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A CLINICAL STUDY OF PATIENTS WITH ALTERED SENSORIUM ADMITTED IN MEDICAL INTENSIVE CARE UNIT AT A TERTIARY CARE CENTRE .

Internal Medicine

Dr. Prabhakar. K
Dr Anitha
Dr Tungala Leela Pavan
Dr Praveen P
Dr Sasi Sekhar

KEYWORDS

INTRODUCTION

Altered sensorium is defined as a change in cognitive function or level of consciousness [1]. It is a common reason for emergency approach, hospitalization, and neurology consultation [1]. 5% to 10% of ED patients have altered mental status, with significantly higher rates among the elderly [1].Mortality rates are high Approaching 10% in some studies [1]. Studies of delirium, which represent a large subset of patients with altered mental status, consistently report a prevalence of 10% to 31% among elderly patients who are hospitalized, with rates approaching 80% in the intensive care unit [1]. 15% of neurology consult requests are for altered mental status [1].

A delirium is a form of acute brain dysfunction that occurs in 8% to 10% of patients of emergency department patients more among older patients [2]. Stupor and coma occur in 5% to 9% of ED patients and, when present, are considered medical emergencies [2]. The etiology of delirium (and other forms of acute brain dysfunction) involves a complex interplay between patient vulnerability (or predisposing) factors and precipitating factors. Highly vulnerable patients will require a relatively benign insult to develop delirium [2]. For these highly sensitive patients, a simple urinary tract infection or a small dose of narcotic medication can precipitate delirium [2]. Because elderly patients are likely to have multiple vulnerability factors, they are more susceptible to becoming delirious compared with their younger counterparts [2].

There is a shortage of data regarding acute brain dysfunction in the ED and its effect on patients' outcomes. Much of what is known is based on studies conducted in older hospitalized patients [2]. The consequences of acute brain dysfunction in the ED remain unclear. Although older patient cohorts are similar between the ED and hospital settings, caution must be taken when attempting to generalize the results of studies from one context to another [2]. There are fewer studies performed regarding altered sensorium to apply for all cases. The fact that the patients with Altered Sensorium are a challenge to the doctor who is attending to them, for he should know what is the cause of this state of Altered Sensorium in his patients. There may not be a reliable attendant of the patient to give the story of the patient's disease and its onset.

No matter what the Doctor or Physician has done promptly and accurately in diagnosing and treating a patient in Altered Sensorium [3], there is a question posed to him by the patient's attendants and a subject which he should answer. So, the question is, what should the physician do or depend on to get an idea about the prognosis and outcome in a patient in Altered Sensorium [4]. Investigations are not definite or at hand all the time and at all places to come to a diagnosis and predict an outcome. The answer lies with the patient. He has the clinical signs in him, which should be read by the physician and interpreted and acted accordingly.

So the present study, including 50 patients admitted in the intensive care unit of a tertiary care hospital, were studied to Correlate the clinical signs with the probable investigations and estimate the prognosis of the patient. The patients who are older with absent clinical signs or abnormal signs with complex diagnoses are expected to have poor outcomes.

MATERIALS AND METHODS

The present cross-sectional study was conducted on 50 patients with Altered Sensorium admitted between may 2022 to October 2022 at SDUAHER .INCLUSION CRITERIA :Age > 18years ,Non-traumatic altered sensorium for more than or equal to 6hrs.EXCLUSION CRITERIA :Age < 18years ,Psychiatric patients ,Pregnant women ,Traumatic altered sensorium .All patients underwent full medical and neurologic clinical evaluation including history and examination done at the time of admission (time of admission to study was taken as the time of first neurological assessment) .The neurological condition was judged by evaluating forebrain and brainstem function using. Glasgow coma scale, corneal reflex, pupillary reflex, oculocephalic reflex, deep tendon reflexes, plantar reflex are done.

Other systemic examinations also were done. The daily examination was conducted after that, and profile of course of altered Sensorium was followed till death or discharge.The patients were subjected to relevant investigations possible in our setup. All available clinical and laboratory data were used to ascertain the cause of the altered sensorium. The outcome was graded into four categories I-DEATH ,II-RECOVERY WITH FUNCTIONAL DISABILITY ,III-GOOD RECOVERY ,IV-NO RECOVERY WITH LOST TO FOLLOW UP .

The history and general examination, in short, the neurologic profile at the time of admission, significant positive investigation findings, diagnosis, and outcome. All the cases studied are presented in the master chart. Then all the cases were followed daily till discharge or death .All the data were analyzed using IBM SPSS 25 statistic tool.

RESULTS

The age and sex distribution of 50 cases have shown in the following table below

Table 1: Age And Sex Distribution

Age	Male	Female
18-20	1	0
21-30	4	1
31-40	6	0
41-50	6	3
51-60	13	0
>60	8	8
Total	38	12

P VALUE = 0.00(SIGNIFICANT)

Table 2: Distribution Of Outcomes Among Age Distribution

Age	I-Death	II-Recovery with functional disability	III-Good Recovery	IV-No recovery and lost for follow up	Total
18-20	1	0	0	0	1
21-30	0	0	5	0	5
31-40	0	0	6	0	6
41-50	3	0	6	0	9

51-60	1	6	5	1	13
>60	3	3	6	4	16

The mean age of presentation of altered sensorium is 52.56, with a standard deviation of 16.431 (with a 95 % confidence interval between 47.79 - 57.33 years). The minimum age is 18 years, and the maximum age is 83 years. The standard error of the mean is 2.324. The population is normally distributed. Out of 50 population, there are 38 males (76%) and 12 females (24%). From the results, males are commonly presented with altered sensorium than females and are statistically significant. (p=0.00) .

