Acute confusional state (ACS) is a significant challenge for the physician as it does not suggest a specific diagnosis but rather a manifestation of a wide range of medical conditions. As etiology of ACS are numerous, proper and prompt identification can help us to treat underlying disorder and thus prevent fatal outcome.

**Aim:** To study the Clinical and etiological profile of Acute Confusional State in a tertiary care hospital.

**Design:** Prospective and observational study.

**Materials and methods:** This study included 200 patients admitted with ACS of less than 7 days duration diagnosed according to Confusion Assessment method. A detailed history and examination was done. All patients were subjected to hemogram, complete urine examination, renal and liver function tests, serum electrolytes and arterial blood gas analysis. In selected patients blood and urine cultures, CSF analysis, CT and MRI Brain were done as per clinical suspicion.

**Results:** Out of 200 patients, males were 124, females were 76 and divided into three groups based on age, 44 patients in younger age group (18-30 years), 97 patients in middle age group (31-60 years) and 59 patients in old age group (61-90 years). Overall the most common cause of ACS was found to be metabolic (37%) followed by cerebrovascular disorder (CVA) (29%). In younger patients, the most common cause was found to be CNS infections (28.5%) followed by CVA (26.5%) and autoimmune disorders (18.5%). In middle age group, common etiologies were CVA (34%) followed by hepatic encephalopathy (19.7%) and CNS infections (16%). In elderly patients most common causes were found to be metabolic (38%) followed by CVA (35%) and septic causes (25%).

**Conclusion:** Acute Confusional State is a very common condition encountered in clinical practice. Many causes of ACS are completely reversible like infections, metabolic abnormalities. This finding emphasize the great importance of early and accurate etiological diagnosis of ACS, as it can help in better management of patients.

**Key Words:** Acute confusional state, CVA, Metabolic encephalopathy, Delirium, especially if undiagnosed.

Proper and prompt management could only be possible if the etiology of acute confusional state could be diagnosed accurately for favourable outcome. Therefore an awareness regarding the common causes of acute confusional state is essential at all levels of medical practice for its early diagnosis, proper treatment and prevention as well.

**AIM OF THE STUDY:**

The aim was to study the Clinical and etiological profile of Acute Confusional State in a tertiary care hospital.

**OBJECTIVES OF THE STUDY:**

**Primary Objective:**

To identify the aetiology of Acute Confusional State among the hospitalized patients in a tertiary care centre.

**Secondary Objective:**

1. To identify the percentage of patients admitted with Acute Confusional state by the type of acute illness and observing their in–hospital outcomes.
2. To identify the aetiology of Acute Confusional State in different...
MATERIALS AND METHODS:
A total of 200 patients of both genders admitted in a tertiary care centre during the study period (August 2016 – August 2017) and diagnosed to have acute confusional state and fulfilling the inclusion criteria are selected for the study after giving consent. It is a prospective and observational study.

METHODOLOGY:
Patients are selected with the following Inclusion and Exclusion Criteria.

INCLUSION CRITERIA
Patients with acute confusional state/delirium of less than seven days duration. The enrolled patients fulfilled the diagnostic criteria of an acute confusional state, according to the confusion assessment method. The confusion assessment method diagnostic algorithm includes the following criteria:

1. An acute onset or fluctuating course;
2. Inattention;
3. Disorganized thinking; and
4. Altered level of consciousness.

The diagnosis of delirium by confusion assessment method needed the presence of features 1 and 2 and either 3 or 4.

EXCLUSION CRITERIA
Previous history of stroke, Chronic degenerative neurological disease where cognitive function is impaired.

- Known psychiatric illness.
- Patients with a history of head trauma or those who have undergone any surgery in the past one week will be excluded from the study.
- Duration of confusional state for more than seven days.

ETHICAL ISSUES:
All the information was collected from patients’ attendants and hospital records. No intervention was done on study purpose. Written consent was taken from the patients’ attendant.

