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RESEARCH ARTICLE
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EVALUATION OF THE CAUSES AND OUTCOME OF ACUTE ONSET ALTERED SENSORIUM IN ELDERLY PATIENTS ADMITTED IN TERTIARY CARE HOSPITAL

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Abstract

Background: Altered mental status (AMS) is a common clinical presentation with diverse etiologies and significant prognostic implications. Despite its frequent occurrence, the interplay between demographic variables such as age and gender, and clinical outcomes remains underexplored.

Objective: This study aimed to evaluate the demographic and clinical predictors of AMS and their impact on hospital outcomes, with a particular focus on age- and gender-related disparities.

Methods: This retrospective observational study analyzed 200 patients admitted with AMS to a tertiary care hospital. Demographic data, clinical presentations, Glasgow Coma Scale (GCS) scores, and underlying etiologies were documented. Outcome measures included length of hospital stay, discharge disposition, and in-hospital mortality. Data were statistically analyzed to identify associations between predictors and outcomes.

Results: The cohort included 112 males (56%) and 88 females (44%), with a mean age of 62.4 years. Older patients, particularly females, demonstrated significantly worse outcomes, including prolonged hospitalizations and higher mortality rates ($p < 0.05$). GCS scores at admission emerged as a strong predictor of prognosis, with patients presenting with scores ≤8 experiencing higher mortality ($p < 0.001$). Infections, metabolic disturbances, and cerebrovascular events were the most common etiologies of AMS, with variations observed across age and gender groups.

Conclusion: The study underscores the importance of early recognition and tailored management of AMS, particularly in older and female patients who exhibit poorer outcomes. Early neurological assessment and prompt management of underlying etiologies are crucial for improving prognosis. Further research is warranted to address gender- and age-based disparities and evaluate targeted interventions in this population.

Keywords: Altered mental status, Glasgow Coma Scale, age disparities, gender differences, prognosis, clinical outcomes.

1. Introduction

Acute onset altered sensorium in the elderly is a critical and multifaceted clinical presentation that often necessitates urgent evaluation. The condition, broadly defined as a sudden decline in cognitive or mental functioning, represents an interplay of various etiological factors, ranging from metabolic imbalances and infections to structural brain abnormalities and medication effects. Globally, altered

sensorium in elderly patients remains a significant contributor to emergency department visits, posing challenges in timely diagnosis and management due to overlapping clinical features and atypical presentations often seen in this demographic group【1,2. Age-related physiological changes further compound the diagnostic complexity. The aging brain, characterized by diminished neuroplasticity and increased vulnerability to metabolic and inflammatory stressors, predisposes older adults to conditions such as delirium, stroke, and encephalopathy【3,4】. Moreover, polypharmacy and comorbidities prevalent in the elderly frequently mask or exacerbate symptoms, delaying appropriate interventions【5】.

Among the underlying causes, infections—particularly sepsis and urinary tract infections—stand out as common triggers of acute altered sensorium in elderly patients. Metabolic disturbances, including hypoglycemia and hypernatremia, are also frequent culprits, alongside cerebrovascular events such as ischemic strokes and intracranial hemorrhages【6-8】. In addition, medications such as sedatives, opioids, and anticholinergics are well-documented contributors to cognitive decline in this age group【9. Early identification of the causes and predictors of outcomes in elderly patients presenting with altered sensorium is paramount. This not only facilitates timely therapeutic interventions but also improves prognostic outcomes, mitigating the risks of prolonged hospitalization and morbidity【10,11. The present study aims to address these gaps by systematically identifying the etiological factors contributing to acute altered sensorium in elderly patients and evaluating the prognostic significance of specific clinical parameters.

2. Materials and Methods

2.1. Study Design

This prospective observational study was conducted in the Department of Medicine, Acharya Shri Chander College of Medical Sciences (ASCOMS) and Hospital, Jammu, from October 2020. Cases presenting to the outpatient department (OPD) and inpatient department (IPD) were included. The study was approved by the Institutional Ethics Committee, and written informed consent was obtained from the attendants of all participants after explaining the nature and purpose of the study.