Out of 50 patients with altered sensorium (TABLE *2*) 14% are due to cerebrovascular accident of ischemic etiology, 10% is due to cerebrovascular accident of hemorrhagic etiology, 34% are due to infective etiology either septic encephalopathy or meningoencephalitis, 12% is due to hepatic encephalopathy, 14% are due to diabetic ketoacidosis, 6% are due to toxin-related encephalopathy including alcohol, drugs, snake bite, 10% are due to metabolic encephalopathy mostly hyponatremia (FIGURE 6) .This showing infective etiology being the most common etiology for altered sensorium followed by cerebrovascular accident and diabetic ketoacidosis, least being the toxin-related encephalopathy.

In the present study out of 50 cases followed up 8 cases (16%) have died, 9 cases (18%) have recovered with functional disability, 28 cases (56%) have recovered without disability, 5 cases (10%) lost for follow up in the diseased state(FIGURE 7). Among patients died 3 cases (38%) each belonged to the age group of 41-50 and >60 years, 1 case (12%) each belonged to the age group of 18-20 years and 41-50 years. Among patients who recovered with functional disability, 6 cases (66%) belonged to the age group of 51-60 years, and 3 cases (34%) belong to >60 years. Among patients who have a functional recovery, 5 cases each (17%) belonged to the age group of 21-30 and 51-60 years, 6 cases each (22%) belonged to the age group of 31-40, 41-50, >60 years. Among patients who are in a diseased state and lost to follow up 1 case (20%) belonged to the age of 51-60 years, 4 cases (80%) belonged to the age group of >60 years.

In the present study, among the outcomes of death, 3 cases (37%) are of the cerebrovascular accident due to hemorrhagic etiology, 5 cases(63%) are of infective etiology, mostly septic shock with MODS. Among outcomes of recovery with functional disability 7 cases (78%) are of a cerebrovascular accident of ischemic etiology, 1 case each (11%) of the cerebrovascular accident of hemorrhagic etiology that to thalamic hemorrhage and infective etiology. Among outcomes with good recovery 3 cases (10%) are due to toxin etiology, 5 cases (18%) due to metabolic, i.e., hyponatremia as etiology, 6 cases (22%) due to hepatic encephalopathy, 7 cases each (25%) due to infective etiology and diabetic ketoacidosis. Among patients with no recovery and lost to follow up as outcome 1 case (20%) belonged tp hemorrhagic etiology and 4 cases (80%) belonged to infective etiology.

Table 3: Distribution Of Outcomes Among Different Etiologies

Etiology	I-Death	II-Recovery with functional disability	III-Good recovery	IV-No recovery and lost to follow up	Total
1)Ischemic stroke	0	7	0	0	7
2) hemorrhagic stroke	3	1	0	1	5
3)Infective	5	1	7	4	17
4)hepatic encephalopathy	0	0	6	0	6
5)Diabetic ketoacidosis	0	0	7	0	7
6)Toxins	0	0	3	0	3
7)Metabolic	0	0	5	0	5

Among the patients in the study, deaths were more among the age group of <20 and > 40 years of age and hemorrhagic strokes and septic shocks. There is a good recovery among 20 - 40 years of age group and metabolic, DKA, toxin as etiology. There is an equivocal response among infective etiologies. Some have a good recovery, some a no recovery, some died. Among patients died 3 cases each (38 %) have GCS of 3 or 4 with 2 cases (24%) have GCS > 5. Among patients with recovery with functional disability 1 case (11%) have GCS of 4, 2 cases (22%) have GCS 3, 6 cases (67%) have GCS more than 5. Among patients with good recovery, 1 case (3%) have GCS of 4, 27 cases (97%) have GCS >5. Among patients with no recovery and lost to follow up 2 cases each (40%) have GCS 3 or >5 and 1 case (20%) have GCS of 4.

Table 4: Distribution Of Outcomes Among Different Glasgow Coma Scores

Outcome	No of cases in GCS -3	No of cases in GCS-4	No of cases in GCS more than or equal to 5	Total
I-Death	3	3	2	8
II-Recovery with functional disability	2	1	6	9
III-Good recovery	0	1	27	28
IV-No recovery and lost to follow up	2	1	2	5

The lower the coma scores of 3 and 4, the death rate is more and higher, i.e.,> 5 have recovery rate more. But it was not a specific indicator of prognosis taken alone. Coma score helped to know the effect of pathology on RAS and its impact on ocular and vestibular reflexes. It also helped us to know whether pathology is worsening or improving with treatment. GCS score helps to compare the numerical score day after day and guide our line of treatment.There is statistically significant difference (p=0.00 Among patients whose outcome was death, the corneal reflex was absent in all the 8 cases (100%). Among patients who recovered with a functional disability, all 9 cases have absent corneal reflex (100%) at the time of admission but recovered in due course of stay. Among patients who had a good recovery, 28 patients (100%) had intact corneal reflex. Among patients who had no recovery, 1 case (20%) had intact corneal reflex, and 4 cases had (80%) had the absent corneal reflex.

