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STRUCTURE OF MORBIDITY AND MORTALITY AMONG PATIENTS WITH ALTERED STATE OF CONSCIOUSNESS (ASOC) ADMITTED IN MEDICAL WARD 6 OF DHQ/TEACHING HOSPITAL, GUJRANWALA

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Abstract:

Background: *Though defined as a change in intellectual, emotional, psychological, and personality functioning, typically accompanied by behavioral changes, altered state of consciousness (ASOC) refers to a group of non-specific and variable neurological symptoms, either hyper-active or hypo-active, assessed by the Glasgow Coma Scale (GCS), and be psychiatric, encephalitic, or intracranial in cause. The diagnoses this leads to fall in various categories: pharmacological, systemic/organic, obstetric, metabolic, endocrine, and so on. Demographic data among patients with ASOC can help identify disease trends and, in turn, can make way for effective planning of better healthcare services to cater to one of the most frequently encountered complaints in emergency departments.*

Objective: *The aim of our study was to assess the morbidity and mortality among patients admitted with the chief presenting complaint of ASOC in Medical Ward 6 of DHQ/Teaching Hospital, Gujranwala.*

Materials and Methods: *This is a descriptive cross-sectional study, performed on 1095 patients, out of which 417 (38.08%) presented with the chief complaint of ASOC, and were admitted in Medical Ward 6 between February 2018 and July 2018, chosen by the convenient sampling technique. Data regarding the demographic features of these patients along with their diagnoses, whether malignant or non-malignant, and involving which system and their clinical outcomes were collected via structured performas and analyzed.*

Results: *Out of a total of 417 (38.08%) patients, 241 (57.8%) were females while 176 (42.2%) were males. The mean age with standard deviation was 63.7 ± 16.2 years. Total duration (SD) of hospital stay was 4.01 (± 3.64 days). HTN and DM were the commonest co-morbid conditions found in 199 (47.7%) and 157 (37.7%) patients respectively. Other common co-morbidities were CLD 149; 35.7%), stroke 77; 18.5%), and CKD (38; 9.1%). The commonest diagnoses turned out to be CVA (16.2%), closely followed by DCLD due to PSE (13.7%). 156. (37.4%) of these patients expired during hospital stay.*

Conclusion: *Prognosis of patients presenting with ASOC is strikingly poor with high in-hospital mortality rates.*

Keywords: *ASOC, morbidity, mortality, DHQ/Teaching Hospital, Gujranwala.*

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INTRODUCTION:

A person's mental status is made up of two components: level of consciousness and cognition, and an altered state may be a disorder of only consciousness – as in meningitis –, only cognition – as in dementia –, or both – as in delirium. Ranging from slight confusion to coma, the term altered mental state or altered state of consciousness (abbreviated as ASOC) is more or less a vague term responsible for emergency department visits in 4-10% of patients, out of which 25-30% constitute the older population. [1] Over 50% of such cases are considered for hospital stay and 15% are referred for neurology consultations. [2]

An ASOC may be manifested as the patient being **hyper-alert**, i.e. higher than normal level of arousal making the patient restless, aggressive, and sometimes even physically and/or verbally threatening; **confused**, i.e. bewildered, disorientated, following commands with difficulty; **delirious**, i.e. restless, disoriented, delusional or hallucinating; **somnolent**, i.e. sleepy, responsive as disorganized movements or incomprehensible mumbling; **lethargic**, i.e. reduced alertness with lower than usual interest in the surroundings; **obtunded**, i.e. lethargic plus slower responsiveness, drowsiness and increased tendency to sleep; **stuporous**, i.e. profound decline in alertness and responsive to only painful stimuli; and lastly, **comatose**, i.e. unarousable, deep, sustained unconsciousness. [1]
Not acting right, generalized body weakness, altered behavior, agitation, lethargy, disorientation, psychosis, inattention, inappropriate behavior, and hallucinations are all synonymous to ASOC. [3] The lack of standardized terminology regarding this common chief presenting complaint in emergency departments is believed to hamper the evaluation plus appropriate management of patients with ASOC along with advancement of knowledge via research. [4]