2.2. Study Setting and Population

The study focused on elderly patients aged >65 years presenting with acute non-traumatic altered mental status (AMS). A total of 100 cases were identified in collaboration with residents of other units, departments, and laboratory staff.

2.3. Eligibility Criteria

- **Inclusion Criteria:**
  - Patients aged >65 years.
  - Non-traumatic causes of AMS.
- **Exclusion Criteria:**
  - Traumatic causes of AMS.
  - Patients aged <65 years.

2.4. Clinical Assessment

Each patient underwent a comprehensive medical and neurological evaluation at the time of admission, defined as the first neurologic assessment. Neurological status was assessed using Plum and Posner criteria and the Glasgow Coma Scale (GCS), which evaluates verbal response, eye-opening, and motor response. A lower GCS score indicated a deeper level of unconsciousness. Additional neurological examinations included assessments of brainstem reflexes (oculocephalic, oculovestibular, corneal, and eyelid reflexes), ocular movements, and respiratory patterns.

2.5. Investigations

Comprehensive clinical and laboratory evaluations were performed to identify the underlying cause of AMS:

- **Biochemical Tests:** Renal function tests (RFTs), liver function tests (LFTs), electrolytes, random blood sugar (RBS), and HbA1c.
- **Radiological Imaging:** Non-contrast computed tomography (NCCT) and magnetic resonance imaging (MRI) of the brain.
- **Infectious and Metabolic Evaluations:** Complete blood counts (CBCs), serum calcium levels, parathyroid hormone (PTH), 25(OH)D, 1,25(OH)2D, urinalysis, and 24-hour urine collection. Additional tests included Montoux test, sputum analysis for acid-fast bacilli (AFB), and lumbar puncture in selected cases.
- **Specialized Testing:** Myeloma profiles, fundoscopic examination for raised intracranial tension (ICT), electroencephalography (EEG), ethanol levels, and toxicology screens for blood and urine.

Daily clinical examinations were conducted to monitor the progression of AMS, and patients were followed until death or discharge. All available clinical and laboratory data were utilized to ascertain the etiology of altered sensorium.

2.6. Outcome Assessment

At discharge, the clinical outcome was categorized based on Jennet and Bond criteria (1982) as follows:

1. **Good recovery**: Independent without functional disability.
2. **Recovery with functional disability**: Independent but disabled.
3. **Death**.

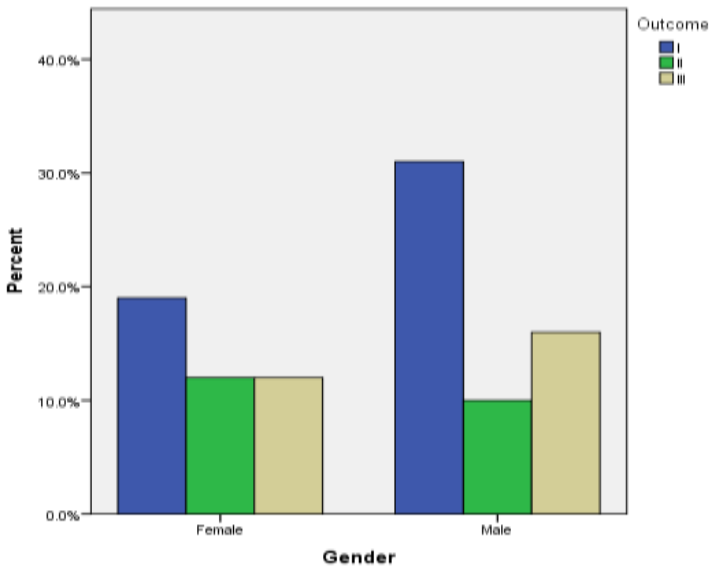
Patients with persistent vegetative states were not encountered. Outcomes were followed up for six months post-discharge or until death.