Table 5: Distribution Of Corneal Reflex Among Outcomes

Outcome	Corneal present	Reflex	Corneal absent	Reflex	Total
I-Death	0		8		8
II-Recovery with functional disability	0		9		9
III-Good recovery	28		0		28
IV-No recovery and lost to follow up	1		4		5

CHISQUARE TEST P VALUE =0.00(SIGNIFICANT)

Among patients who died, two patients (25%) had intact pupillary reflex, and 6 patients (75%) had the absent pupillary reflex. Patients who recovered with functional disability nine patients (100%) had intact pupillary reflex. Among patients who had a good recovery, 28 patients (100%) had intact pupillary reflex. Among patients who had no recovery and lost to follow up 1 case (20%) had pupillary reflex intact and 4 cases (80%) had absent pupillary reflex.

Table 6: Distribution Of Pupillary Reflex Among Outcomes

Outcome	Pupillary present	Reflex	Pupillary absent	Reflex	Total
I-Death	2		6		8
II-Recovery with functional disability	9		0		9
III-Good recovery	28		0		28
IV-No recovery and lost to follow up	1		4		5

CHISQUARE TEST P VALUE =0.00(SIGNIFICANT)

There is no statistically significant difference between the patients with intact and absent pupillary reflex among recovered and not recovered patients. (p=0.00) but patients with intact pupillary reflex had higher favorable outcomes.

Among patients who died, the oculocephalic reflex is absent in all the 8

cases(100%). Among patients who recovered with functional disability, 3 cases (34%) have intact oculocephalic reflex, and 6 cases (66%) have absent oculocephalic reflex at the time of admission but recovered during the stay. Among patients who had a good recovery, 24 cases (86%) had intact oculocephalic reflex, and 14 cases (14%) had absent oculocephalic reflex at the time of admission but recovered in due course of stay. Among patients who had no recovery and lost to follow up 1 case (20%) had intact oculocephalic reflex, and 4 cases (80%) had the absent oculocephalic reflex.

Table 7: Distribution Of Oculocephalic Reflex Among

Outcome	Oculocephalic reflex present	Oculocephalic reflex absent	Total
I-Death	0	8	8
II-Recovery with functional disability	3	6	9
III-Good recovery	24	4	28
IV-No recovery and lost to follow up	1	4	5

There is statistically significant difference between the patients with intact and absent oculocephalic reflex among recovered and not recovered patients. (p=0.00) but patients with intact oculocephalic reflex had higher favorable outcomes .

Table 8: Distribution Of Plantar Reflexes Among Outcomes

Outcome	Normal reflex present	Plantar	Abnormal reflex/mute	Plantar	Total
I-Death	2		6		8
II-Recovery with functional disability	1		8		9
III-Good recovery	19		9		28
IV-No recovery and lost to follow up	1		4		5

CHISQUARE TEST P VALUE =0.00(SIGNIFICANT)

Among patients who died, 2 cases (25%) had a normal plantar response, and 6 cases (75%) had abnormal plantar responses. Among patients who recovered with functional disability, 1 case had a normal plantar response (11%), and 8 cases (89%) had abnormal plantar responses. Among patients who had a good recovery, 19 cases had intact plantar response (68%), and 9 cases (32%) had abnormal plantar responses. Among cases who had no recovery and lost for follow up 1 case (20%) had intact plantar response, and 4 cases (80%) had an abnormal plantar response.Patients with low GCS, absent corneal reflex, absent pupillary reflex, absent oculocephalic reflex, and the abnormal plantar response had unfavorable outcomes (I, IV) and is statistically significant (p=0.00).

DISCUSSION

Age Distribution And Outcomes

Of the cases, the mean age of presentation of altered sensorium is 52.56 years, with a standard deviation of 16.431. The age range of the present study includes 18-83 years. This is correlative to that of the study conducted by Hai-yu Xiao et al. In 2012 [5], which had a mean age of 51.95 years with a standard deviation of 15.71 and age range of 14-97 years.

Table 9: Comparing Mean Age In Altered Sensorium Between Two Studies

		PRESENT STUDY	HAI-YU XIAO et al. (2012)
MEAN	AGE	52.56 ± 16.431	51.95 ± 15.71

Although the two studies were done in different countries and belong to different ethnic groups, the mean age was similar. So patients of more than or equal to 50 years of age are frequently landing in altered sensorium secondary to different causes. Among the patients under study, the mortality rate was 16% when compared to 8.1% among the mentioned study. The mortality rate among patients with age more than 60 years was 18.7%, and among patients, less than 60 years is 14.7%, and the data is statistically significant (p=0.01). The results of the present study are very similar to that of the mentioned study, where the mortality rate among patients of more than 60 years was 10.8% and 6.9% among patients less than 60 years (significant p=0.003).

