ORIGINAL ARTICLE

JIACM 2025; 26 (3): 86-91

A Study of Clinical Assessment, Aetiology and Outcome of Patients Presenting with Altered Sensorium

Shivaputra Patil, RS Yadav**, Dharmendra Kumar Mekle***, Simmi Dube****, SV Subhash**

Abstract

***Background:** This study seeks to determine the clinical assessment methods, aetiology and clinical prognosis that are implemented among patients with altered sensorium in emergency.*

***Methodology:** This research was designed as a prospective observational study on patients with altered sensorium (GCS <15) admitted in Department of Medicine, Hamidia Hospital over a period of 18 months. Detailed history was obtained and examination was done. Necessary investigations were done to determine the underlying cause and outcomes were assessed.*

***Results:** This study was conducted on a total of 200 cases, where majority were males (68%) and 37.5% of the cases belonged to elderly age group. Most common presenting complaint was hemiparesis (29.5%). Most common aetiology was acute ischaemic stroke (21.5%) followed by infections (16%). There was 34.5% mortality rate. We observed a significant association of outcomes with age, presenting complaints and aetiology (p <0.05).*

***Conclusion:** Altered sensorium is a significant medical condition with varied aetiologies and outcomes influenced by age, presenting complaints, and underlying morbidities. The study highlighted that age and specific presenting symptoms such as limb weakness and breathlessness are critical factors in patient outcomes. Haemorrhagic strokes and severe infections were associated with higher mortality, emphasizing the need for timely diagnosis and intervention.*

***Key words:** Altered sensorium, infections, stroke.*

Introduction

Altered sensorium encompasses a variety of clinical manifestations, including cognitive disorders, attention deficits, arousal abnormalities, and diminished levels of consciousness[1]. This condition presents a common challenge in emergency medicine, often with vague symptoms. Therefore, the task of diagnosing and managing patients with altered sensorium can be quite challenging for emergency physicians. Understanding how it develops and thoroughly evaluating the patient are crucial for improving the accuracy of diagnosis and effectiveness of treatment[2]. Clinical assessment plays a crucial role in evaluating patients with altered sensorium. It involves extensive neurological examination, cognitive assessment, and diagnostic investigations[3]. With a keen eye for detail and a methodical approach, clinicians are able to detect even the most subtle changes in consciousness, cognitive abilities, and neurological impairments. This allows for precise diagnoses and tailored treatments. In addition, the field of neuroimaging techniques and biochemical assays have made significant progress, allowing clinicians to better understand the underlying pathology with more accuracy and efficiency[4].

Understanding the causes of change in consciousness involves a wide range of complex factors, including neurological, systemic, and environmental influences. Neurological causes, such as traumatic brain injury, stroke, encephalitis, and seizures, play a significant role in many cases[5,6]. At the same time, there can be metabolic disturbances such as imbalances in electrolytes, hepatic encephalopathy, uraemic encephalopathy, and diabetic ketoacidosis that can cause changes in consciousness[7]. In addition, the diagnosis of infectious diseases such as bacterial meningitis and viral encephalitis can be quite challenging. It is important to approach the screening and treatment of these infections with great care.

Although altered sensorium is of great clinical importance, there is a lack of epidemiological studies on this topic globally. The outcome of patients with changes in mental state depends on how quickly and accurately they are diagnosed, and how promptly appropriate treatment is started. Swift recognition and intervention can help reduce the chances of complications, prevents any decline in neurological health, and improves the overall prognosis. This study seeks to determine the clinical assessment methods, aetiologies and clinical prognosis among the

**Post-Graduate Resident, **Associate Prtofessor, ***Assistant Professor, ****Professor, Department of Medicine, Gandhi Medical College, Bhopal - 462 002, Madhya Pradesh.*

Corresponding Author: Dr SV Subhash, Post-Graduate Resident, Department of Medicine, Gandhi Medical College, Bhopal - 462 002, Madhya Pradesh. Tel: 9491552724, E-mail: subhashsvs0@gmail.com

patients with altered sensorium.