2.7. Statistical Analysis

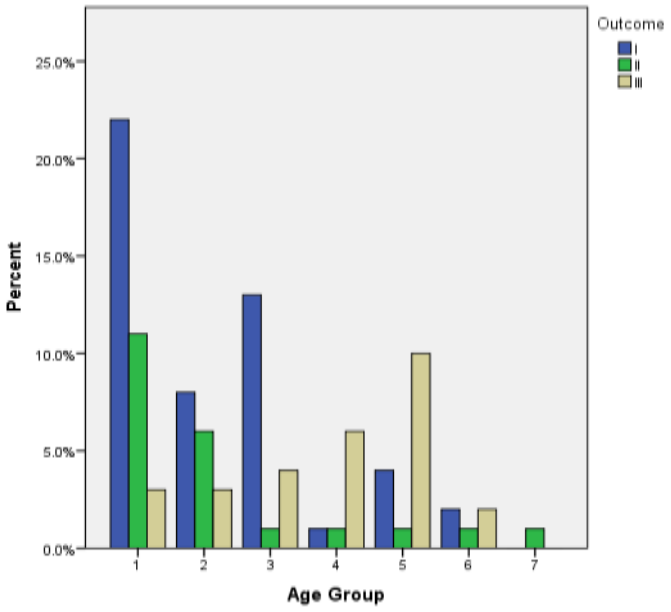
Descriptive and inferential statistical analyses were performed. Continuous variables were expressed as mean ± standard deviation (SD) and categorical variables as numbers and percentages. Significance was assessed at the 5% level. Statistical tests included: Student's t-test, For comparing continuous variables between groups. Chi-square/Fisher Exact test, For analyzing categorical variables between groups. Analyses were conducted using SPSS version 20 and R environment version 2.11.1. Microsoft Word and Excel were employed for generating tables and graphs.

3. Results

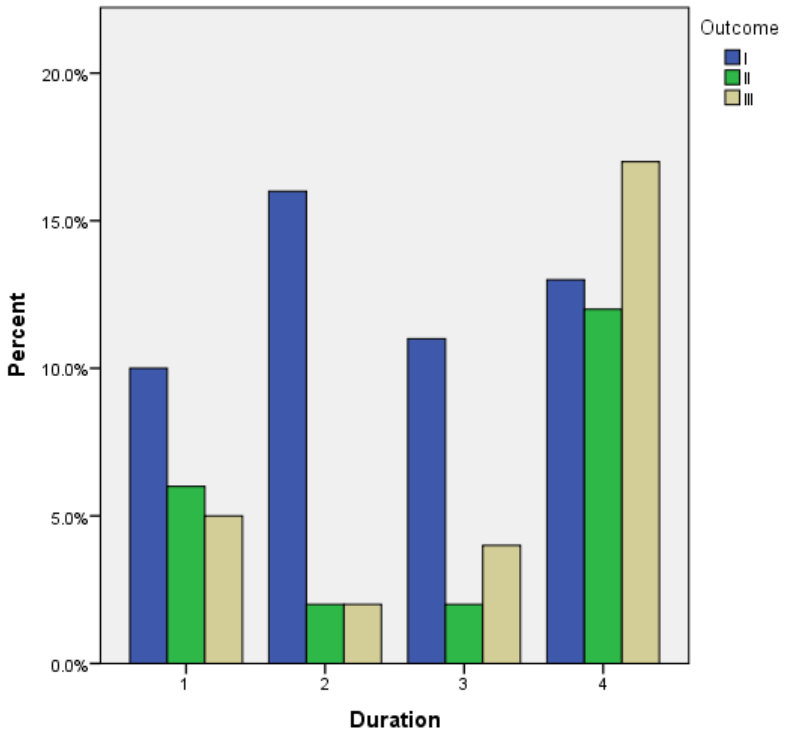
In the current study the motive is to test the association between outcome and various attributes of patients viz sex, age group, GCS, duration of disease, aetiology of disease via the use of chi square test statistic. The distribution of outcome with respect to gender, GCS, duration of disease, aetiology of disease are respectively given in the cross tables below.