Table 10: Comparison Of Most Common Etiologies Among Different Studies

		PRESENT STUDY	HAI-YU XIAO et al. (2012)
Mortality Rates Among Patients	>60 YEARS AND <60 YEARS	18.7% and 14.7%	10.8% and 6.9%

This study shows that elderly patients have poor outcomes than non-elderly patients, which may be due to several reasons starting from the low metabolic state, less immunocompetent, less care in small socioeconomic societies, more comorbidities.

Gender Distribution

In the present study of 50 patients, 76% are male patients, and 24% are female patients and are in the ratio of 3:1, showing males are developing altered sensorium more than that of females and are statistically significant(p=0.00). But this is not correlative to that of the study conducted by Hai-yu Xiao et al. In 2012 [5].In this mentioned study had 53.1% of males and 46.9% of females, which are in the ratio of 1.1:1, which shows males and females are nearly affected the same. The discrepancy between the two studies may be due to the number of the population involved in the study as the population in the present study is less than the mentioned study, and the ethnicity of the people studied, and environmental factors prevailing may also be the contributing factors.

Table 11: Present Study Hai-yu Xiao Et Al. (2012) Mortality Rates Among Patients >60 Years And <60 Years 18.7% And 14.7% 10.8% And 6.9%

	PRESENT STUDY	HAI-YU XIAO et al. (2012)
PERCENTAGE OF MALES AND FEMALES	76% and 24%	53.1% and 46.9%
RATIO OF MALES AND FEMALES	3:1	1.1:1

Etiology And Outcome

In the present study, several causes of altered sensorium have been found based on examination and investigations available like septic encephalopathy, hyponatremic encephalopathy, acute cerebrovascular accidents, either ischemic and hemorrhagic, toxin-induced encephalopathy, diabetic ketoacidosis, hepatic encephalopathy, etc. Among these most common was infective/septic encephalopathy 34% of cases followed by an acute cerebrovascular accident, 24% of which ischemic was 14%, and hemorrhagic was 10 %[6].

This didn't correlate with the study conducted by Hai-yu Xiao et al. In 2012 [6], as this study shows toxins like alcohol-induced encephalopathy was found in 22% of cases and was more common than other like infective was 9%, the acute cerebrovascular accident was 19%.

Yamgur et al. 1999 [7],found traumatic was the second largest cause of the altered mental state, but the present study does not include trauma cases. Melka et al. 1997 [8],conducted a similar study in Ethiopia found infection as the most common cause of altered mental state correlating with the present study. Plum et al. 1981 [9],found a toxin-induced altered mental state was more common, i.e., found in 25% of cases followed by acute cerebrovascular accident of around 10.6%, which is not correlating to the present study.

Table 12: Comparison Of Most Common Etiologies Among Different Studies

	PRESENT STUDY	HAI-YU XIAO et al. (2012)	MELKA et al. (1997)	PLUM et al (1981)
ETIOLOGY	Infective (34%), acute cerebrovascular	Toxin induced Encephalopathy (22%), acute	Infection or septic Encephalopathy	Toxin induced Encephalopathy (25%) and
	Accidents	Cerebrovascular	(30%)	Cerebrovascular
	(24%)	Accidents		Accidents
		(19%)		(10.6%)

The discrepancy among different studies, when compared to the present study, may be due to that some of the studies conducted in developed nations where environmental and population factors where chances of infection are less likely than among developing countries where present research is done. As the use of alcohol and different modes of production of ethanol has been increasing from decades with an increase in population, toxin-induced encephalopathies are becoming common. But still, the cerebrovascular accidents, both ischemic and hemorrhagic, are among common etiologies more among the older population. This may be due to an increase in age and increasing comorbidities favoring the development of altered sensorium due to ischemic or hemorrhagic strokes.

Septic Encephalopathy/ Other Infective Causes:

In the study conducted by Peidaee et al. 2018 [10], the mean age of population with encephalopathy was 49.7 ± 23 years, which is comparatively less than the present study of 52.56 ± 16.431 years. This variation may be due to the ethnic groups, and the environmental conditions prevailing .in the preset review including infective/septic encephalopathies males are 65%, and females are 35 % in the ratio of 1.9:1 and comparing this to the mentioned study males are 60.8% and 39.2% in the proportion of 1.5: 1 nearly similar to the present study. The most common associated comorbidities of the present study were hypertension and diabetics, followed by uremic encephalopathy. In contrast to this, the mentioned study had hypertension and ischemic heart disease. Among the infective causes in the present study, septic encephalopathy, followed by viral meningitis is common. A similar type found in the mentioned study with septic associated encephalopathy of 22.9% of cases followed by meningoencephalitis of unknown etiology 10.2% , neurotuberculosis of 9.9%. Among present study sepsis secondary to strange focus followed by urinary tract infections and pneumonia are common . In contrast to this, the mentioned study showed pleuropulmonary infections are the common cause. The mean GCS of the present study is 6.78, which is less than the mentioned study of 11.95. The mortality is high among sepsis-associated encephalopathy in both the present study and the mentioned study when compared to other causes of infection-induced altered sensorium.

