Assessment of Risk Factors and Management of Altered Sensorium in Tertiary Care Hospital

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Abstract

Altered sensorium is a neurological deficit that changes the brain function varying from consciousness to coma and death. This condition requires urgent medical attention. A prospective observational study was conducted and recorded 160 cases. Out of 160cases, 92 were males and 68 were females. GCS was measured in 64 cases in our study in which 33 cases are severe. Neurological causes are most commonly seen followed by infections, and metabolic causes. The treatment pattern we observed are symptomatic based on risk factors and comorbid conditions. Our study concludes that etiology and severity vary from different age groups and comorbid conditions of the person. As a result, it was determined that the risk factor treatment was effective because it resulted in better patient care by reducing stay in the hospital. To enhance the patient's state and prevent recurrent disease conditions, physical examinations and regular consultations with doctors are required.

Keywords: *Altered sensorium, GCS, Risk factors, Neurologic causes.*

Introduction:

An altered sensorium (AS) is a group of clinical symptoms that affect the functions of the brain including cognitive disorders, attention disorders, and altered levels of consciousness. consciousness level varies from mild to severe drowsiness and leads to coma. In altered sensorium, timely diagnosis is important, and efficient supportive treatment will improve outcomes significantly. [1] Altered sensorium can have a variety of causes from metabolic disorders (such as uremia, and ketoacidosis) to acute localized brain lesions (such as stroke) to chronic neurodegenerative diseases. [2]

Risk factors:

- **Neurologic causes:** Infections- meningitis, encephalitis.
- Seizures.
- Vascular –strokes (ischemic, hemorrhagic).
- Trauma – epidural/intracranial hematomas.
- **Metabolic causes:** Dysglycemia, Hyponatremia/Hypernatremia, Sepsis, Wernicke's encephalopathy, Uremia.
- **Medications:** Drug overdose, Drug withdrawal.
- **Others:** Alcohol, Polypharmacy. [3]

Management: The ABCDE Approach (Airway, Breathing, Circulation, Disability, and Exposure) is a systematic approach to assessing and treating critically ill or injured individuals. The method can be used in any clinical emergency.

The aims of the ABCDE approach are

- To provide life-saving treatment.
- To Break down difficult clinical situations into smaller, more manageable parts.
- To act as an assessment and therapeutic algorithm.
- To ensure that all healthcare providers are aware of the current situation.
- To buy time until a final diagnosis and therapy can be determined.

The airway is in stable condition if the patient responds in a normal voice. Breathing is stabilized by determining the respiratory rate. Lung auscultation should be conducted if a stethoscope is accessible, and a pulse oximeter should be used if possible. If breathing is insufficient, assisted ventilation by using rescue breaths with or without a barrier device is required. Circulation can be managed by heart auscultation if a stethoscope is available. Blood pressure measures and electrocardiography monitoring should be done as soon as possible. Disability can be determined by the AVPU method. This method can quickly assess a patient's level of consciousness, grading them as alert (A), voice responsive (V), pain responsive (P), or unresponsive (U), The GCS, on the other hand, can be used. By observing for signs of trauma, bleeding, skin responses (rashes), needle marks, and so on. Exposure can be managed by allowing complete physical examination. [4].

Glasgow Coma Scale:

Eye responses	Verbal responses	Motor response
Spontaneous - 4 To command- 3 Pain- 2 Eyes Unresponsive- 1	Oriented- 5 Confused- 4 Inappropriate words- 3 Incomprehensible speech- 2 No speech response- 1	Movement- 6 Painful stimulus- 5 Withdrawal to pain- 4 Flexion- 3 Extension- 2 No response - 1[5]

GCS is usually performed in patients with head trauma. If the GCS score is between 3-8 is considered severe the condition. If the GCS score is between 9-12 is considered moderate in condition If the GCS score is between 13-15 considered minor in condition. [6]

Study Objectives

- To identify the various risk factors causing altered sensorium.
- To observe the treatment pattern in altered sensorium.

Methodology

Study Design

- A single-center prospective observational study.

Study Site

- Inpatient departments of general medicine, Gandhi hospital, Secunderabad.