Material and Methods

This research was designed as a prospective observational study on patients admitted to Medical Ward 1 and Medical Ward 2, Department of Medicine, Gandhi Medical College and associated Hamidia Hospital, Bhopal, Madhya Pradesh over a period of 18 months. All the patients presenting with Glasgow Coma Scale (GCS) score of less than 15, and new onset drowsiness or confusion of 1 week duration were included, whereas patients with chronic altered sensorium conditions (such as Alzheimer's disease, schizophrenia, and other psychiatric disorders), of age less than 13 years, and traumatic brain injury were excluded from the study.

The study was approved by the Institutional Ethics Committee (IEC) of Gandhi Medical College, Bhopal. Informed consents were obtained from all the participants or their legal health proxies (in case of minors or incapacitated patients). The confidentiality of patient data was strictly maintained throughout the study. Upon admission, the time and manner of admission along with detailed medical history were obtained. All the patients were subjected to detailed general and systemic examination. Laboratory tests were done which included complete blood counts, renal function tests with serum electrolytes, liver function tests (LFTs), and arterial blood gas (ABG) analysis and findings documented to determine the underlying cause. Apart from this, imaging studies such as ultrasound of abdomen and pelvis, computed tomography (CT) of the head, and magnetic resonance imaging (MRI) of the head were done. Electrocardiogram (ECG), electroencephalogram (EEG) and cerebrospinal fluid (CSF) analysis were done where indicated.

Aetiology of altered sensorium was established as:-

Primary Neurological: Cerebrovascular Accident (CVA), seizure disorder, meningoencephalitis.

Non-neurological: Metabolic, hepatic, renal, respiratory (RS), cardiovascular (CVS), sepsis with multiple organ dysfunction syndrome (MODS), pharmacologic/toxic.

Statistical Analysis

Data were analysed using IBM SPSS software version 20 (Statistical Package for Social Sciences, IBM Corp. Illinois Chicago). The Chi-square test was used to study the association between contributory factors and outcomes. A p value of <0.05 was considered statistically significant.

Results

This study was conducted on a total of 200 cases presenting with altered sensorium at our centre.

Table I: Distribution of patients according to baseline variables

Baseline variables		Number of patients (n = 200) (Per cent)
Gender	Female	64 (32.0)
	Male	136 (68.0)
Age (years)	13 - 20	4 ((2.0)
	21 - 30	30 (15.0)
	31 - 40	42 (21.0)
	41 - 50	24 (12.0)
	51 - 60	25 (12.5)
	>60	75 (37.5)
Complaints	Abnormal Body Movements	10 (5.0)
	Breathlessness	32 (16.0)
	Fever	32 (16.0)
	H/O Unknown Substance Ingestion	14 (7.0)
	Headache	3 (1.5)
	Jaundice	23 (11.5)
	Loss of Consciousness	5 (2.5)
	Pain Abdomen	13 (6.5)
	Vomiting	18 (9.0)
	Hemiparesis	59 (29.5)

68% of the patients with altered sensorium were males, and 37.5% of the cases belonged to elderly age group. Most common presenting complaint in the present study was hemiparesis (29.5%), followed by breathlessness (16%)

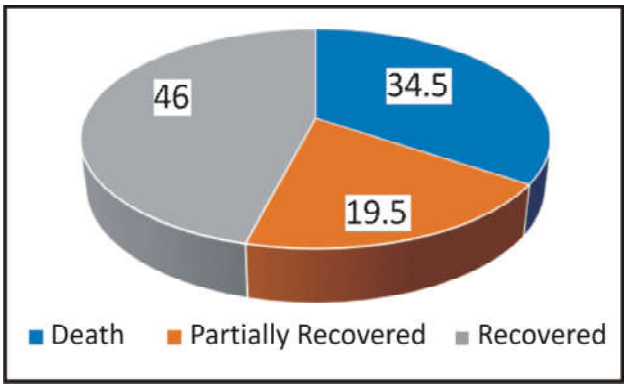

Fig. 1: *Distribution of patients according to outcome.*

and fever (16%) as shown in Table I.

