

“Study of Non-Traumatic Altered Mental Status in Emergency Department of Tertiary Care Centre”

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ABSTRACT

BACKGROUND: The assessment of patients presenting with altered mental status (AMS) in the emergency department (ED) is challenging as these patients are characterized by a broad spectrum of illnesses and disease severity. The present study is to determine the etiology and outcome as well as the role of the GCS score as a prognostic value.

METHODS: This prospective observational study was done in a tertiary care center, in India over a period of two years where patients with AMS were evaluated and subjected to relevant investigations. All available clinical and laboratory data were used to ascertain the cause of the altered sensorium. Patients were followed up until discharge or death.

RESULTS: Among 1000 study participants 57% were males with a mean age of 52.5 years. The most common etiology was Metabolic Encephalopathy (32%) followed by poisoning (20%). Mortality was highest in Cerebrovascular accidents (84.4%) and partial recovery was highest in Neuro-infection. Glasgow Coma Scale score <6 was associated with mortality of 44.4%.

CONCLUSION: AMS is a vital warning signal, because of its potentially fatal and irreversible effects. Timely evaluation with the point of care investigation reduces mortality in metabolic and poisoning causes and greatly improves the cost-effective basis for treatment.

KEYWORDS: Altered Mental Status, Emergency Department, Glasgow coma scale

INTRODUCTION

AMS is a common emergency in the ED and it comprises a group of clinical symptoms rather than a specific diagnosis. It includes a state of drowsiness, unresponsiveness, sudden behavioral change, disorientation or confusion, agitation, or hallucination.[1] Patient's often manifest vague

symptoms many times and attendants may not be able to give a reliable history thus the diagnosis and treatment of AMS are highly challenging for emergency physicians. One study from California showed that 27% of cases in the emergency department had abnormal Glasgow Coma Scale (GCS).[2] Few studies point out that the prevalence may range from 1 to 10%. [3-5] An in-depth understanding of the pathogenesis and complete assessment of patients with AMS will aid in appropriate diagnosis and ensure accurate treatment.

It is vital to prognosticate mortality and morbidity upon admission. Although alterations in mental status occur in patients of all ages, the elderly are especially at a higher risk. Other major risk factors include prior cognitive impairment, underlying chronic disease, and systemic infections.

study of altered sensorium is important in developing countries like India because it will help in predicting the outcome and sometimes preventing vegetative state or coma which in turn helps in reducing the financial burden on family and community. The purpose of the study is to determine the etiology of AMS and the outcome as well as the role of GCS in patients presented to the Emergency Department.

METHOD

This prospective, observational, single-center study was carried out in a tertiary care center from January 2017 to December 2019 after the approval from Ethics Committee. 1000 patients who presented to the Emergency Department with AMS fulfilling the criteria were included. At the time of admission age, gender, and clinical presentation with GCS score were noted. Patients were further evaluated as per the algorithm (Figure 1) and point of care investigations like GRBS, ECG, and ABG were done at ER, additionally Complete hemogram, Serum Electrolytes levels (sodium, chloride, potassium, calcium, and magnesium), Renal Function (Blood urea, Serum Creatinine), Liver function test, Thyroid function test, Toxicology screening for suspected poisoning patients, CSF analysis, CT and MRI of the brain were done when required.

Patients were followed up until discharge or death.

The following outcome was graded into 3 categories:

I) Mortality- Death in Hospital

II) Partial Recovery- patient at the time of discharge or after 28 days of hospital stay having neuro deficit like motor or speech.

III) Complete Recovery- recovered from underlying cause without residual neuro deficit.

A. INCLUSION CRITERIA:

1. Altered mental status with symptoms lasting for <1 week such as diminished or absent response to verbal or physical stimuli, Inability to maintain arousal, hallucination, confusion, and other abnormal behavior.
2. Glasgow coma score <15.

B. EXCLUSION CRITERIA:

1. Patient sustained major trauma to the head within 3 months.
2. Patient treated/treated for psychiatric illness.
3. Patients with a known history of habitual substance abuse.
4. Patients of age <18 years.
5. Pregnant women.