Selection of Patients

- Patients in the age group of 14-90 years who experienced altered sensorium were included in the study.

Inclusion Criteria

- Patients admitted into the general medicine ward were with altered sensorium.

Exclusion Criteria

- Paediatric patients up to 12 years.
- Pregnant women and lactating women were excluded.
- Outpatients.
- Patients who are absconded.

Sample size

- 160 cases were collected.

Duration of study

- The study duration was 6 months.

Study period

- October 2021- March 2022.

Study Method

- Preparation of structured data collection form for entering the demographics and medical details of the patient.
- Visit general medicine wards on regular basis.

- Review and collection of cases on regular basis.
- Up-date previous day case/ update up to discharge.
- Processing the data.
- Preparation of final report for the project.

Study Approval

- The study protocol was submitted and approved by the institutional ethical committee (IEC).

Results:

Table 1: Age wise Distribution of Cases Based on Gender in AS

AGE (YEARS)	FEMALE	MALE
11-20	4	5
21-30	5	10
31-40	8	11
41-50	6	16
51-60	13	28
61-70	23	13
71-80	6	8
81-90	3	1
TOTAL	**68**	**92**

The above table indicates that the age group of 61-70 years of female patients was predominant over other age groups whereas the age group of 51-60 years of male patients was predominant over the other age groups.

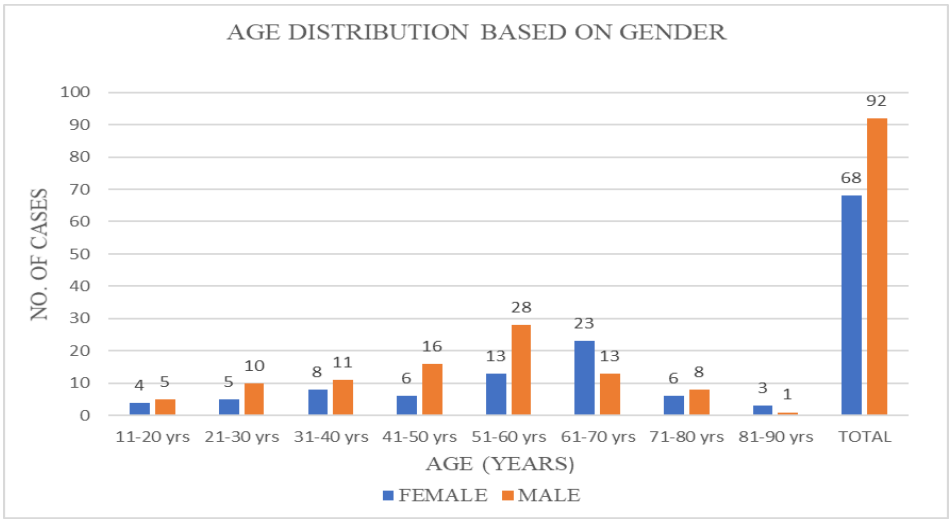

Figure 1. Age-wise distribution of cases based on gender in AS

Table 2: Aetiology Factors of AS

AETIOLOGY GROUPS	NO. OF CASES	PERCENTAGE (%)
Neurological causes	83	51.9
Metabolic causes	68	42.5
Toxic causes	6	3.8
Others	3	1.8
Total	**160**	**100**

The above table indicate that Among 160 cases, 83 cases were due to neurological causes, 68 cases were due to metabolic causes, 6 cases were of toxic causes and the remaining were of other causes.