Table II: Distribution as per aetiology

Aetiology	Number of patients	Per cent
CNS	**108**	**54.0**
Infections	32	16.0
Haemorrhagic stroke	20	10.0
Ischaemic stroke	43	21.5
ICSOL	3	1.5
Seizure disorder	10	5.0
Metabolic	**92**	**46.0**
Drugs/Toxin	14	7.0
Hyponatraemia	9	4.5
Hepatic	23	11.5
Hypoglycaemia	5	2.5
Ketosis	9	4.5
Respiratory	14	7.0
Uraemic encephalopathy	18	9.0

Primary CNS involvement was seen in 54% of the patients. Most common aetiology reported in the study was ischaemic stroke (21.5%), followed by infections (16%) and hepatic (11.5%). Other common aetiologies were uraemic encephalopathy (9%), drugs/toxin (7%) and respiratory (7%) (Table II).

Death was reported in 34.5% patients, 19.5% were partially recovered and 46% were fully recovered (Fig. 1).

Table III: Association of outcome with baseline variables and aetiology

Variables		Outcome			p value
		Death	Partially Recovered	Recovered	
Gender	Female	20	15	29	0.593
	Male	49	24	63	
Age (years)	13 - 20	1	1	2	0.001*
	21 - 30	7	0	23	
	31 - 40	12	3	27	
	41 - 50	8	4	12	
	51 - 60	9	3	13	
	>60	32	28	15	
Compl aints	Abnormal Body Movements	2	0	8	0.001*
	Breathlessness	6	0	8	
	Fever	10	1	21	
	H/O Unknown Substance Ingestion	5	0	9	
	Headache	1	2	0	
	Jaundice	8	0	15	
	Loss of Consciousness	2	0	3	
	Pain Abdomen	4	1	8	
	Vomiting	6	0	12	
	Hemiparesis	23	35	1	
Aetiology	Drugs/Toxin	5	0	9	0.001*
	Hyponatraemia	2	0	7	
	Haemorrhagic stroke	16	3	1	
	Hepatic	8	0	15	
	Hypoglycaemia	2	0	3	
	ICSOL	1	2	0	
	Infections	10	1	21	
	Ischaemic stroke	10	33	0	
	Ketosis	1	0	8	
	Respiratory	6	0	8	
	Seizure disorder	2	0	8	
	Uraemic encephalopathy	6	0	12	

Though we found no significant association of outcomes with gender ($p > 0.05$). Death was more common among the older patients (12/69), followed by those having age between 31 - 40 years (12/69) ($p < 0.05$). Death was more common in patients complaining of hemiparesis (n = 23/69) followed by breathlessness (n = 10/69) and jaundice (n = 8/69) ($p < 0.05$). Also, death was more among the patients with haemorrhagic stroke (n = 16/69) followed by infective causes (n = 10/69) and ischaemic stroke (n = 10/69) ($p < 0.05$) (Table III).

Discussions

In our study, the majority of patients presenting with altered sensorium were over 60 years of age (37.5%) and were males. Our study found a wider age range, with a notable number of patients over the age of 60 years. In the study conducted by Rai *et al*[9], it was observed that a significant number of patients were males (68%) with an average age of 45.53 ± 20 years. This could be attributed to variations in study settings and populations, as well as the specific emphasis on EEG predictors in Rai's study, which may have attracted a distinct patient demography.

In a study conducted by Raghu *et al*[10], it was discovered that the largest portion of patients fell within the 31 - 40 years age group. Males accounted for 31% of the patients, while females made up 22%. In our study, we observed that older age groups were more affected by altered

sensorium, which may be attributed to various geographical and environmental factors influencing its aetiology in different regions. This finding is in contrast to the younger age range observed in other studies. According to Jali *et al*[2], the study found that the majority of patients with altered sensorium were aged 60 years and above (32%). This aligns with our own findings and indicates that age-related factors, such as co-morbidities and higher susceptibility to neurological conditions, are important contributors to the presentation of altered sensorium in older populations. In the study conducted by Namindla *et al*[1], the age group most frequently affected was 51 - 60 years (28%), followed by 41 - 50 years (21%) and 61 - 70 years (18%), with an average age of 49.12 ± 14.77 years. This distribution indicated a pattern favouring middle to older age groups, which aligns with our observation that a considerable number of patients are over 60 years old. The slight differences in age distribution across these studies could be attributed to variations in healthcare access and the specific health conditions that are more common in the study populations. Our study and other similar studies have found that older adults are more likely to experience altered sensorium. This is likely due to the fact that older individuals often have multiple comorbidities, such as cardiovascular diseases, diabetes, and neurodegenerative disorders, which can contribute to altered sensorium[11,12]. In addition, there are certain physiological changes that occur with age, such as reduced blood flow to the brain and increased vulnerability to metabolic disruptions, which may also contribute to the situation.