Varying in time courses and degrees of severity, ASOC secondary to coma, stupor, and delirium is almost always a result of acute brain dysfunction while dementia is a result of chronic alterations in mental states. While the former occurs over a time span of hours or days and is exacerbated by an underlying potentially life-threatening disorder, the latter develops over months to years and has lesser likelihood of being associated with an underlying life-threatening disorder. [4]

Emergency departments play a key role in the assessment and management of patients presenting with ASOC, with the primary focus on stabilization of the patient and determining the underlying etiology. [4]

The emergency department first follows the 'ABCDE' protocol to look for immediately reversible causes of ASOC while the patient is being provided IV access and placed on a monitor. [5]The Glasgow Coma Scale (GCS) is the most commonly used scale to evaluate a patient with ASOC. Ranging from 3 (unresponsive) to 15 (normal), GCS rates eye, motor and verbal responses to painful plus verbal stimuli. [4][6]

Once the patient is stabilized, a detailed history that is aimed at ascertaining the nature of the change in mental state is taken, following which the patient is subjected to a detailed head-to-toe physical examination; then comes laboratory testing to confirm a diagnosis. [5][7]

The differential diagnoses of ASOC constitute a variety of disorders, the commonest of which are such that require immediate intervention and are highly amenable to treatment. [8][9]

Neurological Causes (34.4-35%)	**Infectious Causes (9.1%-18.3%)**	**Metabolic Causes (12%)**
Delirium Dementia Brain tumors Non-convulsive status epilepticus Seizures with possible post-ictal state Wernicke encephalopathy Hypertensive encephalopathy	Acute systemic infection Meningitis Encephalitis Brain abscess Neuro-syphilis	Hyper-/hypoglycemia Hyper-/hyponatremia Hyper-/hypothermia Dehydration Hyper-/hypocalcemia Hypoxia/hypoxemia Hypercarbia Hepatic encephalopathy Uremia
Psychiatric Causes (3.9%)	**Systemic and Organic**	**Systemic and Organic Causes**

	Causes (14.5%) - Cerebrovascular	**(14.5%) – Pulmonary**
Bipolar disorder Depression Acute psychosis	Stoke/CVA and transient ischemic attack (TIA) Epidural hematoma Subdural hematoma Subarachnoid hemorrhage	Hypoxia Pulmonary embolism Carbon monoxide (CO) poisoning
Systemic and Organic Causes (14.5%) – Cardiac	**Systemic and Organic Causes (14.5%) - Gastrointestinal**	**Endocrinological Causes (7.9%)**
Myocardial infarction (MI) Congestive cardiac failure (CCF) Ventricular arrhythmias	Constipation Mesenteric ischemia Acute diverticulitis	Pituitary apoplexy Thyrotoxicosis Myxedema coma Adrenal insufficiency
Exogenous/Pharmacological/Toxicological Causes (23%)	**Traumatic Causes (2.1%)**	**Gynecological/Obstetric Causes (1.9%)**
Alcohol toxicity/withdrawal Drug toxicity/withdrawal	Hip fracture Head injury	Ecclampsia

[8][10][11][12]

ASOC is a proven risk factor for morbidity and mortality – with death rates of 44% predominantly due to infectious causes as per studies in developing countries [13], and 11% in developed countries, out of which 33.9% and 36.8% deaths resulted from ischemic and hemorrhagic strokes, respectively. [8] It occurs in all age groups, with a slight male predominance (53.1% versus 46.9%), more commonly in the elderly as already mentioned, the mean age being 51.95±15.71 years. The mortality rate in the elderly also surpasses that of the younger age groups – 10.8% versus 6.9% - with the commonest conditions leading to death being cerebrovascular disease and trauma. [11][14]

The morbidity and mortality associated with ASOC can be decreased by prompt assessment and appropriate management [11][15], which is why studies regarding the morbidity and mortality among patients with ASOC carry immense significance in planning and implementation of effective treatment guidelines for a substantial decline in the lengths of hospital stay and mortality associated with the wide variety of conditions that cause it.

MATERIALS AND METHODS:

Study Design: The research involves a descriptive cross-sectional study.

Setting: The study has been conducted in Medical Ward 6 of DHQ/Teaching Hospital, Gujranwala.