STUDY PROCEDURE:
After obtaining detailed history, a complete general physical examination and systemic examination, the patients are subjected to relevant investigations.

RESULTS:
A total of 200 patients with acute confusional state were included in the study. Of these, 124 were males (62%) and 76 were females (38%) showing male predominance. The demographic details of the patients were presented in Fig.1. Age distribution of patients was considerably variable ranging from 18-90 years with a mean age of 48.7 years (Standard Deviation=18.1 years). The most common age group with ACS observed was 51-60 years accounting 21% of the study participants followed by 61-70 years of age group (19.5%).

Fig 1: Sex distribution in all age groups.

Overall most predominant etiologies identified (Fig.2) were metabolic abnormalities in 83 patients followed by cerebrovascular disorders in 66 patients and infections in 48 patients. Multiple etiologies were noted in 23 patients.

Fig 2: Broad etiological proportions of acute confusional state.

Of metabolic abnormalities, hepatic encephalopathy was the most common cause observed in 30 patients followed by dyselectrolytemia in 20 subjects. Of Cerebro Vascular Disorders, 61 were stroke (Ischemic-36; Hemorrhagic-25), two were cerebro venous sinus thrombosis and three due to thrombotic thrombocytopenic purpura (Table.1).

Among infectious etiology, CNS infections were seen in 28 patients with TB meningitis being the commonest cause (n=12) followed by viral encephalitis (n=7).

Septic encephalopathy found to be the cause in 20 subjects. Toxin induced encephalopathy was observed in ten patients with alcohol withdrawal being the predominant cause.

<table>
<thead>
<tr>
<th>ETIOLOGY</th>
<th>Number of patients N=200 (percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>METABOLIC</td>
<td></td>
</tr>
<tr>
<td>CEREBRO VASCULAR DISORDERS</td>
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<tr>
<td>INFECTIONS</td>
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<td>TOXINS</td>
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<tr>
<td>AUTOIMMUNE</td>
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<td>OTHERS</td>
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</tbody>
</table>

Table 1: Different etiological proportions of acute confusional state.
Delirium is a clinical presentation of an acute medical condition and early recognition of delirium not only allows prompt management of the underlying medical cause but also permits the rapid implementation of targeted interventions for the predisposing and precipitating condition, thereby resulting in a reduction of delirium severity, duration and consequences.  

This study consisted of 200 patients admitted at NIMS Hospital, Hyderabad. All cases met inclusion and exclusion criteria.

In the present study, of the 200 patients presenting with acute confusional state, 62% were male patients and 38% were female patients. The sex distribution was similar to another study by Rai, Garg et al and Kanich et al showing male predominance.

Age of the patients ranged from 18 years to 90 years (Fig. 1). The mean age of the population was 48.7 years with a standard deviation of 18.1 years. The most common age group was 51-60 years (21%) (Fig. 1). The second most common age group was 61-70 years (19.5%). Most studies on acute confusional state are in the elderly and it is thought that acute confusional state is predominantly a state of the elderly. One possible reason for 51-60 years age group being more common than the older age groups could be total lifespan which is less in our population than the Western population.

Sex distribution in all age groups showed higher male to female ratio except in 18-20 years group could be due to the increased prevalence of autoimmune disorders.

Broad etiological classification showed predominant etiology for delirium (Fig. 2) as Metabolic (37%), followed by Cerebrovascular disorders (29%) and infections (21%). These findings are analogous to the study in Dhaka by Hossain et al. In the study by Chrispal et al and Rai, Garg et al, the most common causes were infections followed by metabolic and cerebrovascular disorders. But these studies included only elderly patients thus explaining the discrepancy.

For a total of 200 patients 25 different etiologies were noted. Multiple etiologies were seen in 23 patients (11.5%). 20 patients had two different etiologies and three patients had three different etiologies. Multifactorial etiologies for delirium are well described in several studies like Cacchione et al, Chrispal et al and Hossain et al.

