



**ALTERED LEVEL OF CONSCIOUSNESS: AETIOLOGY AND SHORT- TIME
OUTCOME IN A TERTIARY HOSPITAL OF BANGLADESH**

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ABSTRACT

Altered level of consciousness is a very common medical emergency resulting in considerable mortality and morbidity. Accurate diagnosis and prompt management can reduce the complications to a great extent. There are various aetiologies of impaired consciousness including infective and metabolic causes as well as cerebro-vascular accidents. This hospital based prospective observational study described different clinical outcomes of the patients relating to specific aetiologies of the illness. Hundred patients of altered level of consciousness admitted in a tertiary hospital of Bangladesh were evaluated clinically and with relevant investigations. Their clinical outcomes in the form of mortality or residual morbidity within one month were determined on the basis of clinical, radiological and biochemical features. The mean age of the study patients was found 48.7 years with range from 19 to 92 years. Majority (58.0%) of the patients were male. CVD or stroke was identified as the commonest (39.0%) aetiology of impaired consciousness followed by meningo-encephalitis (19.0%), septicaemia (10.0%) and poisoning (10.0%). Overall death rate was higher among structural and vascular lesions of brain (36%). Infective (mortality 10% in encephalitis and septicaemia), poisoning (mortality 10%) and metabolic (no mortality) causes of impaired consciousness showed better outcome than structural and vascular lesions of brain.

KEYWORDS: altered level of consciousness, short-time outcome, stroke, meningo-encephalitis.

INTRODUCTION

Altered level of consciousness includes a spectrum of disorders that range from mild confusion to deep coma. The common aetiologies are divided into two broad groups: structural causes and medical causes. Structural causes are Vascular (Stroke, Cerebral vein thrombosis.) and Increased Intracranial Pressure (Hydrocephalus, tumour, cyst and abscess). Medical causes are Anoxia, Hypothermia/ Hyperthermia; Metabolic (DKA, Uraemia and Hypoglycemia); Dyselectrolytemia; Infection (Sepsis, Meningitis, Encephalitis); Toxins. and Psychogenic.^[1,2]

It was shown in the literatures that metabolic and infective causes of altered consciousness provide the best outcome, whereas if it is associated with structural damage, such as cerebrovascular disease or subarachnoid haemorrhage, tends to have the poorest outcome.^[3] Current epidemiological studies rarely focus on altered state of consciousness with very few literatures in the context of developing countries like ours. It was estimated that over 8% of admissions in the emergency wards of large municipal hospitals in the UK are due to

conditions that cause a disorder of consciousness among which death rate is about 12%.^[4] Another survey study conducted over a 3 years' period at department of Medicine in a tertiary care hospital of Thailand, shows that impaired consciousness is a major problem which accounts about 4-10% of all patients admitted in the emergency department.^[5]

In a study done in a tertiary hospital at southern part of Bangladesh cerebral malaria topped the list of the causes comprising 31.0% of the patients. This was followed by stroke 21.0%, meningitis 15.0%, acute poisoning 13.0%, hepatic encephalopathy 10.0%, hypovolumic shock 6.0%, septicaemic shock 2.0% and hypoglycemic shock 2.0%.^[6]

Another study conducted in a tertiary hospital of northern part of Bangladesh showed stroke (44.0%), meningitis (16%) and acute poisoning (12.0%) as the common causes. Other causes included – hypoglycemia (6.0%), cerebral malaria (5.0%), hepatic encephalopathy (5.0%), electrolyte imbalance (3.0%), renal failure (3.0%), respiratory failure and DKA (2.0% each), ICSOL

and septicemia (1.0% each). In consideration of in-hospital outcome of the patients, stroke patients comprised of the highest death rate (31.8%) in comparison to other infective and metabolic aetiologies of the illness.^[7]

Our study was designed to assess the outcome of such patients over a period of one month in a tertiary hospital in the capital city of Bangladesh. Our aim is to explore the common causes of impaired consciousness (GCS<15) among the admitted patients and to assess the mortality and morbidity of these patients within a period of one month based on the specific aetiologies.