SAMPLE SIZE ESTIMATION

$$N = \frac{Z^2(1-\alpha) \times PQ}{\delta^2}$$

Z (1- α)=1.96 (For 95% Confidence Interval) P=10 [Based on the assumption that 10% prevalence]

Q=1-P, δ (Margin of Error) =0.4 N=882.

STATISTICAL ANALYSIS:

Descriptive Analysis of all the explanatory and outcome parameters was expressed in frequency and categorical variables as proportions, continuous variables as Mean & SD. Statistical Package for Social Sciences [SPSS] for Windows, Version 22.0.

RESULTS

1000 patients presenting to the ED who fulfilled inclusion criteria were included, the youngest was 18 years of age, and the oldest was 85 years. 57% were males and 43% were females. A maximum number of subjects were in the age group of more than 60 years. (Table 1)

Table 1 Age and Gender Distribution among Study Patients			
Age Group	Males	Females	Total
< 20 years	30	20	5%
21-30 years	90	110	20%
31-40 years	60	80	14%
41-50 years	120	30	15%
51-60 years	100	60	16%
> 60 years	170	130	30%
Total	570(57%)	430(43%)	100%

Among the etiology of altered mental status, metabolic encephalopathy was 32% followed by cerebrovascular accidents 28%, and Hanging 7%. (Table 2)

Table 2 Distribution of various diagnoses among study patients		
Diagnosis	n	%
Poisoning	200	20%
Hanging	70	7%

Hemorrhage (CVA)	100	10%
Infarct (CVA)	180	18%
Met. Encephalopathy	320	32%
Neuro infections	120	12%
Others*	10	1%

CNS tumors, AV malformations, aneurysms, degenerative neurological disorders

Table 3 - distribution of outcomes based on the age groups of the study patients

Age Groups	Mortality		Partial Recovery		Complete Recovery	
	n	%	n	%	n	%
< 20 years	10	4.76	00	0.0%	40	8
21-30 years	00	0.00	40	13.79	160	32
31-40 years	20	9.5	20	6.8	100	20
41-50 years	90	42.8	30	10.34	30	6
51-60 years	20	9.5	90	31.0	50	10
> 60 years	70	33.33	110	37.1	120	24
Total	210	100	290	100	500	100

In the present study maximum mortality was 42.8% in the age group of 41-50. Patients, less than 40 years had a complete recovery of 60% and more than 60 years had a high partial recovery rate of 37.1%. (Table 3)

Table 4 - Distribution of outcomes based on the diagnosis among the study patients

Diagnosis	Total Cases	Mortality		Partial Recovery		Complete Recovery	
		n	%	n	%	n	%
Poisoning	200	00	0.0	10	3.5	190	38
Hanging	70	10	4.7	10	3.5	50	10
Hemorrhage (CVA)	100	40	19.0	50	17.2	10	2
Infarct (CVA)	180	80	38.1	100	34.4	00	0
Met. Encephalopathy	320	70	33.3	30	10.3	220	44
Neuro infections	120	10	4.7	80	27.5	30	6
Others	10	00	0.0	10	3.5	00	0
Total	1000	210	100	290	100	500	100

Among the mortality group, the maximum number of deaths in CVA is 57.1% followed by metabolic encephalopathy 33.3% and no deaths in poisoning patients. (Table 4)

Among the partial recovery group, CVA accounted highest 51.6% followed by infections 27.5% and the least was in poisoning and Hanging patients. (Table 4)

Among the complete recovery group, Metabolic Encephalopathy was highest 44% followed by poisoning 38% and the least was in CVA infarct patients. (Table 4)

GCS of less than 6 had a mortality of 44.4%. (Graph 2)