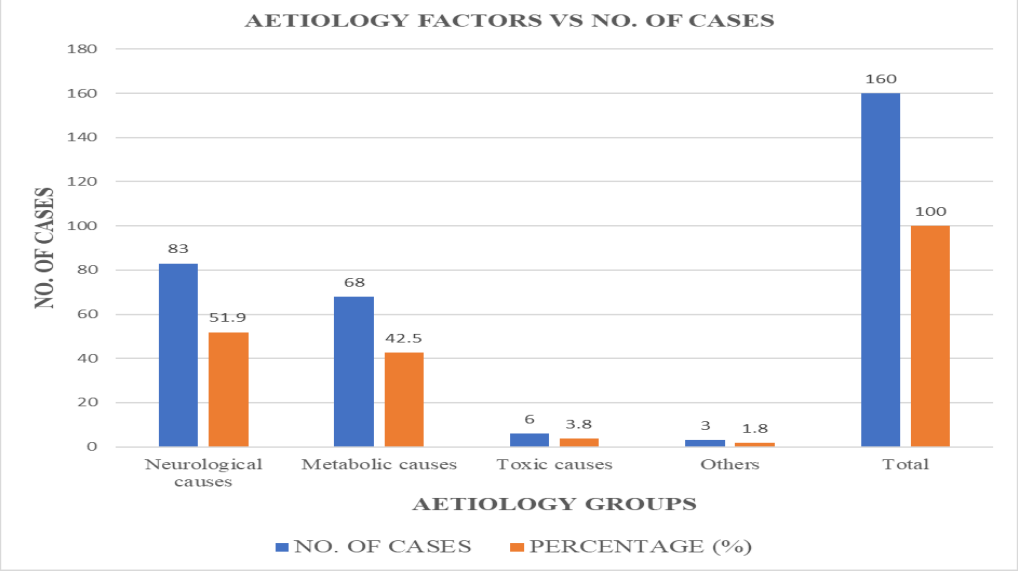

Figure 2: Aetiological factors of AS

Table 3: Risk factors of AS of the study population

SL.NO	RISK FACTORS	NO. OF CASES	PERCENTAGE (%)
1.	Strokes	27	16.9
2.	Encephalitis	25	15.7
3.	Encephalopathy	21	13.2
4.	Septic encephalopathy	11	7
5.	Hyponatremia/ Hypernatremia	10	6.5
6.	Dysglycemia	9	5.6
7.	Alcohol	4	2.5 (for each)
8.	Uremic encephalopathy	4	
9.	Encephalopathy+ stroke	4	
10.	Seizures	3	2 (for each)
11.	Others	3	
12.	Alcohol intoxication + encephalitis	3	

13.	Wernicke's encephalopathy	2	1.2 (for each)
14.	Hepatic encephalopathy	2	
15.	Stroke+ encephalitis	2	
16.	Encephalopathy+ hyponatremia	2	
17.	Septic encephalopathy+ uremic encephalopathy	2	
18.	Meningitis+ seizures	2	
19.	hyponatremia+ dysglycemia	2	
20.	Stroke+ hyponatremia	2	
21.	Encephalopathy+ encephalitis	2	
22.	Phenytoin toxicity	1	0.6 (for each)
23.	Hypoxic-ischemic encephalopathy	1	
24.	Meningitis	1	
25.	Stroke+ meningitis	1	
26.	Hyponatremia+ meningitis	1	
27.	Encephalitis+ dysglycemia	1	
28.	Alcohol intoxication+ seizures	1	
29.	Alcohol intoxication+ stroke	1	
30.	Alcohol withdrawal + dyselectrolytemia	1	
31.	Alcohol withdrawal+ encephalopathy	1	
32.	Encephalitis+ uremic encephalopathy	1	
33.	Septic encephalopathy+ encephalitis	1	
34.	Stroke+ septic encephalopathy	1	
35.	Septic encephalopathy +hypo/hypernatremia	1	
36.	Hypo/hypernatremia +seizures	1	
37.	Hypo/hypernatremia+ dysglycemia	1	
38.	Hypo/Hyper natremia+ sepsis	1	
39.	Seizures+ encephalitis+ dysglycemia+ alcohol withdrawal	1	
	TOTAL	160	100

The above table indicates that the stroke (27 cases) was the most common risk factor for altered sensorium followed by encephalitis, encephalopathy, and dyselectrolytemia. In our study, we also determined that there were combinational risk factors that ultimately led to the altered sensorium.