Comparing individual etiologies, CVA was seen in 61 patients (30.5%). In the study by Levy et al, 36.2% of non-traumatic acute confusional patients were due to stroke.

Of the 61 patients with stroke, 52 patients had mass effect explaining the confusional state, four patients had multiple acute infarcts which were cardioembolic in origin, one patient had multiple bleeds and was a known patient of pheochromocytoma and three patients had brainstem infarcts/bleed.

Confusional states in thalamic infarcts have been described and are particularly common when the anteromedial portion of the thalamus is involved.

Among metabolic encephalopathy, hepatic dysfunction leading to acute confusional state was the most common cause and was seen in 30 patients (15%). This was consistent with the study by Levy et al in which 10.2% of altered consciousness was due to hepatic encephalopathy. Decompensated chronic liver disease due to alcohol was the most common cause of hepatic failure seen in 18 of 30 patients (60%).

CNS infections were noted in 28 patients (13%) (Table 1). The most common CNS infection was TB meningitis (Fig. 6) seen in 12 patients. The second most common CNS infection was viral encephalitis seen in seven patients (3.5%). The incidence of viral encephalitis was 4%.

### Table 2: Etiologies in different age groups.

<table>
<thead>
<tr>
<th>AGE RANGE (YEARS)</th>
<th>MOST COMMON (M/C) CAUSE</th>
<th>SECOND M/C CAUSE</th>
<th>THIRD M/C CAUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-20</td>
<td>CNS infections (37%)</td>
<td>CVA (21%)</td>
<td>Autoimmune (21%)</td>
</tr>
<tr>
<td>21-30</td>
<td>CVA (32%)</td>
<td>CNS infections (20%)</td>
<td>Autoimmune (16%)</td>
</tr>
<tr>
<td>31-40</td>
<td>CVA (25%)</td>
<td>CNS infections (25%)</td>
<td>Hepatic (14%)</td>
</tr>
<tr>
<td>41-50</td>
<td>CVA (48%)</td>
<td>Hepatic (22%)</td>
<td>Metabolic (11%)</td>
</tr>
<tr>
<td>51-60</td>
<td>CVA (30%)</td>
<td>Hepatic (23%)</td>
<td>CNS infections (14%)</td>
</tr>
<tr>
<td>61-70</td>
<td>Metabolic (33%)</td>
<td>Septic (28%)</td>
<td>CVA (28%)</td>
</tr>
<tr>
<td>71-80</td>
<td>Metabolic (43%)</td>
<td>CVA (43%)</td>
<td>Septic (12.5%)</td>
</tr>
</tbody>
</table>

*Metabolic - includes all causes other than hepatic and uremic encephalopathy.*

### DISCUSSION:

Delirium is a clinical presentation of an acute medical condition and...
Septic encephalopathy was seen in 20 patients (i.e. 10%). Of these (Table 1), ten patients had Sepsis, four had pneumonia, three had UTE, two had cellulitis and one had cholangitis. This predomination of sepsis, pneumonia, UTE and skin infections was also noted in Arinzon et al, Hossain et al and Cacchione et al.

Dyselectrolytemia as a cause of acute confusional state was seen in 20 patients (10%). Hyponatremia was the most common finding noted in 17 of 20 patients. This is similar to the study by Rai, Gargetal where hyponatremia was the most common metabolic precipitating factor.

Two patients had hypernatremia. One patient presented with hypercalcaemia (Serum Calcium =18mg/dl) and on further evaluation was found to have Multiple Myeloma. After hemodialysis, patient’s calcium levels normalised and sensorium improved.

Toxin exposure leading to acute confusional state was seen in (Table 1) 14 patients (7%). Of these, five were in alcohol withdrawal, five had drug toxicity/ overdose and four patients had Organophosphate poisoning.

Among drug induced encephalopathy, two patients had deliberate sedative overdose. Of the other three patients, each had toxicity with phenytoin, valproate and baclofen respectively after sudden increase in dosage.