Among patients with altered sensorium, hemiparesis was the most common presenting complaint (29.5%). This was followed by breathlessness (16%), fever (16%), jaundice (11.5%), vomiting (9%), history of unknown substance ingestion (7%), and abdominal pain (6.5%). These findings are consistent with the study conducted by Raghu *et al*[10], which found that fever (36%), headache (56%), vomiting (53%), and weakness (14%) were common symptoms in patients with altered sensorium. Their study also observed that infective causes were the most prevalent, followed by cerebrovascular accidents (CVAs), metabolic, and other causes. These findings indicate that these symptoms are common indicators of altered sensorium in various patient populations.

Kanich *et al*[13] found that among emergency department patients with altered mental status (AMS), the most common causes were neurological (28%) and toxicological (21%), followed by trauma (14%), psychiatric (14%), and infectious causes (10%). Diagnosing AMS can be quite complex due to the wide range of causes and symptoms, including lethargy and unusual behavior. Tuma *et al*[14] emphasized the complex factors contributing to AMS in cancer patients, included medications, metabolic issues, and infections. This complexity is reflected in our study, where symptoms such as weakness and vomiting suggest various possible underlying causes, requiring a thorough diagnostic approach.

Mahmood *et al*[15] discovered that the most prevalent causes of AMS were pyogenic meningitis, encephalitis, and cerebral malaria. It was also noted that fever was a persistent symptom in these cases. Our findings indicate that fever was a common complaint, highlighting the need to consider infectious causes in patients who have changes in their mental state. The occurrence of vomiting and abdominal pain in our study aligns with the results of Arora *et al*[16], who observed gastrointestinal symptoms in pediatric patients experiencing hyperosmolar diabetic ketoacidosis and hyperglycaemic hyperosmolar state, resulting in changes in mental alertness.

We found that a significant portion of patients with altered sensorium did not survive, while others experienced varying degrees of recovery. The high mortality rate underscores the serious nature of changes in consciousness. In the study conducted by Raghu *et al*[10], high mortality rates were observed in severe cases such as intracerebral haemorrhage (ICH) and subarachnoid haemorrhage (SAH). On the other hand, patients with metabolic causes like hypoglycaemia and Wernicke's encephalopathy showed better recovery rates. The correlation between these findings highlights the significance of pre-existing conditions on the outcomes of patients. Mahmood *et al*[15] also found significant mortality caused by infections such as pyogenic meningitis and encephalitis. This observation further supports our findings that infections play a significant role in increasine mortality rates.

In a study by Kanich *et al*[13], the causes of AMS in emergency departments were found to be primarily neurologic and toxicologic, resulting in a relatively low mortality rate of 9%. Nevertheless, their research highlighted the significance of patient history and physical examination in diagnosing AMS, underscoring its critical role in determining the prognosis and guiding treatment. These findings indicate that infections and severe neurological conditions play a significant role in higher mortality rates. It is crucial to diagnose and intervene promptly and comprehensively to improve recovery outcomes in patients with altered sensorium.

Our study found that 54% of patients with altered sensorium had involvement of the central nervous system (CNS), while metabolic causes were responsible for the remaining 46%. These findings align with findings of multiple other studies. Jali *et al*[2] found that altered

sensorium was primarily caused by cerebrovascular accidents (CVAs), accounting for 38% of cases. Metabolic causes and infections followed closely behind, making up 28% and 24% of cases, respectively. Raghu *et al*[10] found a high prevalence of CNS involvement. Their study showed that neurological causes, especially CVAs, were major factors contributing to changes in sensorium, with metabolic causes also playing a significant role. Kanich *et al*[13] discovered that neurologic causes were the primary reason for altered mental status (AMS) in emergency department patients, accounting for 28% of cases. They also noted the significance of metabolic causes in contributing to AMS.