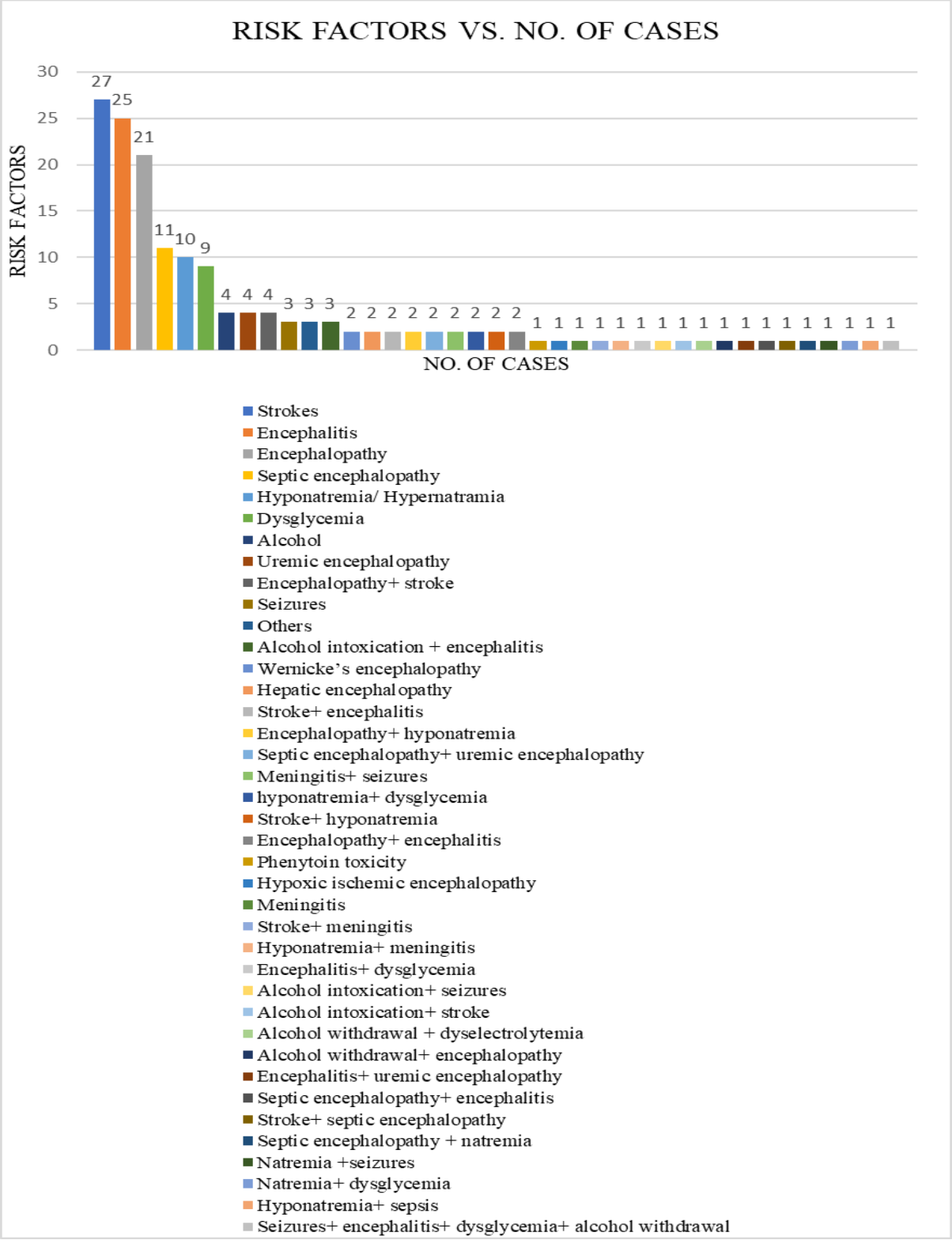

Figure 3: Risk factors for AS of the study population

Table 4: Assessment of AS in Cases Without Use of GCS

SLNO	SIGNS	NO. OF CASES	PERCENTAGE (%)
1.	Plantar	40	41.5
2.	Plantar and neck rigidity	24	25
3.	Plantar + neck rigidity+ kerning's sign	8	8.4
4.	Plantar + kerning's sign	8	8.4
5.	Neck rigidity+ kerning's sign	6	6.3
6.	Plantar+ neck rigidity+ Brudzinski sign	5	5.2
7.	Plantar+ neck rigidity + kerning's sign+ Brudzinski sign	5	5.2
8.	**TOTAL**	**96**	**100**

The above table indicates that plantar signs are commonly shown in 96 cases followed by plantar and neck rigidity. Our research also observed multiple signs in a single case.