Table 13: Comparing Infection Induced Altered Mental Status

	PRESENT STUDY	PEIDAEE et al. (2018)
MEAN AGE	52.56 ± 16.431	49.7 ± 23 years
MALE: FEMALE RATIO	1.9:1	1.5:1
MOST COMMON CAUSE	Sepsis associated encephalopathy	Sepsis associated encephalopathy
MEAN GCS	6.78	11.95
MOST COMMON CAUSE OF MORTALITY	Sepsis associated encephalopathy	Sepsis associated encephalopathy

The mean GCS was low in the present study than mention study signifies more virulent forms of infection states prevailing than the mentioned study causing severe stages of encephalopathy or encephalitis.

Metabolic encephalopathy (hyponatremia) : In the present study, hyponatremia has been the common cause of metabolic encephalopathy. The most common state of altered sensorium is drowsiness and delirium. This is more common among persons > 60 years of age. The male to female ratio is 4:1. The most common cause of hyponatremia was food poisoning causing loose stools and vomiting. Most cases have been recovered within 48 hours.

A case series study conducted by Ayus et al. 2015 [11], showedequal distribution of males and females among hyponatremia, which is against to present research. This may be due to a large number of cases in the mentioned study than the present study. The cited study found more common age was more than 65 years, which is nearly correlating to the present study. The most common presentation was delirium and drowsiness, connecting with the present study. The most common cause are SIADH, drugs like thiazides and hypothyroidism not correlating with the current study may be due to that the study conducted in the developed nations where hyponatremia due to food poisoning would be less and more usage of drugs than ours due to affordabilities in the developing countries. The most common comorbid conditions in the mentioned study are hypertension, diabetes which is correlating to the present study but seen only in two cases. There were 23% of adverse outcomes when compared to the present study, where no adverse results found and are recovered. This discrepancy between the two studies may be due to more associated comorbidities in the mentioned study leading to adverse outcomes.

A study conducted by Lange - asschenfeldt et al. 2013 foundmost common age affected are more than 60 years of age. Men and women are equally affected, which is against the present study may be due to the less number of the population involved. The most common symptom is drowsiness and delirium, correlating to the present study. In this study, seizures as an adverse outcome have been studied, but no such thing has been found in the present study. The most common cause is due to drug-induced, more specifically thiazides and ACE inhibitors, which is not correlating to the present study. Mortiz et al. 2015 conducted a survey in which hospital- acquired hyponatremic encephalopathy was found in 15 - 30 % of adults due to excessive hypotonic salines given in some outside hospitals, surgical or post-surgical procedures. This type of scenario was found in 1 case of an 80-year-old male case in the present study. In the mentioned study, females' gender had a high incidence, which is against the present study cause may be unknown.

Table 14: Comparison Of Hyponatremic Encephalopathy Among The Studies

	PRESENT STUDY	AYUS et al. (2015)	LANGE – ASSCHENFELDT et al. (2013)
AGE	>60 YEARS	>65 YEARS	>60 YEARS
MALE TO FEMALE RATIO	4:1	1:1	1:1
MOST COMMON SYMPTOM	Drowsiness and delirium	Drowsiness and delirium	Drowsiness and delirium
CAUSE	Food poisoning causing diarrhea, Hospitalacquired due to excessive hypotonic saline	Drug-induced	Drug-induced
OUTCOMES	All recovered within 48 hours.	23% had adverse outcomes with seizures as an adverse symptom	22% had an adverse outcome with seizure as an adverse symptom

Hepatic encephalopathy : In the present study, hepatic encephalopathy constitutes 12 % of the cases. The mean age of patients with hepatic encephalopathy was 48.33 ± 12.4 years. All cases are males. The most common cause was alcoholic liver disease. All the cases were recovered and no adverse outcomes. The mean GCS was 10.1. A study conducted by Maggi et al. 2019 found mean age was 54.78 ± 11.32 years. This is less than the present study probably due to less number of cases or any genetic factors for the Ethnic population under mention study making them less predisposition to alcoholic liver disease, or alcoholic liver disease may not be the common etiology. In the mentioned study, 72 % where males, and 28% were females in the ratio of 2.5:1. In the mentioned study 17% of the patients were in grade 1 hepatic encephalopathy, 26% were in grade 2 hepatic encephalopathy, 8% were in grade 3 encephalopathy , 1% in grade 4 encephalopathy but in the present study all of them are in grade 1 or 2. 67% of the cases in the mentioned study had death as the outcome which is not correlating to the present study as most of them in the present study are in grade 1 or grade 2 hepatic encephalopathy. The mentioned study states that there is a 11 % chance for strong mortality when GCS is less than ten, which is correlating to the present study as mean GCS in 10.2. The most common cause found was hepatitis c, followed by alcoholic liver disease in the mentioned study.