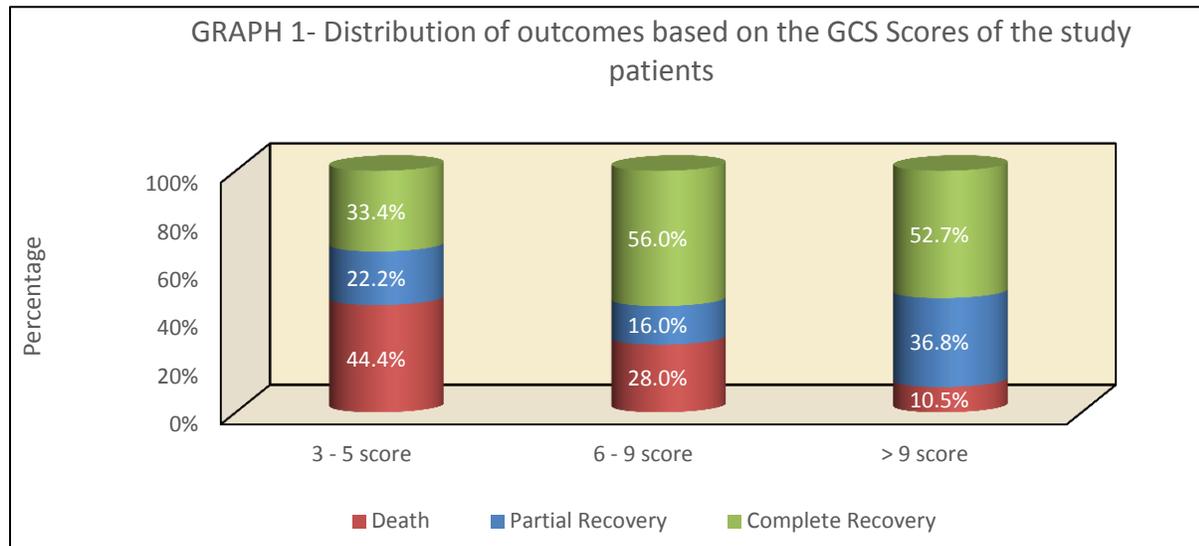


Table 5 - Comparison of mean Duration of stay at Hospital based on the outcomes among the study patients

Variable	Mortality		Partial Recovery		Complete Recovery		KW-Value	P-Value
	Mean	SD	Mean	SD	Mean	SD		
Duration of stay (days)	3.43	4.15	7.79	3.74	5.64	5.41	20.710	<0.001*

The mean duration of stay among the mortality group was 3.43 days as compared to the complete recovery group was 5.6 days and in the partial recovery group 7.79 days. (Table 5)

DISCUSSION

In the present study, 1000 cases of altered mental status were evaluated prospectively with emphasis on etiology and their outcomes, and the prognostic value of the GCS score. In our study, metabolic and poisoning etiology accounted for 52 % as a cause of AMS compared to Plum and Posner's [6] study of 65.2% and K Srinivasan's [7] study of 40% respectively. Among structural causes, our study showed 29% as etiology for AMS, compared to Plum and Posner's study 33.2%, and K Srinivasan's study 60% respectively.

In our study, the most common cause of AMS was Metabolic Encephalopathy (32%) followed by CVA (28%). But, in Plum & Posner's study, the most common cause of altered mental status was metabolic encephalopathy followed by poisoning w 43% and 24.8% respectively. The main

cause in K.Srinivasan's study where infection (50%). This difference may be due to Geographical distributions and the selection of the study population.

When gender distribution is compared in patients of AMS, our study shows males were 57% and females were 43%, in Xiao HY et al [8] reported that males were 53.1% and females of 46.9%, Melka A et al [9] observed that 60.4% were males and 39.6% were females. Thus, all these studies found that the altered mental status condition is more common in males compared to females though there may not be a significant difference.

Metabolic encephalopathy in the present study was 32%, in Melka A et al study it was 22.5% and Jali SN et al [10] 28%, thus indicating that metabolic encephalopathy was the most common etiology across the world.

In our study, Neuro infection causes were 12%, as compared to Xiao HY et al observed 9.1%, Melka A et al observed 55%, and Jali SN et al 24%. This variation is due to the distribution of infections and disease patterns.

The overall mortality in the present study was 21% as compared to Melka A et al study 60.4% , Levy et al study [11] 62% and Plum and Carona's study [12] 56%. Lower mortality in our study can be due to the algorithmic approach and being a tertiary care unit equipped with advanced treatment.