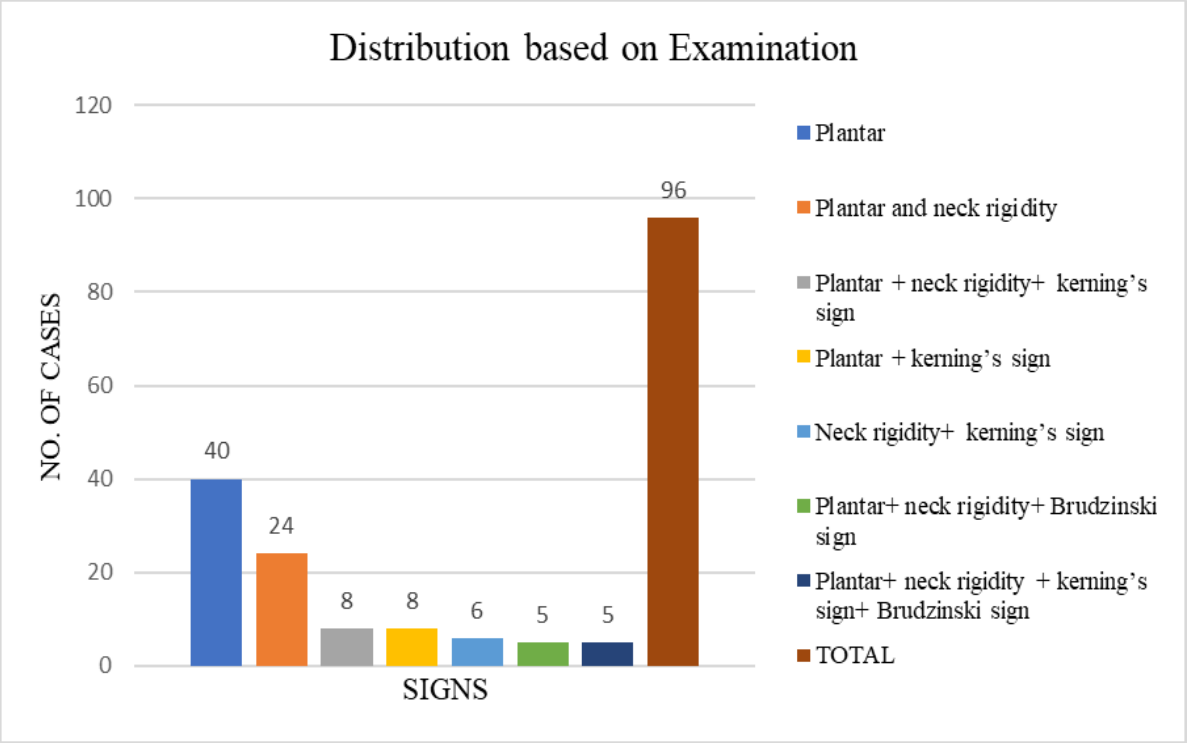

Figure 4. Assessment of Altered Sensorium in Cases Without the Use of GCS

Table 5: Severity of Altered Sensorium Using GCS

SL NO.	SEVERITY	NO. OF CASES	PERCENTAGE (%)
1.	Minor (13-15 score)	5	7.8
2.	Moderate (9-12 score)	26	40.7
3.	Severe (3-8score)	33	51.5
4.	**TOTAL**	**64**	**100**

The above table indicates that among 94 cases, 33 cases were found to be severe (3-8) when compared to other cases by using the Glasgow coma scale.