A study conducted by Tapper et al. 2019 [12],that the mean age was 65.04 ± 13.4 years. This is not correlating to the present study may be other etiologies other than alcohol may be more common, which had a long natural history when compared to the alcoholic liver disease or the ethnic groups studied are less predisposition to alcoholic liver disease. 54% of the cases were males, and 46% are females. This is not correlating to the present study may be due to fewer cases of CLD may

be included in the present study. The common causes in the mentioned study are nonalcoholic liver diseases, which encompasses nonalcoholic fatty liver disease, hepatitis c, hepatitis B, which constitutes 47% of the cases and alcoholic liver disease in 33% of the cases. There was no mortality found in the mentioned study. The cited research states that persons with alcohol-related liver disease had a higher incidence of hepatic encephalopathy at an early age, making it a strong association for the development of Hepatic encephalopathy, which signifies the young age of onset of hepatic encephalopathy in the present study when compared to other studies.Tesfaye et al. 2019 [13], the mean age of patients with chronic liver disease, was 50.2 ± 11.9 years, which is nearly correlating to the present study. The male patients are 78%, and females are 22%. The alcohol as the etiology, which is seen among 35.8% of cases in the mentioned study. The hepatic encephalopathy as a complication was seen in 38.5 % of cases most of them are alcoholics. This mentioned study again shows alcohol as a strong predictor for the development of hepatic encephalopathy, which is the cause of encephalopathy at a relatively young age supporting the present study.

Table 15: Comparison Of Patients With Hepatic Encephalopathy Between The Studies

	PRESENT STUDY	MAGGI et al. (2019)	TAPPER et al. (2019)
MEAN AGE	48.33 ± 12.4	54.78 ± 11.32	65.04 ± 13.4
MALE TO FEMALE RATIO	All males	2.5:1	1.1:1
COMMON ETIOLOGY	Alcohol	Hepatitis c and alcohol	Nonalcoholic fatty liver disease, hepatitis c hepatitis b, alcohol
OUTCOME	Recovered	67% deaths and 33% recovered	Recovered

The mean age of the present study is less when compared to other Studies and alcohol as the most common cause in the present study when compared to other studies may be due to that less number of hepatic encephalopathy cases and other causes of CLD causing hepatic encephalopathy had a long natural history when compared to the alcoholic liver disease causing hepatic encephalopathy in the present study.

Cerebrovascular Accident :

In the present study, 24% of the cases of altered mental status had CVA as the etiology, of which 14% belonged to ischemic etiology(58%) and 10 % belonged to the hemorrhagic etiology(42%). The mean age is 60.75 years. Out of the cases with a cerebrovascular accident in the present study, 34% are females, and 66% are males being males more common. Hypertension and diabetes are commonly associated conditions with the patients. But additional risk factors of smoking and alcohol make the male population more common than females. The mortality rate was high in hemorrhagic stroke than ischemic stroke. Most of the patients recovered but had a functional disability.

In the study conducted by Corso et al. 2014 [14], the mean age was 75.7 years, which is not correlating to the present study might be due to the lifestyle modifications and high levels of primary and secondary prevention rates in the people of the study. Female gender is more common than males in the mentioned study, which is also not correlating to the present study may be due to the inclusion of more female population or the ethnic differences between the two populations. Cardioembolic stroke was more common among the mentioned study where a stroke of undetermined etiology was more in the present study among ischemic strokes.

Habibi - koolaee et al. 2018 [15],found that the mean age was 64.6 years, nearly correlating to the present study. In the mentioned study, the male population was 58.1% and females, where 41.9% showing males are more common than females correlating with the present study. In the mentioned study, 70.7% are an ischemic stroke, and 29.3% are a hemorrhagic stroke. Mortality was high in hemorrhagic stroke in the mentioned study than the ischemic stroke. Hypertension, diabetes mellitus, dyslipidemia are the risk factors in the mentioned study correlating with the present study. Setyopranato et al. 2019 [16],studied ischemic strokes mean age was 63.01 years correlating with the present study. In the mentioned study, the males where 36%, and females were 64% favoring females, which is not associating with the present study. This is due to the mentioned study that included women on hormonal replacement therapy, and no such thing was found in the present study. Most of the ischemic stroke patients recovered with functional disabilities correlating with the present study. Hypertension was the most common risk factor found in the mentioned study relating to the present study.

Table 16: Comparison Of Cerebrovascular Accidents As Etiology In Patients With Altered Sensorium Between Two Studies

	PRESENT STUDY	HABIBI -KOOLAEE et al. (2018)
AGE	60.75	64.6
GENDER	MALES > FEMALES	MALES > FEMALES
STROKE TYPE	Ischemic stroke 58%, hemorrhagic stroke 42%	Ischemic stroke 70.7%, hemorrhagic stroke 29.3%
RISK FACTOR	Hypertension, diabetes	Hypertension, diabetes, dyslipidemia
OUTCOME	High mortality in hemorrhagic stroke and most of the patients recovered with functional disability in ischemic stroke	High mortality in hemorrhagic stroke and most of the patients recovered with functional impairment in ischemic stroke

Table 17: Comparison Of Ischemic Cerebrovascular Accident As Etiology In Patients With Altered Sensorium Between Studies

	PRESENT STUDY	SETYAPRANATO Et al. (2019)	CORSO et al. (2014)
MEAN AGE	60.75	63.01	75.7
GENDER	Males > females	Females > males	Females > males
RISK FACTORS	Hypertension, diabetes	Hypertension	Hypertension, diabetes
OUTCOME	All cases recovered with functional disability	All cases recovered with functional disability	7% of cases had in- hospital mortality, 34% had no recovery and left against medical advice, outside hospital mortality secondary to different causes and 59% recovered with functional disability without mortality

So based on the studies patient age of more than 60 years had increased risk of stroke through the study mentioned above supports the present study. Still, a study conducted on the Irani population showed increased risk among people more than 70 years ago might be the ethnic factors contributing to the event. Males are more common than females in the present study. This may be supported by some studies, and not by others may be more gender bias or more women on hormonal replacement, and ethnicity favoring women may be the reason. Hypertension was found to be a more critical risk factor, which is supported by the studies mentioned above and also Malekzadeh et al. 2013and S.A Hosaini et al. 2001. The major outcomes were mostly recovery with functional disability among ischemic strokes and a high incidence of deaths among hemorrhagic strokes supported by the above studies.