MATERIALS AND METHODS

1. Our study was observational, prospective, hospital based conducted over 100 patients admitted in a tertiary hospital. The sampling method was purposive and included all consecutive patients of impaired consciousness over a period of six months. The patients who were selected as cases of altered level of consciousness, fulfilled one or more of the following criteria.^[8]

- GCS < 15
- Socially withdrawn and exhibits disorientation about time, place & person.
- Diminished or absent response to verbal or physical stimuli.
- Somnolence.
- Inability to maintain arousal
- Hallucinations
- Confusion or other abnormal behavior

All patients of age >18 years irrespective of sex with informed written consent from guardians were included. Patients with past history of Cerebrovascular disease (CVD), epilepsy, syncope, a known psychiatric disease, using psychotropic drugs or impaired consciousness persisting more than seven days were excluded. The most commonly used tool for measuring level of consciousness objectively "Glasgow Coma Scale (GCS)" was used. Meticulous history was taken regarding symptoms (onset and duration) and detailed clinical examination was performed in each patient. A structured case record form was prepared containing age, sex, onset of illness, previous medical illness and grading of unconsciousness. Appropriate and necessary investigations (serum electrolyte, blood sugar, Complete blood count, liver, renal and thyroid functions, chest x-ray, Ultrasonogram, cranial computed tomography and cerebrospinal fluid studies) were done to find out exact etiology of the illness as well as to determine the future outcome or progression of the disease. Patients were followed up throughout their hospital stay up to discharge & once again within one month for evaluation of clinical outcome after receiving treatment. Outcome was assessed by three variables: Improvement, Improvement with residual disability and Death. The study was approved by institutional ethical committee. Statistical analyses were carried out by using the

Statistical Package for Social Sciences (SPSS) version 16.0 for Windows. P values of <0.05 were considered as statistically significant. Confidence interval was set at 95% level.

RESULTS

Table 1 showed baseline characteristics of the study patients. It was observed that majority (42.0%) of the patients belonged to age group 46-60 years. The mean age was found 48.7±15.7 years. Male to female ratio was 1.4:1. In case of both male and female patients, age difference was not statistically significant (p>0.05). Percentage of Sub acute and gradual onset were almost equal. It was observed that more than one fourth (26.0%) patients had hypertension; Four-fifth of the patients had GCS score less than 11.

Table 2 showed, male preponderance in every type of altered level of consciousness excepting septicaemia, dyselectrolytaemia and AKI.

Fig I showed, out of 39 patients having stroke, haemorrhagic stroke supersedes ischaemic stroke but both constitutes more than 80%. Only 2 patients were diagnosed as sub-arachnoid haemorrhage. Among 19 cases of meningo-encephalitis, more than half were diagnosed as pyogenic / bacterial, one-third as viral and one-sixth as tubercular. Among patients of poisoning, half were of unknown poisoning.

Table 3 showed, among stroke patients one-third expired and about half only improved with residual disability. In case of meningo-encephalitis, full recovery occurred in more than 80%. All pyogenic/bacterial meningitis patients fully recovered.

Table 4 showed, out of 14 stroke patients who expired, two-third patients died within 2-7 days. One patient with meningo-encephalitis died on third day after hospital admission. Two patients of septicaemia died within 2-7 days.

Table 5 showed Out of 19 patients of stroke with residual disability, half had focal neurological weakness (in the form of hemiparesis/hemiplegia), when they were followed up within one month. 2 patients of meningo-encephalitis developed multiple cranial nerve palsy and 1 patient of ICSOL developed complete blindness during follow-up within a period of one month.