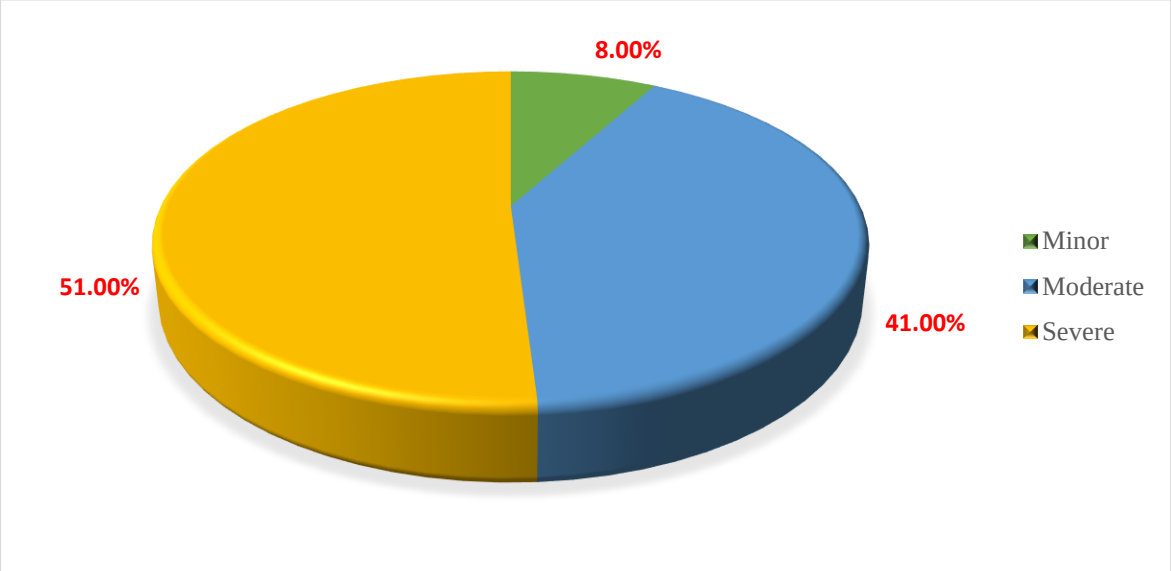

Figure 5 Severity of Altered Sensorium using GCS.

Table 6: Day-wise Recovery of AS

DAYS	NO. OF CASES	PERCENTAGE (%)
1-7	96	60
8-14	48	30
15-21	11	6.7
22-28	2	1.5
29-35	3	1.8
TOTAL	**160**	**100**

The above table indicates that among 160 cases, 96 cases were recovered within 7 days, whereas some cases have recovered more than 15 days due to comorbidity conditions like stroke, encephalitis, encephalopathy, and seizures.

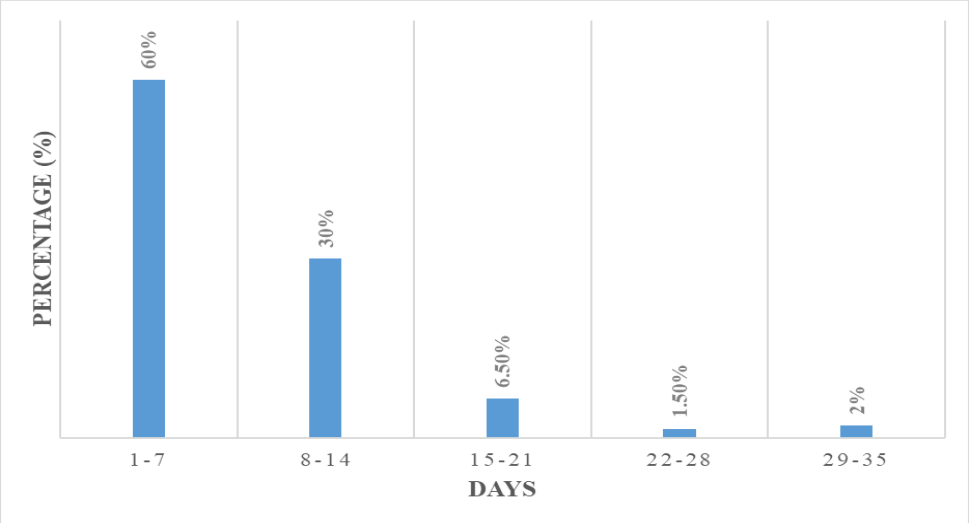

Figure 6 Recovery day-wise distribution in AS

Discussion:

Out of 160 cases, based on gender males were predominant with 57% and females were observed to be 43% in sex distribution which was similar to another study conducted by **Swaroopa.D** [7]

In our study done in general medicine patients of various age groups, it was observed that the maximum cases were in the age group of 51-60yrs (26%). In another study done by **jali SN et al.,** [8] it was found that the maximum number of patients were from the age group of 60years and above (32%) which was a slightly more age group compared to our study.

