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Original Article

Prognostic Factor of Outcome in Adults with Altered Mental Status Presenting in Emergency Department

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ABSTRACT

Objective: To determine the prognostic factors which affect the outcome and mortality in patients of Altered Mental Status at the emergency department.

Study Design: Cross sectional study.

Place and Duration of Study: Emergency Department of Combined Military Hospital, Rawalpindi Pakistan, from Dec 2020 to June 2021.

Methodology: A total 90 patients were selected with the age range of 18-75 years who met the inclusion and exclusion criteria. Patients with prior history of trauma, dementia or any other mental illness were excluded. Patient's complete history and examination was performed by emergency physician. Base lines investigations along with other required tests were performed and analysis of data was done to conclude the prognostic factors.

Results: There were 50(55.5%) males and 40(44.5%) females. Mean age of patients was 52.64±3.21 years. Cerebrovascular events 28(31.1%) patients were the leading cause of AMS followed by infections which causes AMS in 14(15.5%) patients. 23(25.5%) patients had died during their hospital stay. The mean PH in Group-A was 7.36±0.06 while in Group-B it was 7.30±0.10, The oxygen saturation was 96.77±3.34% in Group-A while 93.52±7.06% in Group-B and TLC levels were 9.31±4.52 mg/dl in Group A while in group B they were 15.23±4.82 mg/dl which were statistically significant (*p*-value 0.001).

Conclusion: It is concluded that patients of stroke and cardiovascular diseases had higher mortality rate. Male gender, pH, TLC, mean blood pressure, GCS, and SaO_2 were also associated with the increased mortality rate.

Keywords: Altered mental status, Mean blood pressure, Prognosis.

How to Cite This Article: *Batool SN, Zareen SF, Batool SK, Liaqat F, Munir Z, Abbas SW. Prognostic Factor of Outcome in Adults with Altered Mental Status Presenting in Emergency Department. Pak Armed Forces Med J 2023; 73(4): 1208-1211. DOI: https://doi.org/10.51253/pafmj.v73i4.7338*

INTRODUCTION

Any kind of change or alteration in the mental status of a person is referred to as altered mental status (AMS). It is a general phrase used to describe any kind of variation in the normal mentation of an individual.[1] These variations include diminished attention, altered level of consciousness, impaired cognition, reduced awareness, amnesia, confusion, errors in judgment, disorientation, disturbance in perception, and a poor regulation of emotions.[2] In the emergency department the major complaint observed is AMS, which is present among 10% of the patients.[3] Among all the ED patients, the elderly group is more susceptible to develop AMS, as 30% elderly patients in the ED have dementia, and other mental health disorders.[4] Even though AMS is very commonly present in the ED, still it is arduous for physicians at ED to diagnose the cause of AMS in these patients. The physician in emergency often /at times fail to arrive at the specific diagnosis, as the patients manifest a wide range of medical syndromes related to the AMS.[5] AMS is usually due to administration or usage of drugs, Infection, metabolic disarray, neoplasms, trauma, convulsion, stroke, or some organ system dysfunctions.[6] Whatever the specific cause is, AMS is due to the attack on central nervous system (CNS), or because of a secondary injury which have an impact on neurological system.[7] AMS can exist in multiple forms, from being complete unresponsive to extreme hyperactivity. There is a group of patients who develop depressed mental conditions, similarly other group who seem to be alert and active but cannot respond. Some patients also appear hyperactive than the normal patients.[8] Glasgow coma scale (GCS) is commonly used to determine the altered mental status of a person.[9] It is important to have a complete, thorough, and detailed history of patients going through AMS which is impossible unless a family member or a friend accompanies the patient.[10] Similarly, one can have the patient's complete medical history, but it is quite difficult to determine the baseline mental activity which makes it impossible to learn a correct prognosis regarding AMS.

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Received: 30 Aug 2021; revision received: 28 Dec 2021; accepted: 05 Jan 2022

This study was conducted to assess the demographic, Laboratory, and clinical prognostic factors which affect the morbidity and mortality in adult patients at the emergency department who are dealing with AMS.

METHODOLOGY

This cross-sectional study was conducted at the Emergency Department (ED) of Combined Military Hospital, Rawalpindi Pakistan, from December 2020 to June 2021 after approval from ethical committee (Ltr no. 180/07/2021). A sample size of 90 patients was calculated with WHO calculator by 80% confidence interval and 5% significance level and mortality rate in low Glasgow coma score patients i-e 92.3 % with GCS <5 and 10.8 % with GCS more than 5.[11] All Adult patients aged between 18 to 75 years who came on random days with AMS who met the inclusion and exclusion criteria at the ED over the period of 7 months i.e. from 1st December 2020 to 30th June 2021 were included. Patients in this study were diagnosed by the physician present at ED with AMS.