Table 1: Baseline characteristics of patients (n=100).

| Characters | Number | percentage |
|------------------------------------|--------|------------|
| Age | | |
| ≤30 | 17 | 17.0 |
| 31-45 | 20 | 20.0 |
| 46-60 | 42 | 42.0 |
| 61-75 | 18 | 18.0 |
| >75 | 3 | 3.0 |
| Sex | | |
| Male | 58 | 58 * |
| Female | 42 | 42 |
| Onset of illness | | |
| Acute(<6yrs) | 22 | 22 |
| Sub acute (6-24hrs) | 40 | 40 |
| Gradual (>24hrs) | 38 | 38 |
| Previous medical illness(total 57) | 57 | 57 |
| Hypertension | 26 | |
| Diabetes mellitus | 17 | |
| CKD | 5 | |
| CLD | 3 | |
| IHD | 4 | |
| COPD/BA | 2 | |
| GCS grading | | |
| 3-5 | 27 | 27 |
| 6-10 | 53 | 53 |
| 11-14 | 20 | 20 |

*Male: female age compared, p value 0.236

CKD: chronic kidney disease, CLD: chronic liver disease, BA: bronchial asthma

COPD: chronic obstructive pulmonary disease, IHD: Ischaemic heart disease

Table 2: Distribution of the study patients according to aetiology of altered consciousness (n=100).

| Diagnosis | Male (n=58)* | Female(n=42)* |
|----------------------------------|--------------|---------------|
| Stroke(n=39) | 25(64.1) | 14(35.9) |
| Meningo-encephalitis(n=19) | 10(52.6) | 9(47.4) |
| Septicaemia (n=10) | 4 (40) | 6 (60) |
| Poisoning (n=10) | 7 (70) | 3((30) |
| DKA(n=3) | 2(66.7) | 1(33.3) |
| Dyselectrolytaemia (n=3) | 1(33.3) | 2(66.7) |
| Hypoglycaemia (n=1) | 0 | 1(100) |
| AKI (n=3) | 1((33.3) | 2(66.7) |
| Hepatic encephalopathy(n==4) | 3(75) | 1(25) |
| Status epilepticus(n=2) | 2(100) | 0 |
| ICSOL(n=2) | 1(50) | 1(50) |
| Hypertensive encephalopathy(n=1) | 1(100) | 0 |
| Thyrotoxic crisis(n=1) | 0 | 1(100) |
| ADEM(n=2) | 1(50) | 1(50) |

Parenthesis denotes percentage of total male or female patients. DKA: diabetic ketoacidosis, ICSOL: intracranial space occupying lesion, ADEM: Acute disseminated encephalomyelitis.

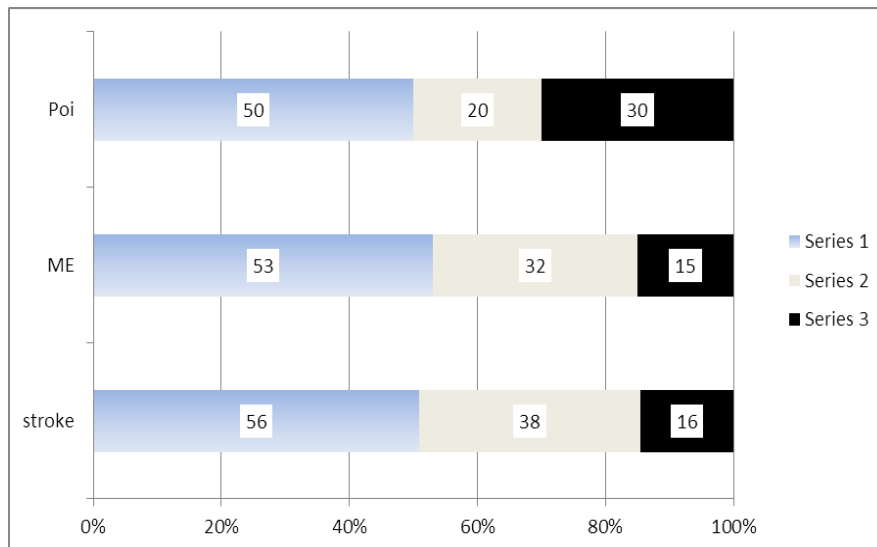


Fig 1: Different varieties of stroke, meningo-encephalitis and poisoning.