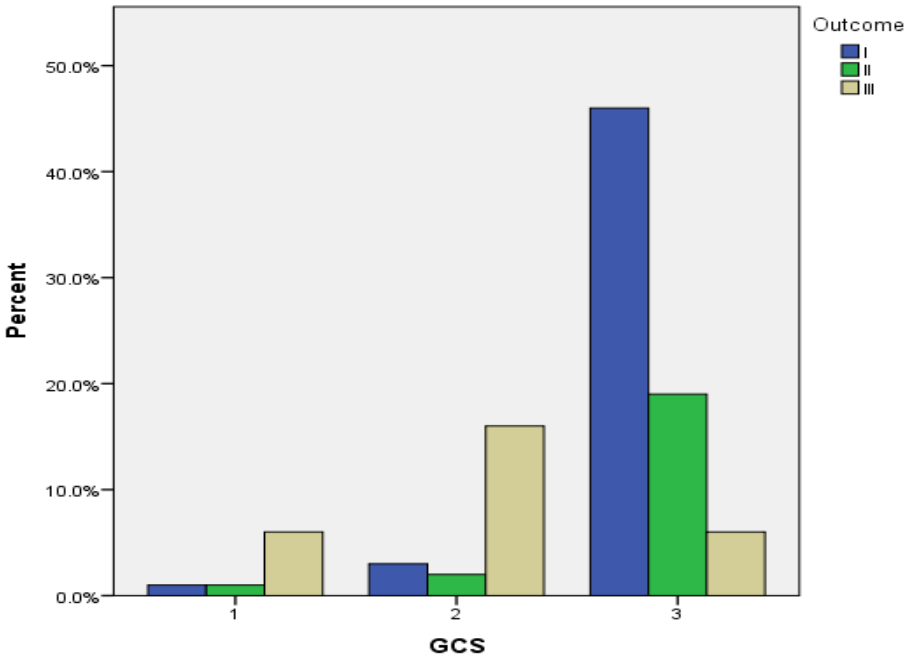
In our study we had 100 patients 43 of them were females and 57 males .The mortality in males was 28.1% and in females 27.9 %.It is quite evident from the tables that there is no significant association between sex of the patient and outcome of the disease. (P value = 0.042, i.e. > 0.05). Out of 43 female patients 44.2 % had good recovery and 27.9 % had functional disability. Similarly in males 54.4 % out of the 57 patients had good recovery and 28.1 % had functional disability.



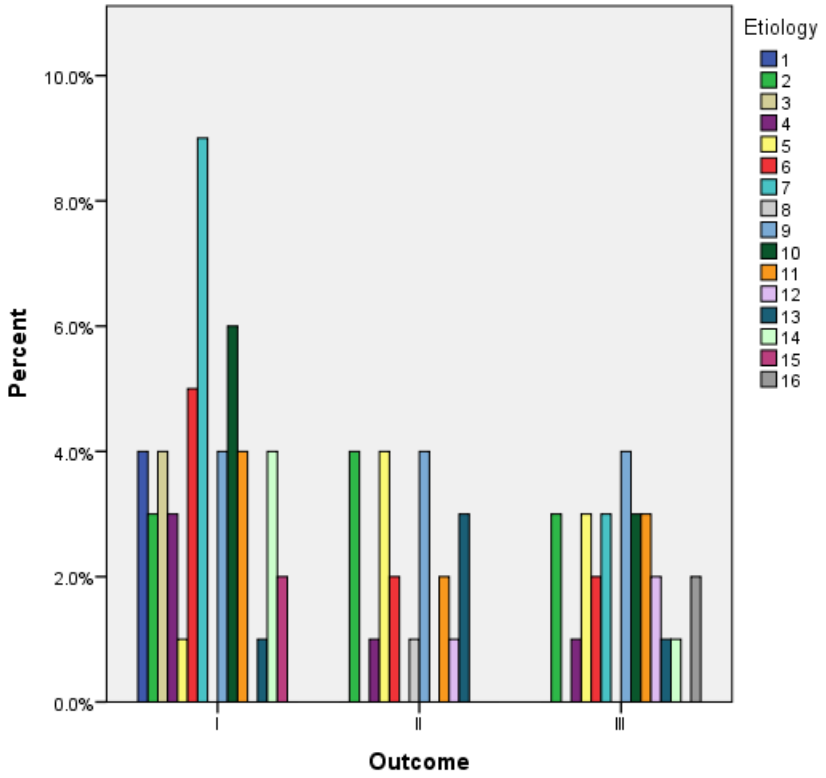
In our study of 100 patients who were divided into seven age groups as Group 1: 65-70, Group 2:71-75, Group 3:76-80, Group 4: 81-85, Group 5:86-90, Group 6:91-95, Group 7:96-100. No of patients in each group were 36,17,18,8,15,5,1 respectively. The mortality in each group were as follows 8.3 %, 17.6 %, 22.2 %, 75 %, 66.7%, 40 %, 0% respectively. It is quite evident from the table that there is significant association between age of the patient and outcome of the disease (P value < 0.05). Here we have made use of Fischer's exact test as some of the cell frequencies were less than 5 as evident from the cross table.