Inclusion Criteria: was patients with low GCS, who were not oriented (with place, person or time), patients with difficulty in arousal or difficult to stay awake or being conversant, patients with hallucinations, or patients who showed any kind of inappropriate or bizarre behavior.

Exclusion Criteria: was All patients less than 18 years, patients who displayed obvious signs of trauma, dementia or patients who were already going through some kind of psychiatric disease or taking any sort of psychiatry medications.

A detailed history and examination was performed on the selected patients by the physician present at ED. Basic tests were conducted on the patients such as their complete blood count (CBC), renal function test (RFT), blood sugar test, electrolytes, arterial and venous blood gas, along with their chest X-ray. CSF analysis and their CT scan were also recorded. All other investigations needed to develop a proper correct diagnosis were also performed. Patients were kept under keen observation until they were discharged or died during the study. Autopsy was not performed.

The categorical data was summarized by using frequency, mean and standard deviation. Chi square test was performed for the comparison of different demographic, laboratory, and clinical variables between the two groups; one of the patients who lived, and discharged, and the other of the patients who died. The *p*-value <0.05 was considered statistically significant. Statistical analysis was done by using SPSS version 23.

RESULTS

Out of these 90 patients, 50(55.5%) patients were male, while 40(44.5%) patients were females. Average age of patients was 52.64±3.21 years. 21(23.3%) patients presented within 11 hours after they developed AMS while 24(26.6%) patients presented within 12-24 hours. 27(30%) patients had GCS <8 on presentation while 29 (32.2%) patients had GCS between 8-12 and 34(37.7%) patients had GCS between 12-15. 31(34.4%) patients had focal neurological deficit when they were admitted to ED, while the rest had no focal neurological deficit.

Table-I: sociodemographic and presentation data of patients

Study Parameter	n(%)
Gender	
Males	50(55.5%)
Females	40(44.44%)
Mean age±SD 52.64±3.21	
Presentation time(hours)	
within 0-11 hours	21(23.3%)
within 12-24 hours	24(26.6%)
After 24 hours	45(50%)
GCS	
<8	27(30%)
8-11	29(32.2%)
12-15	34(37.7%)
Focal Neurological Deficit	
Present	31(34.4%)
Absent	59(65.5%)

Cerebrovascular events 28(31.1%) patients were the leading cause of AMS followed by infections which causes AMS in 14(15.5%) patients. Out of 23 death 6 (26%) patients died of cardiovascular events, 6(26%) patients died of metabolic causes and seizures, 4(18%) patients died of cerebrovascular events and intracranial infections. All other causes of AMS and male to female ratio are mentioned in Table-II.

When mortality was observed it was found out that out of 90 patients, 23(25.5%) patients had died during their hospital stay, whereas, 67(74.5%) patients were discharged. On the basis of this, two groups were formed; Group-A included patients who were alive, and Group-B included patients who had died. The clinical, laboratory, and demographic variables of both groups were recorded, compared, and described in Table-III. Out of 50 males, 13(26%) males died during their hospital stay whereas 10 females died out of 40 (25%). 14(15.5%) patients presented with hypertension out of them 13(92.9%) patients had died. 12(13.3%) patients who were known diabetic at the time of pres-

entation out of them 6(50%) patients had died. Mean arterial pressure was 91.52±17.43 mmhg in Group-A while 75.13±15.51 mmhg in Group-B.

Table-II: Etiological causes of AMS of patients

Etiology	n(%)	Gender		Deaths (n%)
		Male	Female	
Cerebro Vascular Accident	28(31.1%)	15	13	Male 1 Female 1 Total 2(8.7%)
Metabolic causes	6(6.66%)	4	2	Male 2 Female 1 Total 3(9%)
Infections	14(15.5%)	9	5	Male 0 Female 1 Total 1(4.3%)
Intra-cranial infection	8(8.88%)	5	3	Male 2 Female 0 Total 2(8.7%)
Seizures	4(4.44%)	1	3	Male 1 Female 2 Total 3(9%)
Poisoning	10(11.1%)	5	5	Male 1 Female 0 Total 1(4.3%)
Intra Cranial Space Occupying Lesion	2(2.22%)	2	0	Male 1 Female 0 Total 1(4.3%)
Cardiovascular	9(10%)	4	5	Male 2 Female 4 Total 6(26%)
Subdural hematoma	1(1.11%)	1	-	Male 1 Female 0 Total 1(4.3%)
Miscellaneous	8(8.88%)	4	4	Male 3 Female 0 Total 3(9%)
Total	90	37	30	Male 13 Female 10 Total 23(25.5%)

