influenced by regional disease patterns, diagnostic facilities, and socioeconomic conditions. Strengthening emergency triage systems, ensuring point-of-care glucose and electrolyte testing, and expanding access to neuroimaging services can substantially improve early diagnosis and patient outcomes. Overall, the findings of this study highlight that altered sensorium is a multifactorial emergency condition with significant mortality, particularly

among elderly patients and those with metabolic or severe neurological causes. Strengthening early diagnostic protocols, improving access to essential investigations such as neuroimaging and laboratory testing, and ensuring prompt management of reversible conditions can substantially improve patient outcomes in resource-limited settings.

LIMITATIONS

This was a single-center, hospital-based study with a relatively small sample size, which may not reflect the full population of Western Nepal. The use of convenience sampling may have introduced selection bias. Additionally, advanced investigations such as MRI and CT angiography were not available for all patients due to financial constraints. Long-term neurological outcomes after discharge were not assessed.

CONCLUSIONS

Altered sensorium in non-traumatic adults was found to predominantly affect individuals above 60 years of age. Stroke (ischemic and hemorrhagic) was the leading cause, followed by metabolic disturbances such as hepatic and uremic encephalopathy, and substance intoxication (organophosphates and alcohol). Mortality was highest in metabolic causes, while many patients either recovered completely or with residual disability. These findings emphasize the importance of early recognition, timely management, and improved emergency care infrastructure to reduce morbidity and mortality related to altered sensorium in resource-limited settings like Nepal.

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