ME : meningo-encephalitis , Poi : poisoning

Stroke : series1 = haemorrhagic, series2=ischaemic, series 3 =subarachnoid haemorrhage

Meningo-encephalitis: series 1 : bacterial, series 2 =viral, series 3 =tuberculous

Poisoning : series 1 =unknown, series 2 =sedative, series 3 = organophosphorus.

Table 3: clinical outcomes of patients with altered consciousness (n=100).

| Disease * | Improved (n=55)** | Death (n=23)** | Improved with disability(n=22)** |
|--------------------------------|-------------------|----------------|----------------------------------|
| Stroke(39) | 6(15.4) | 14(35.9) | 19(48.7) |
| M E(19) | 16(84.2) | 1(5.3) | 2(10.5) |
| Septicaemia(10) | 8(80) | 2(20) | 0 |
| Poisoning (10) | 9(90) | 1(10) | 0 |
| DKA (3) | 3(100) | 0 | 0 |
| Dyselectrolytaemia(3) | 3(100) | 0 | 0 |
| Hypoglycaemia (1) | 1(100) | 0 | 0 |
| AKI(3) | 2((66.7) | 1(33.3) | 0 |
| Hepatic encephalopathy(4) | 3(75) | 1(25) | 0 |
| Status epilepticus (2) | 1(50) | 1(50) | 0 |
| ICSOL(2) | 0 | 1(50) | 1(50) |
| Hypertensive encephalopathy(1) | 1(100) | 0 | 0 |
| Thyrotoxic crisis(1) | 1(100) | 0 | 0 |
| ADEM(2) | 1(50) | 1(50) | 0 |

- Parenthesis denotes total no of patients. ** parenthesis denotes percentage.

Table 4: Time of death after admission into hospital (n=23).

| Disease* | ≤1 day** | 2-7 day** | 8-14 day** | 15-30 day** |
|------------------------|----------|-----------|------------|-------------|
| Stroke(14) | 3(21.4) | 7(50) | 3(21.4) | 1(7.2) |
| ME (1) | 0 | 1 | 0 | 0 |
| Septicaemia(4) | 0 | 2(100) | 0 | 0 |
| Poisoning(1) | 1(100) | 0 | 0 | 0 |
| AKI(1) | 1(100) | 0 | 0 | 0 |
| Status epilepticus (1) | 1(100) | 0 | 0 | 0 |
| ICSOL(1) | 0 | 1(100) | 0 | 0 |
| HE(1) | 0 | 1(100) | 0 | 0 |
| ADEM(1) | 0 | 1(100) | 0 | 0 |

HE= hepatic encephalopathy.

*parenthesis denotes total no of death

**parenthesis denotes percentage

Table 5: Pattern of disability during follow up within one month (n=22).

| Disease* | Aphasia | Dysarthria | Cranial nerve palsy | Hemiparesis/hemiplegia | Blindness |
|-------------|-----------|------------|---------------------|------------------------|-----------|
| Stroke (19) | 5(26.3)** | 1(5.3)** | 2(10.5)** | 11(57.9)** | 0 |
| ME(2) | 0 | 0 | 2(100)** | 0 | 0 |
| ICSOL(1) | 0 | 0 | 0 | 0 | 1(100)** |

*parenthesis denotes number of disability ** parenthesis denotes percentage

DISCUSSION

Altered level of consciousness is a very common emergency presentation with considerable mortality and morbidity. This prospective observational study was carried out with an aim to observe the short-term clinical outcomes of the patients within one month.