Our study found that ischaemic stroke was the most common cause of altered sensorium, accounting for 21.5% of cases. Infective causes were the second most common, at 16%, followed by hepatic causes at 11.5%. This high prevalence of CNS involvement aligns with the findings of Raghu *et al*[10].

Manji *et al*[17] emphasized the significance of metabolic encephalopathy, specifically hyponatraemia, as a common cause of AMS in elderly patients. Similarly, Mahmood *et al*[15] found that metabolic disorders such as diabetic ketoacidosis and hepatic encephalopathy frequently contribute to altered sensorium. The consistency observed in these studies emphasizes the significant contributions of both central nervous system and metabolic factors in the development of changes in consciousness. Understanding and addressing these underlying conditions is crucial for enhancing patient outcomes. These studies highlight the significance of thorough diagnostic evaluations in effectively identifying and treating the various causes of changes in consciousness.

Our study found that ischaemic stroke was the most common cause of altered sensorium, accounting for 21.5% of cases. Infective causes followed closelybehind at 16%, while hepatic causes accounted for 11.5%. In addition, patients with haemorrhagic stroke had a higher mortality rate (16/69), followed by infective causes (10/69) and ischaemic stroke (10/69).

According to Jali *et al*[2], patients with cerebrovascular accidents (CVAs), especially those with intracerebral haemorrhage (ICH), had alarmingly high mortality rates, with a 100% fatality rate in their study. Infections and metabolic causes were found to have different outcomes, with metabolic causes generally resulting in better recovery rates.

Manji *et al*[17] shed light on the high mortality rates observed among patients with severe neurological and infectious conditions. Kanich *et al*[13] also highlighted thesignificance of timely intervention in improving outcomes, particularly in cases involving neurologic and infectious causes. Mahmood *et al*[15] discovered that infectious causes such as pyogenic meningitis and encephalitis were common and had high mortality rates. Raghu *et al*[10] found that SAH patients with altered sensorium at presentation had a 100% mortality rate. Our findings align with those of other studies, highlighting the significance of comprehending the diverse causes and their effects on patient outcomes in cases of altered sensorium.

Our study revealed strong correlations between age distribution and outcomes, with higher mortality rate in older patients. Patients experiencing hemiparesis (23/69), breathlessness (10/69), and jaundice (8/69) had a higher incidence of death. According to Jali *et al*[2], it was observed that the mortality rates were higher in older age groups, especially in individuals over 60 years of age. Their study highlighted the importance of age in determining outcomes, as older patients often have multiple co-morbidities that can lead to more unfavorable prognoses. Raghu *et al*[10] discovered that older patients with changes in their mental state experienced worse outcomes as compared to younger patients. Mahmood *et al*[15] found that older patients with fever and altered sensorium had a higher mortality rate. This was especially true for those who had underlying infections and co-morbidities.

Our study highlights the crucial role of early and accurate diagnosis, especially in older patients and those with severe symptoms. The correlation between age distribution and outcomes, as well as the significant impact of presenting complaints, further emphasizes this importance. These findings are consistent with previous research, highlighting the importance of conducting thorough evaluation and implementing specific treatments to enhance patient outcomes in situations involving changes in mental status.

The limitations of our study include the observational design, which may introduce bias and limit the ability to establish causality. The study is conducted at a single centre, potentially affecting the generalizability of the findings to other populations and settings. The exclusion of patients with chronic altered sensorium and traumatic brain injuries might limit the comprehensiveness of the study. Additionally, the reliance on self-reported medical histories and the accuracy of clinical assessments could be subject to variability. The sample size, while substantial, may still not capture all potential variations in aetiologies and outcomes, and the study's duration may not be sufficient to observe long-term outcomes and trends.