Type 2 respiratory failure was seen in ten patients. All of these were in the older age group ranging from 57-82 years. Of the 10 patients, five had history of obstructive airway disease. The mean PCO2 on ABG was 95.2 mmHg with a standard deviation of 25.69 mmHg.

Disturbance in glucose metabolism (hypoglycaemia or hyperglycaemia) leading to altered sensorium was seen in nine patients (4.5%). Of these, eight patients had neuroglycopenia and one had DKA.

Autoimmune causes of altered mental state were seen in ten patients. Of these three patients had Autoimmune encephalitis diagnosed based on imaging or CSF/serum autoimmune antibodies.

TTP (Thrombotic Thrombocytopenic Purpura) as a cause of altered sensorium was diagnosed in three patients. These patients had history of rheumatologic disease and fulfilled the other hematological criteria for TTP.

CNS vasculitis was seen in one patient and required brain biopsy to establish the final diagnosis. CNS lupus and Acute Demyelinating Encephalomyelitis (ADEM) were diagnosed in one patient each.

Uremic encephalopathy was noted in ten patients (5%). Renal failure as a cause of acute confusional state is uncommon and had a variable incidence in different studies ranging from 1% in Kanich et al, 1.7% in Xia et al14 to 4% in Rai, Garg et al.

In patients with hypertensive encephalopathy, the mean Systolic blood pressure (SBP) was 190 mmHg and the mean diastolic blood pressure was 120 mm Hg. Previously normotensive individuals can show signs of encephalopathy at blood pressures as low as 160 mm Hg systolic, 100 mm Hg diastolic (160/100 mmHg).25

CNS metastasis (Table 1) was seen in three patients. One of them was a 50-year female who was a known case of breast carcinoma on radiotherapy and chemotherapy and developed acute confusional state with CT brain showing metastasis with perilesional edema. Her sensorium improved as the edema subsided with injectable steroids.

Another patient was a 50-year old female who presented with Acute confusional state and MRI was s/o hemorrhagic metastasis. She also had a thyroid swelling which, on FNAC, revealed Follicular carcinoma.

The third patient was a 90-year old male who presented with Acute confusional state and left hemiparesis. His MRI brain showed metastatic ring enhancing lesions. Due to abnormality on chest radiograph and in search of primary malignancy, CT chest was done, which was s/o Carcinoma Lung.

Common etiologies in different age groups:

In the younger age groups (age range of 18-30 years), the three common etiologies (Table 2) were CNS infections (28.5%), cerebrovascular disorders (26.5%) and autoimmune causes (18.5%). The cerebrovascular disorders were commonly caused by CSVT (cerebral sinus venous thrombosis) in this age group. A review article on CSVT by Alvis Miranda et al emphasises that CSVT affects predominantly younger age group. In a study by Narayan et al in which clinical profile of CSVT was studied, the mean age of patients was 31.8 years.

In the middle age group (age range of 31-60 years), the three common etiologies were CVA (cerebrovascular accidents – 34%), hepatic encephalopathy (19.7%) and CNS infections (16%).

In the elderly age group (age range of 61-90 years), the three common etiologies (Table 2) were metabolic (38%), CVA (35%) and septic (20%). In Rai, Garg et al, the common etiologies in similar age group were infections followed by metabolic causes. In Xiao et al, the cause of ACS was studied in elderly vs non-elderly. The causes frequently seen in the elderly in this study were CVA followed by metabolic causes. In Hossain et al, systemic infection causing acute confusional state was more common in older age group i.e 56 to 75 years.

Comparison of etiology in both genders:

Etiologies like CVA, CNS infections, septic and uremic encephalopathies were seen in equal proportions in both the genders.

Hepatic encephalopathy was seen in 19% males and 9% females. The male to female ratio was 2:1. Decompensated chronic liver disease due to alcohol was the most common cause of hepatic failure. The causes of hepatic failure among females were variable which included HCV-related Chronic Liver Disease( CLD), NAFLD (Non Alcoholic Fatty Liver Disease), peliosis hepatis, Wilson’s disease etc.