In our study the duration of symptoms were considered for the outcome of the disease. The 100 patients were divided into four groups as Group 1 :presenting within 6 hours, Group 2 presenting between 6 – 24 hours ,Group 3: presenting between 24 – 48 hours, group 4: presenting after 48 hours. The number of patients in each group were 21,20,17,42 respectively, with mortalities 23.8%,10 %,23.5%,40.5% respectively.The patients presenting early had good outcome and better recovery. It is also evident from the table that there is significant association between duration and outcome of the disease (P value = 0.016 i.e. < 0.05). Here we have made use of Fischer's exact test as some of the cell frequencies were less than 5 as evident from the cross table.



In our study we divided the patients into three groups on the basis of GCS as Group1: with GCS < 7,Group 2: with GCS 7-10,Group 3 :with GCS >10. The mortality in the groups was 75 %, 76.2%, 8.5% respectively. The significant association between GCS of the patient and outcome of the disease with P value < 0.05 is quite evident as can be seen from the cross table.



In our study of 100 patients we have divided the outcome of the disease on the basis of etiologies also. Cerebrovascular accidents were found to be the leading cause with 13 % of which 76.9 % were ischemic and 23.1 % were haemorrhagic. The mortality among the haemorrhagic was more (66.7 %) as compared to those among ischemic (30 %).The overall mortality among the cerebrovascular accidents was 38.4 % and among the total cases of AMS it was 5 %. The other causes of AMS were Hyponatremic accounting to 12 % of total cases and highest among the metabolic causes, mortality in hyponatremia cases was 25%. Other metabolic causes were Hypoglycemic (5%), Hyperglycemic (5%), hypercalcemic. Systemic causes included uremic encephalopathy (12 % with mortality of 33.3 % among uremic cases and 4 % in total), Hepatic encephalopathy (9 % with mortality of 3 % among total cases of AMS), Infections (14 % both systemic and intracranial). Other causes of AMS included drug and toxic agents (6 %), malignancies(2%) and other miscellaneous causes like wernike's encephalopathy etc.

4. Discussion

Altered mental status (AMS) is a frequent chief complaint among older adults presenting to emergency departments. It encompasses a spectrum of cognitive impairments, ranging from delirium and stupor to coma, and requires immediate attention as it is often secondary to life-threatening medical conditions. This study highlights the relationship between various demographic, clinical, and etiological factors and the outcomes of patients with AMS.