We found that mortality was highest in 41 to 50 years 42.8% compared with other studies were highest in more than 60 years of age, Jali SN et al 62.5% and Xiao HY et al 10.8 %. This difference may be due to changes in lifestyle, early occurrence of co-morbidities, and the rise of non-communicable diseases due to the adoption of modernization.

In our study, GCS score of less than 6 had a mortality of 44.4% as compared to Saccorl, vangool R et al mortality of 46.9%. [13] Thus GCS helps to predict outcomes but is not an independent indicator of mortality.

CONCLUSION

In our study, AMS was more common in the age of more than 50 years with slight male predominance. The younger age group (less than 30 years) had more complete recovery. The commonest etiology was Metabolic encephalopathy followed by CVA. The highest recovery was seen in Metabolic and poisoning cases. Partial recovery was seen more in patients with CVA and Neuro infection. Mortality was highest in patients of Cerebro Vascular Accident (CVA) or GCS less than 6 on presentation.

A standard algorithmic approach to AMS patients can reduce mortality and predict morbidity. Knowledge of this helps in the decision-making capacity to counsel patient attendees as well as choose the level of care required in the Emergency Department.

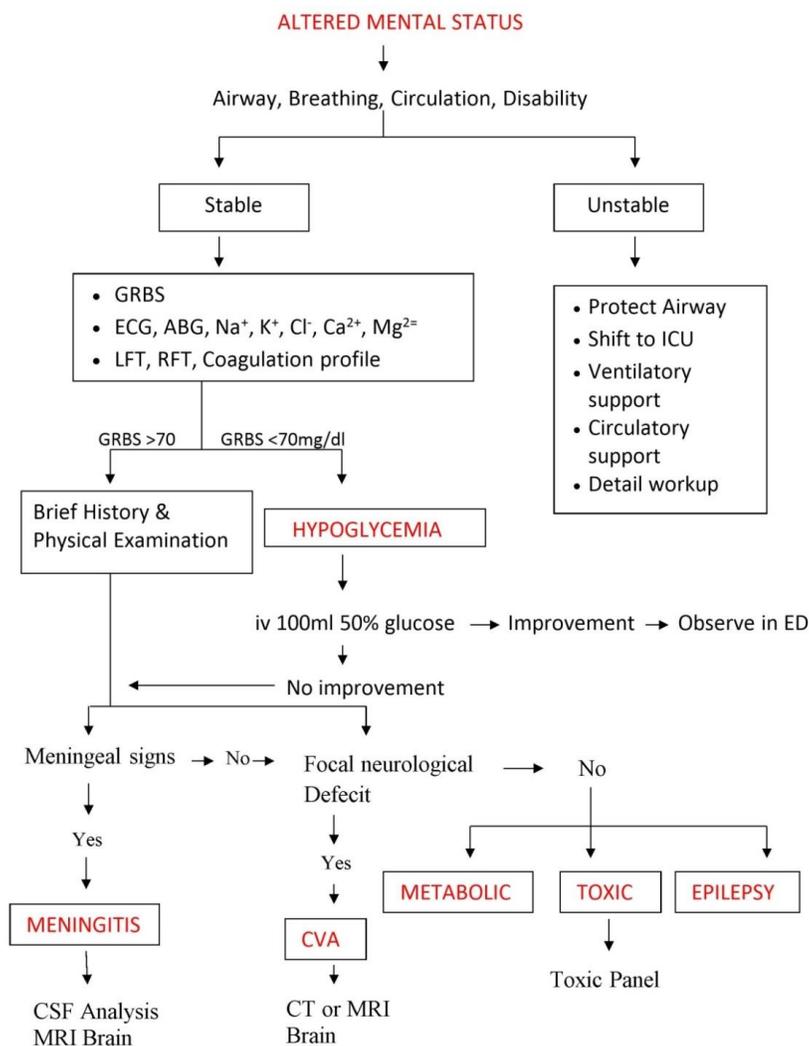


Figure 1 – Algorithm for assessment of AMS at ED

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