Toxin induced delirium also had a male preponderance. It was seen in 9.6% of males and 2.6% of females. Alcohol withdrawal was one of the leading causes.

Autoimmune causes of ACS showed a female preponderance with 10.6% of females being affected compared to 1.6% of males.

The mean duration of hospital stay was 10 days (Table 3) with a standard deviation of 6.5 days (range 2 days to 44 days) in all the recovered patients. In a Turkish study by Kekecet al., the mean duration of hospital stay was 8.1 days and in Kanich et al it was 7.6 days.

The mean duration of stay was longer in CVA patients (12.75 days (Table 3)) followed by CNS infections (10.75 days), hepatic (10.2 days), septic (8.5 days), dyselectrolytemia (8 days) and least in hypo/hyperglycemia (6 days). Stroke patients with the development of delirium have longer hospitalizations and a greater degree of dependence after discharge.

| Table 3: Hospital stay statistics in recovered patients |
| --- | --- | --- |
| ETIOLOGY | MEAN DURATION OF HOSPITAL STAY (DAYS) | STANDARD DEVIATION |

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Clinical features:-
The most common co-morbidity noted was hypertension seen in 37 patients (19.5%). This was similar to the study by Rai, Garg et al’ where in hypertension was the most common associated condition. Other co-morbidities noted were diabetes mellitus (14%), chronic kidney disease (2.5%) and coronary artery disease (2%).

All the patients in our study had acute onset of mental status changes. Fluctuating course was seen in 21 (10.5%) patients. It was most commonly observed in dyselectrolytemia and alcohol withdrawal. Disorganised thinking was seen in 48 patients (24%). It was commonly observed in alcohol withdrawal (80%), hypo/hyperglycemia (66%) and poisoning (55%). Most patients (162 of 200 i.e. 81%) had hypoactive type of delirium. All of them were a subset of patients with disorganised thinking. Hypoactive delirium was seen in 38 patients. The results were comparable to Rai and Garg et al’ where hypoactive delirium was much more common than hyperactive delirium. In Han et al’, 92% of the patients had hypoactive delirium.

The most common symptom in patients with CVA was hemiparesis (68%). In CNS infections, the most common symptom was fever (67%) followed by headache (35%). In hepatic encephalopathy, the most common symptom was jaundice (63%) followed by abdominal distention (23%). The most common sign was flapping tremors (60%). In septic encephalopathy, the most common symptom was fever (80%). The most consistent laboratory finding was leucocytosis (TLC>11000) which was seen in 17 of the 20 patients (85%).

Out of 200 patients, 58 patients required intubation. It was done in 90% (9 out of 10) patients with type 2 respiratory failure, 60% patients with autoimmune disorders to protect the airway, 30% of patients with septic encephalopathy, 39% patients with CNS infections and 38% patients with CVA. Other complications seen were aspiration pneumonia in 12 patients, health care-associated infections in 8 patients, ventilator associated pneumonia in 3 patients. The results were comparable to Rai and Garg et al’ where hypoactive delirium was much more common than hyperactive delirium. In Han et al’, 92% of the patients had hypoactive delirium.

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144 of the 200 patients recovered and were discharged. 37 expired and 19 left against medical advice. The mortality rate was 22.5% in our study (Fig. 4). In Xiao et al’, the mortality rate was 8.1%. In Inouye et al’, in-hospital deaths were only 5% but the mortality rate increased to 14% at three months follow up.

The difference in mortality rates may be due to a smaller sample size in our study and the fact that this study was conducted in a tertiary care referral centre where very sick patients are referred leading to referral bias.

The mortality was highest in uremic (50%), septic (45%) and hepatic encephalopathy (43%). It was 30% in auto immune-disorders, 18% in cerebrovascular accidents and 10% in CNS infections.

**Fig 3: Mortality in different etiological proportions of acute confusional state.**