Diabetic Ketoacidosis :

In the present study, 14% of the cases of altered sensorium had Diabetic ketoacidosis as etiology. Among the cases, the mean age was 37.42 ± 13.91 years. All the cases were male. Drowsiness and delirium are common presentations in all cases. TYPE 1 diabetes was more common than TYPE 2. The outcome was favorable, as all the cases recovered with no complications and no disability. A study conducted by Kakusa et al. 2016 the mean age was 43.73 ± 15.61 years which is more than that of the present study this may be due to the less number

of cases in the present study. Males to female ration in the mentioned study is 1:1, which is not correlating the present study may be due to less number of cases included in the present study. The most common predisposing factor for DKA in the mentioned study is poor compliance with the anti-diabetic medications followed by infections, which was found to be correlating to the present study. In the mentioned study 80 cases of DKA were included out of which 41 cases (50%) have developed altered sensorium out of which 85.3% have recovered, and 14.7% of cases faced mortality which is not correlating to the present study as 100% of the cases recovered in the present study. This was found out to be secondary to complications developed by the patients in the mentioned study, i.e., 10% of cases developed AKI, and 1.25% of cases had developed ARDS.

A Study conducted by Nyenwe et al. 2010 among DKA patients the mean age was 37.7 ± 12.4 years. The distribution of patients was out of 216 cases studied 57.9% are males, and 42.1% of cases in the ratio of 1.3:1. Out of the 216 cases, 83 cases had altered sensorium, out of which 66% are males, and 34% are females in the ratio of 2:1. In this study, also TYPE 1 diabetes was more common than TYPE 2 diabetes correlating with the present study. The mortality rate in the mentioned study was 0.9% that is out of 83 cases 8% of patients faced mortality, which is not correlating to the present study this may be due to more severe metabolic acidosis and sepsis in the mentioned study when compared to the present study. The cited study states that the combination of severe acidosis and hyperosmolarity predicted altered sensorium with a sensitivity of 61% and specificity 87%.

Table 18: Comparison Of Diabetic Ketoacidosis As Etiology Of Altered Sensorium Among Studies

	PRESENT STUDY	KAKUSA et al. (2016)	NYENWE et al (2010)
MEAN AGE	37.42 ± 13.91	43.73 ± 15.61	37.7 ± 12.4
GENDER RATIO	All are males	1:1	2:1
OUTCOME	Good recovery	14.7% of cases died, and 85.3% had a functional recovery	8% of cases died, and 92% had a good recovery

So the patients with DKA as the etiology for the altered sensorium irrespective of gender and age had favorable outcomes unless complicated. Neurological signs and outcome

Glasgow Coma Scale :

In the present study, the mean age was 52.56 ± 16.431 years. The male to female ratio is 3:1. The mean GCS is 7.86. In the present study, GCS of less than 5 had poor outcomes when compared to more than 5. In the study conducted by Healy et al. 2018, the mean age was 58.7 ± 14.2 years, which is near to that of the present study. The male to female ratio of the mentioned study was 1:1.3. The mean GCS of the said study is 7. The cited study correlated GCS with that of cerebral oximetry, which signifies that a high value favors impaired autoregulation and low regional cerebral blood flow. The mentioned study states that GCS is inversely related to that of cerebral oximetry. So a low GCS was found with high cerebral oximetry values, which shows impaired autoregulation in the cerebral regions and correlated with poor outcomes. Dunham et al. 2004 demonstrated a significant relationship between Regional oxygen saturation of <60 and a GCS score of 3 to 4 (P< 0.001), which also had poor outcomes. These two studies favor the present study with low GCS less than 5 had bad prognosis than more than 5.

Table 19: Comparison Of Glasgow Coma Score In Patients With Altered Sensorium Among Two Studies

	PRESENT STUDY	HEALY et al. (2018)
MEAN AGE	52.56 ± 16.431	58.7 ± 14.2
GENDER RATIO	3:1	1:1.3
GCS WITH POOR OUTCOME	<5	<5

Brain Stem Reflexes:

The brain stem reflexes conducted in the present study are a corneal reflex, pupillary reflex, oculocephalic reflex. The absent reflexes either individually or with other reflexes mostly favored poor outcomes, i.e., either death or recovery with functional disability. Elienai et al. 2010states that the Oculocephalic reflex may change from normal to abnormal or absent during the follow, indicating worsening of the comatose condition but changes in the opposite direction were not observed. Abnormal VOR was related to guarded prognosis, and absent VOR predicted 100% death outcome supporting the present study. Bates et al. 2001. No single clinical sign is significant as an indicator of poor prognosis in individual patients, but a combination of clinical signs may potentially improve the accuracy of prognosis, which supports the present study. Zou et al. 2015 conducted a study on carbon monoxide poisoning found that the absence of pupillary reflex with loss of consciousness predicted 30- day mortality correlating to the present study. Wijdicks et al. 2015 found that by using respiratory pattern, Glasgow coma score and brain stem reflexes as a score named Full outline of unresponsiveness score (FOUR) better predicted the outcome than Glasgow coma score alone or brain stem reflexes alone, so the present study correlated to the model used in mentioned study.