In our series unconsciousness due to CVD was common in the elderly and older age group and acute poisoning, meningo-encephalitis; hepatic encephalopathy had been common in younger age groups which was consistent with Ziaul Huq's series.^[7]

Out of all respondents in our series, Male-female ratio was 1.4:1. In Ziaul Huq's series the ratio was 1.7:1.^[7] In Higashi et al series incidence of coma in male was 62.18% and in female 37.82%.^[9] The male predominance of the study may be due to the fact that females are mostly neglected in our society and they usually do not get proper attention during their illness and also due to religious and social ground, they appear less commonly before medical facilities than males.

In our series the commonest cause (39%) was stroke. In Ziaul Huq's series commonest cause of unconsciousness was also stroke (44.0%).^[7] But, in Amdadul Haque's series cerebral malaria was the commonest cause (31%).^[6] That study was conducted in southern part of Bangladesh where malaria is endemic. In a study Melka et al found the commonest cause of unconsciousness in Ethiopia was due to infections 111 (55.0%). Geographical variation might play an important role for the inconsistency of our findings with that of Melka et al.^[10]

In our study population Hypertension, Diabetes Mellitus (DM), Ischemic Heart Disease (IHD), Chronic Kidney Disease (CKD) and Chronic Liver Disease (CLD) were identified as previous medical illness. Among them Hypertension and DM were most common comprising of 26% and 17% respectively of total study patients, which contributed mostly as risk factors of CVD or stroke. Therefore, in many cases previous medical illnesses were responsible for presenting conditions of the patients.

Similar to study done by Levy et al haemorrhage and infarction constitute major percentage of our stroke patients.^[11] Regarding infective cause, our series was similar to Ziaul Huq's series where pyogenic cause was the commonest (52.6% vs 50%).^[7] Regarding poisoning the common cause was unknown poisoning whereas in other series insecticide poisoning was common in other parts of our country.^[6,7]

Out of all stroke patients one-third of the patients died and half survived with residual disability and majority of the patients had focal neurological weakness in the form of hemiparesis or hemiplegia, when they were followed up at a period within one month. In case of meningo-encephalitis 84.2% completely improved after treatment during hospital stay where clinical outcome was quite satisfactory. Out of septicemic patients 80.0% completely improved during discharge from hospital. 90.0% patients of poisoning completely recovered within 48 hours of hospital admission. All the patients suffered from DKA, electrolyte imbalance, hypertensive encephalopathy and thyrotoxic crisis fully recovered from emergency life-threatening situation within 72 hours of hospital admission. Early diagnosis was the key factor that helped rapid recovery of all these patients in hospital setting. In case of ADEM, the diagnosis was slightly delayed due to poor investigation facilities. The prognosis was worst in case of ICSOL

Overall structural lesions (ICSOL and ADEM) and vascular accidents (stroke) of brain bear poorest outcome among all the etiologies of impaired consciousness. This finding is almost consistent with that of Ziaul Huq's series but was different from Melka et al where infective causes topped the list followed by metabolic derangements and structural neurological lesions.^[10]

The limitation of the study is that it was conducted with small sample size. Follow-up period was also very short. Therefore, the outcome of this study fails to represent the actual scenario of the total patients with altered consciousness in medicine department. Results of this study should be proved in larger trial.

CONCLUSION

Altered level of consciousness is a very common emergency presentation in medicine department of a tertiary care hospital. It is really a diagnostic and therapeutic challenge for the physicians to save valuable lives of the patients. This study revealed that stroke was common in the elderly and older age groups. On the other hand, infections, poisoning and metabolic derangements being more common in younger age groups. Meningo-encephalitis, septicemia, poisoning and metabolic derangements also bear favorable outcome. On the contrary, structural and vascular lesions of brain proved to have poorest outcome in this study. Diagnostic facilities specially imaging techniques must be available and affordable to general people so that structural and vascular lesions can be identified at the earliest possible time after admission, because,

successful treatment and prognosis depends on the identification of specific etiology.

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