Conclusion

We found that altered sensorium is a significant medical condition with varied aetiologies and outcomes influenced by age, presenting complaints, and underlying causes. The

majority of patients were older than 60 years of age, and common aetiologies included ischemic stroke, infections, and hepatic failure. The study highlights that age and specific presenting symptoms such as limb weakness and breathlessness are critical factors in patient outcomes. Hemorrhagic strokes and severe infections were associated with higher mortality, emphasizing the need for timely and accurate diagnosis and intervention. Despite no significant differences in the outcomes based on gender, understanding the varied aetiologies and their impact is crucial for improving patient prognosis through comprehensive assessment and targeted treatment strategies. These findings align with existing literature, underscoring the importance of addressing the underlying causes to enhance recovery rates and reduce mortality in patients with altered sensorium.

References

1. Namindla SK, Krishna JG, Murali K, Krishna V. Study of clinical profile in patients with altered sensorium in Osmania General Hospital. *Int J Acad Med Pharm* 2023; 5 (4): 1573-7.
2. Jali SN, Nayak SN, Alexander BK. Clinical and investigational study for the aetiological evaluation of patients in nontraumatic altered sensorium and its outcome. *Int J Res Med Sci* 2019; 7 (5): 1113-9.
3. Arciniegas DB. Clinical electrophysiologic assessments and mild traumatic brain injury: state-of-the-science and implications for clinical practice. *Int J Psychophysiolo* 2011; 82 (1): 41-52.
4. Wolf A, Tripanpitak K, Umeda S, Otake-Matsuura M. Eye-tracking paradigms for the assessment of mild cognitive impairment: a systematic review. *Frontiers in Psycholo* 2023; 14: 1197567.
5. Wilson JE, Mart MF, Cunningham C *et al. Delirium Nat Rev Dis Primers* 6 (1): 90.
6. Balcom EF, Nath A, Power C. Acute and chronic neurological disorders in COVID-19: potential mechanisms of disease. *Brain* 2021; 144 (12): 3576-88.
7. Marshall A, Boyle M. Support of metabolic function. *ACCCN's Critical Care Nursing* 2007: 397.
8. Dhossche DM, Shah A, Wing L. Blueprints for the assessment, treatment, and future study of catatonia in autism spectrum disorders. *Int Rev Neurobiol* 2006; 72: 267-84.
9. Rai V, Jetli S, Rai N. Continuous EEG predictors of outcome in patients with altered sensorium. *Seizure* 2013; 22 (8): 656-61.
10. Raghu G, Bharath G, Manojkumar BK. To study the different aetiologies of non traumatic causes of Altered Sensorium and its correlation with the outcome. *IOSR J Dental and Med Sci (IOSR-JDMS)* 2020; 19 (10): 38-44.
11. Oh ES, Fong TG, Hshieh TT. Delirium in older persons: advances in diagnosis and treatment. *JAMA* 2017; 318 (12): 1161-74.
12. Arnold R, Issar T, Krishnan AV. Neurological complications in chronic kidney disease. *JRSM Cardiovascul Dis* 2016; 5: 2048004016677687.
13. Kanich W, Brady WJ, Huff JS *et al*. Altered mental status: evaluation and aetiology in the ED. *The Amer J Emer Med* 2002; 20 (7): 613-7.
14. Tuma R, DeAngelis LM. Altered mental status in patients with cancer. *Archives of Neurolo* 2000; 57 (12): 1727-31.
15. Mahmood T, Saha SK, Hasin W. Clinical profile and aetiological spectrum of patients present with Fever and altered sensorium. *IOSR J Dental and Med Sci (IOSR-JDMS)*, 2020; 19 (1): 48-54.
16. Arora BB, Maheshwari M, Devgan N. Prevalence of trichomoniasis, vaginal candidiasis, genital herpes, chlamydiasis, and actinomycosis among urban and rural women of Haryana, India. *J Sexually Transmitted Dis* 2014; 2014 (1): 963812.
17. Manji HK, Sawe HR, Kilindimo S. Clinical profile and mortality among adult patients presenting with altered mental status to the emergency departments of a tertiary hospital in Tanzania: a descriptive cohort study. *Pan African Med J* 2022; 41 (1).