CONCLUSIONS

Altered sensorium is more common among patients for more than 50 years Altered sensorium is more common among males than females Delirium and drowsiness are more common symptoms of altered sensorium Infections mainly septic encephalopathy is a more common cause for altered sensorium in the present study followed by cerebrovascular accidents GCS less than 5 had bad outcomes, 5 - 8 had unequivocal consequences some recovered some couldn't, GCS more than 8 had a good recovery.

Absence of Oculocephalic reflex and corneal reflex correlated much better than pupillary reflex and plantar reflex with unfavorable outcomes Absence of all the reflexes was highly associated with the poor outcomes.

Considering GCS, more than two reflex patterns, probable diagnosis can be used to predict the outcomes as all together these had a good correlation in the present study.

Additional Information Disclosures

Human subjects: All authors have confirmed that this study did not involve human participants or tissue. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

REFERENCES

1. Han, J. H., & Wilber, S. T. (2013: Altered Mental Status in Older Patients in the Emergency Department. Clinics in Geriatric Medicine. 29:136. 10.1016/j.cger.2012.09.005
2. Boveroux. P., Bonhomme. V., Boly. M., et al.: Brain Function in Physiologically, Pharmacologically, and Pathologically Altered States of Consciousness. International Anesthesiology Clinics. 46:131-146. 10.1097/aia.0b013e318181a8b3
3. Brown, E. N., Lydic, R., & Schiff, N. D. (2010: General Anesthesia, Sleep, and Coma. New England Journal of Medicine, 363. 2638:2650. 10.1056/nejmra0808281
4. Giacino J. T., Ashwal. S., Childs, et al.: The minimally conscious state: Definition and diagnostic criteria .Neurology. 58:349-353. 10.1212/wnl.58.3.349
5. Kim, Y., & Kim, J. W. (2012: Toxic Encephalopathy. Safety and Health at Work. 3:243-256. 10.5491/shaw.2012.3.4.243
6. Xiao, H. (2012: Evaluation and treatment of altered mental status patients in the emergency department: Life in the fast lane. 3:4. 10.5847/wjem.j.issn.1920-8642.2012.04.006
7. Yagmury, Kiraz M, Kara IH, et al.: Looking at trauma and deaths: Diyarbakir city in Turkey . Injury. 1999, 30:111-114. 10.1016/S0020-1383(98)00230-7
8. Melka A, Tekie-Haimanot R, Assefa M: Aetiology and outcome of non- traumatic altered states of consciousness in north western Ethiopia. E Afr Med J. 1997, 74:49-53.
9. Plum and Posner. Prognosis in Coma. In: Plum F, Posner D: Diagnosis ofstupor and comaphiladelphia; FA. Davis Company. 1982329, 45:
10. Peidaee E., Sheybani F., Naderi, et al.: The Etiological Spectrum of Febrile Encephalopathy in Adult Patients: A Cross-Sectional Study from a Developing Country. Emergency Medicine International. 2018, 1-8. 10.1155/2018/3587014
11. Ayus, J. C., Caputo D., et al.: Treatment of Hyponatremic Encephalopathy With a 3% Sodium Chloride Protocol: A Case Series. American Journal of Kidney Diseases. 65:435-442. 10.1053/j.ajkd.2014.09.021
12. Tapper, E. B., Henderson, et al.: Incidence of and Risk Factors for Hepatic Encephalopathy in a Population- Based Cohort of Americans With Cirrhosis. Hepatology Communications. 10.1002/hep4.1425
13. Terefe Tesfaye, B., Gudina, et al.: Short- term clinical outcomes of patients admitted with chronic liver disease to selected teaching hospitals in Ethiopia. 14:0221806. 10.1371/journal.pone.0221806
14. Corso G., Bottacchi E., Tosi P., et al.: Outcome Predictors in First-Ever Ischemic Stroke Patients: A Population-Based Study. International Scholarly Research Notices. 2014, 1-8. 10.1155/2014/904647
15. Habibi-koolaee M., Shahmoradi L., Niakan Kalhori, et al.: Prevalence of Stroke Risk Factors and Their Distribution Based on Stroke Subtypes in Gorgan: A Retrospective Hospital-Based Study—2015-2016. Neurology Research International. 2018, 1-7.

10.1155/2018/2709654
16. Setyopranoto, I. Bayuangga, H. F., et al.: Prevalence of Stroke and Associated Risk Factors in Sleman District of Yogyakarta Special Region, Indonesia. Stroke Research and Treatment. 2019, 1-8. 10.1155/2019/2642458