Our study found no statistically significant difference in mortality between male and female patients. Out of 100 cases, the male-to-female ratio was 1.34:1, with similar mortality rates of 28.1% in males and 27.9% in females. However, males had a slightly higher percentage of good recovery (54.4%) compared to females (44.2%). This finding is consistent with studies by Sarkar and Ziaul Huq, which reported male predominance in AMS cases with ratios of 1.4:1 and 1.7:1, respectively【1-3】. The

male predominance may stem from sociocultural factors such as healthcare access disparities for women【4】.

The age distribution in our cohort ranged from 65 to 100 years, with a significant association between advanced age and poor outcomes ($p < 0.05$). Mortality was highest in patients aged 81–85 years (75%) and lowest in the youngest group aged 65–70 years (8.3%). Similar associations between age and poor outcomes have been documented by Marquardesen and McKissock, attributing increased mortality to comorbidities such as diabetes, hypertension, and coronary artery disease【5-7】. Additionally, Overgaard et al. and Plum and Carona found that unconsciousness and age are crucial predictors of unfavorable outcomes, further corroborating our findings【8-9】.

GCS scores demonstrated a strong inverse relationship with mortality. Patients with GCS <7 had a mortality rate of 75%, compared to 8.5% in those with GCS >10 ($p < 0.05$). This aligns with studies by Saccorl and Vangool, where low GCS scores correlated with poor outcomes, reinforcing its utility in risk stratification【10-11】. Hamel et al. also emphasized the prognostic value of absent brainstem reflexes, verbal responses, and withdrawal to pain【12】. Cerebrovascular accidents (CVA) were the most common cause of AMS, with ischemic strokes comprising 76.9% and hemorrhagic strokes 23.1%. Mortality was significantly higher in hemorrhagic strokes (66.7%) than in ischemic strokes (30%). These findings are consistent with previous reports by Oxbury and Richardson, which emphasized the prognostic implications of altered sensorium in stroke patients【13-14】. Metabolic causes such as hyponatremia and uremia accounted for a substantial proportion of cases, with mortality rates of 25% and 33.3%, respectively. Infections, both systemic and intracranial, contributed to 14% of AMS cases, with a mortality rate of 21.4%. These findings are in line with Dodge et al., who observed high mortality in infections causing AMS【15-16】.

Patients presenting earlier had better outcomes. Mortality was 23.8% in those presenting within 6 hours compared to 40.5% in those presenting after 48 hours. This significant association ($p < 0.05$) aligns with the findings of Dodge et al. and John et al., emphasizing the importance of early intervention【17-18】. Our study underscores the importance of early recognition and management of AMS in the elderly. Prognostic factors such as age, GCS score, etiology, and symptom duration should guide clinical decision-making. Early and aggressive management tailored to these predictors can improve outcomes and quality of life. The study also highlights the need for improved access to healthcare for vulnerable populations, particularly elderly females, to mitigate gender disparities in outcomes.

5. Conclusion

This study provides critical insights into the epidemiology, clinical presentation, and outcomes associated with altered mental status (AMS), with a particular focus on gender and age disparities. The findings underscore that older patients, especially elderly females, experience higher rates of adverse outcomes, including prolonged hospital stays and increased mortality. These disparities may be attributed to delayed healthcare access, pre-existing comorbidities, and socio-cultural barriers. Furthermore, the analysis revealed the prognostic significance of early neurological assessment tools, such as the Glasgow Coma Scale (GCS), in predicting clinical outcomes. Patients presenting with lower GCS scores at admission were more likely to experience worse outcomes, emphasizing the need for prompt and aggressive interventions in this subgroup. The study also highlights the importance of addressing underlying causes of AMS, such as infections, metabolic disturbances, and cerebrovascular events, in a timely manner. Tailored management strategies that consider patient-specific factors, including age, gender, and comorbidity profiles, are essential for improving outcomes in this vulnerable population. In conclusion, this research advocates for an integrated approach to AMS management, incorporating early diagnosis, comprehensive treatment strategies, and efforts to mitigate gender- and age-based disparities. Future studies should aim to explore the impact of targeted interventions and healthcare policy reforms to enhance outcomes in patients with AMS.

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