Table-III: sociodemographic and disease characteristics of AMS patients

	Group-A Alive (67)	Group-B Dead (23)	*p*-value
Gender			
Male	37(55.22%)	13(56.52%)	0.011
Female	30(44.77%)	10(43.47%)	
Diabetes Mellitus			
No	55(82.07%)	17(55.22%)	0.08
Yes	12(17.91%)	6(73.91%)	
Hypertension			
No	53(79.10%)	10(43.47%)	0.33
Yes	14(20.89%)	13(56.52%)	
Mean Arterial Pressure (mmHg)	91.52±17.43	75.13±15.51	0.39
Glasgow Coma Scale	11.88±2.14	10.00±3.19	0.002

The mean PH in group A was 7.36±0.06 while in Group-B it was 7.30±0.10 which was statistically significant. The oxygen saturation in blood by pulse oximeter was measured in both groups at the time of presen-tation and it was 96.77±3.34 in Group-A while 93.52±7.06 in Group-B which was statistically significant. TLC levels were 9.31±4.52 in Group-A while in Group-B they were 15.23±4.82 which was statistically signifi-cant. Other laboratory investigations done are detailed in Table-IV.

Table IV- Biochemical comparison of patients

Investigation	Group-A Alive (Mean±SD)	Group-B Dead (Mean±SD)	*p*-value
pH	7.36±0.06	7.30±0.10	0.002
PaO2 (%)	94.64±6.47	77.78±14.26	0.634
SaO2 (%)	96.77±3.34	93.52±7.06	0.05
Haemoglobin (g/dl)	13.42±3.00	11.95±2.81	0.214
TLC (mg/dl)	9.31±4.52	15.23±4.82	0.001
Urea (mg/dl)	50.95±11.67	63.88±21.28	0.362
Creatinine (mg/dl)	1.55±0.40	1.92±1.22	0.224
Sodium	138.65±5.52	138.12±4.40	0.04
Potassium	4.24±0.49	4.21±0.91	0.02
BSR	130.50±22.04	153.60±99.04	0.18

DISCUSSION

In the ED physicians generally encounter patients having AMS primarily due to CNS involvement or it may be secondary to some other disease affecting CNS.[12] Most common etiologies of AMS include nonethanol poisoning, convulsions (epilepsy related), seizures, and complications of diabetes, meningitis, pneumonia or other systemic infections.[12] It was observed AMS etiology had a significant impact on the mortality of patients. Patients who had cardiovascular complications or stroke were more susceptible to mortality whereas patients suffering from intracranial infection or going through seizures have decreased mortality rate. A study conducted by Ahmad *et al.* showed similar results as our that Seizure, poisoning, and intracranial infection had less mortality rate as compared to cardiovascular disease, stroke, and infection.[13] A study by Kekec *et al.* in Turkey and Li *et al.* showed that most common cause of AMS is neuro-ogical (hemorrhage, stroke, meningitis, epilepsy).[14,15] The mortality in our study was 25.5% which was comparable to rate reported by Kekec *et al.* and Jung *et al.* which was 20.1%.[14,16] Jali *et al.* and Xiao *et al.* reported that mortality was more in patients above 60 years which was 62.5% and 10.8% respectively.[17,18] Eye, Verbal, and Motor response (GCS) were observed individually because they have a significant prognostic value. It was also reported by Horsting MW *et al.* in their study that GCS components are a reliable predic-tor of outcome in AMS patients.[19] In our study death rate was more in patients who reported with low GCS as compare to those who

presented with normal GCS. These results are similar to those as reported by Jali *et al*. that mortality rate was high i-e 96.6% in patients with low GCS.[17] In our study it was found that the mean blood pressure was low in patients who could not survive. Similar results were shared by Chao *et al.* that patients who presented with low Blood pressure had a high mortality rate.[20] Chi *et al.* inferred in their study that patients who had MAP ≤77.16mmHg, and pH ≤7.22 had a high mortality rate. Kanich *et al.* said in their study that complete medical history and examination are more important in diagnosing the cause of AMS.[12]

LIMITATION OF STUDY

This study was done in ED of CMH Rawalpindi and its results differ from other hospital as all medico legal cases generally report to civil hospitals so very few of them were included in study. We didn't collect data of patients reporting in any specific season or specific time which is a useful indicator of patient's morbidity and mortality.

CONCLUSION

We conclude that emergency physicians should have a very good knowledge of etiologies of AMS. With our results, it was concluded that male sex, low GCS, low arterial SaO_2, low mean blood pressure, high TLC, and low pH are a good predictor of the higher mortality rate in the patients of AMS at ED. AMS requires early diagnosis with timely intervention and prompt treatment which will reduce mortality rate in AMS patients at ED. Using this as model, the mortality rate of the patients can be predicted on a large scale, which can be used by the physician to lower the mortality rate among such patients.

Conflict of Interest: None.

Author's Contribution:

Following authors have made substantial contributions to the manuscript as under:

SNB & SFZ: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

SKB & FL: Data acquisition, data analysis, approval of the final version to be published.

ZM & SWA: Critical review, concept, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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