Gender distribution in various age groups it was observed that the maximum cases of altered sensorium in males were in the age group of 51-60yrs followed by 41-50yrs of age.

Whereas in female patients the age group of 61-70yrs was most affected by altered sensorium followed by 51-60yrs of age.

The least affected age group was 81-90yrs in both males and females.

Our research shows that neurological causes (60%) were maximum in number which was followed by metabolic causes (42%).

In our study of 160 cases, we observed 39 different types of risk factors. Out of 39risk factors, we observed that 26% of multiple risk factors in these 35 cases had 2 risk factors remaining 1 had 4 risk factors in combination.

Maximum cases are affected by stroke (17%) in a study conducted by **Partha Sarathi sarker et al.,** [9] which was similar to our study.

In another study conducted by **Melka et al.,** [10] they observed infections are more common. CNS infections (eg: encephalitis) with 16% followed by encephalopathy with 13% were commonly seen in our study.

Altered Sensorium Without GCS Scale

We observed 96 cases without the usage of GCS, by observing various signs. Plantar signs were observed in 41.5% of cases ie the maximum percentage which was followed by plantar & neck rigidity observed in 25% of cases.

Multiple signs (plantar, neck rigidity, kerning's sign, Brudzinski sign) were observed in 33.5% of cases.

Most of the patients are discharged within one week with symptomatic treatment. **Kanich et al.** [11] observed that medical history and physical examination play an important role in determining the altered sensorium.

GCS Outcome

In our study, a total of 64 cases with GCS scores were observed. On using GCS, it was observed that 33 cases have shown a GCS score of 3-8 which was severe, followed by 26 cases that have shown a GCS score of 9-12 which was moderate and 5 cases have shown a GCS score of 13-15 which was minor which was contradictory to the study conducted by **Ayana Hari Kumar et al.,** [12]where they observed that maximum no. of cases were minor(52%) followed by moderate(19%) and severe(1.5%).

The severity is mainly due to comorbid conditions and underlying disease conditions of the patients.

Outcome-Based on Recovery Days

90% of cases diagnosed with altered sensorium are recovered from the symptoms within 1-2 weeks which is the maximum because of appropriate diagnosis and proper treatment which resulted in positive outcomes by reducing the disease condition and improving the quality of life of the patients.

Treatment Pattern for Risk Factors

Stroke is the major risk factor we observed in our study, aspirin and atorvastatin were most commonly prescribed followed by ceftriaxone and levetiracetam.

Encephalitis is the second risk factor we observed in our study, ceftriaxone was prescribed maximum in no. followed by levetiracetam, dexamethasone, acyclovir, and vancomycin. A maximum number of ceftriaxone were prescribed in case of encephalopathy followed by metronidazole, and levetiracetam. Septic encephalopathy is also one of the risk factors that we observed in our study, piperacillin-tazobactam was prescribed in a maximum no. of cases followed by other antibiotics like doxycycline, meropenem, metronidazole. Whereas in the case of dysglycemia, HAI is the drug prescribed at a maximum no. of cases followed by ceftriaxone,25%D, aspirin, and human mixtard insulin. In the case of alcohol, thiamine and chlordiazepoxide were commonly prescribed. For uremic encephalopathy sodium bicarbonate was prescribed in the maximum no. of cases followed by ceftriaxone, and furosemide. In Seizures, levetiracetam and phenytoin were prescribed in the maximum number of cases followed by midazolam, and doxycycline.

Conclusion:

- AS was found to be occurring in patients due to the presence of risk factors /comorbidities.
- So, observing the underlying cause of the diagnosis made and providing timely intervention and appropriate management has shown improvement in altered sensorium parameters.

- Hence it was observed that the treatment given to the risk factors was appropriate as it showed better patient care by decreasing the length of stay in the hospital.

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