Duration of Study: The study duration spans over one year (February 2018-June 2018).

Sample Size: The study in question includes a total number of 1095 patients.

Sampling Technique: The study has been conducted using the simple random sampling technique.

Sample Selection:

- **Inclusion Criteria:** The study includes all patients admitted in Medical Ward 6 with presenting complaints of an altered state of consciousness, after ruling out head trauma.
- **Exclusion Criteria:** The study excludes all patients admitted in Medical Ward 6 with presenting complaints other than an altered state of consciousness or an altered state of consciousness following head trauma.

Data Collection Procedure: Data for the study has been collected through a questionnaire regarding the demographic data, co-morbidities, the final diagnoses made for such patients and their clinical outcomes.

Data Analysis Procedure: Qualitative plus quantitative data has been analyzed via the SPSS-19 software.

RESULTS AND DISCUSSIONS:

417 out of 1095 patients presented chiefly with ASOC. The following graph shows a female predominance regarding ASOC; 176 males versus 241 females.

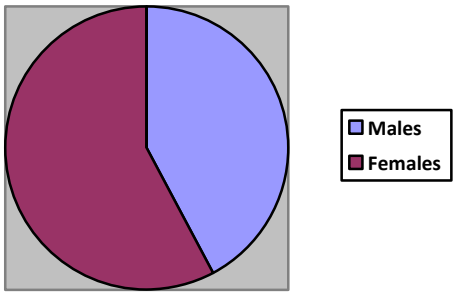
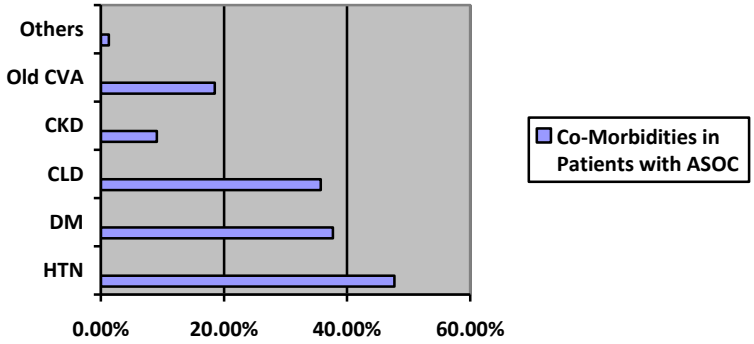


Chart 1. Gender Distribution of Patients Presenting with ASOC

Mean age of presentation was 63.7 years with a standard deviation of ± 16.2 years.
The duration of hospital stay spanned over 4.01 days with a standard deviation of ± 3.64 days.
A number of co-morbidities were found associated with these patients.



Graph 1. Common Co-Morbidities found in Patients with ASOC

The principal diagnoses made on patients presenting with ASOC fell in the neurological category, and the commonest diagnosis to be arrived at following clinical examination and investigations was CVA – either ischemic or hemorrhagic, and new or recurrent – found in 16.2% patients, closely followed by DCLD due to PSE – mostly grade 2 or 3 – found in 13.7% patients.

Sr. No.	System	Malignant/Non-Malignant	Disease/Diagnosis	Percentage
1.	Liver Diseases	Non-Malignant	AVH	0.2%
			DCLD/PSE	13.7%
			DCLD/HRS	0.2%
			Acute on Chronic Liver Disease	0.4%
		Malignant	DCLD/HCC	1.2%
			Metastatic Liver Disease	0.1%
2.	Kidney Diseases	Non-Malignant	AKI	0.2%
			CKD/Uremic Encephalopathy	7.9%
			Acute on Chronic Kidney Disease	0.5%
		Malignant	RCC	0.1%
3.	Respiratory	Non-Malignant	COPD/CO2 Narcosis	0.1%
			Cor Pulmonale	0.2%
4.	Cardiac	Non-Malignant	MI/CCF	0.8%
5.	Skin	Non-Malignant	Bed Sores leading to Sepsis	0.2%
			Cellulitis leading to Sepsis	0.1%

6.	Neurological	Non-Malignant	Ischemic CVA (First/Recurrent)	11.1%
			Hemorrhagic CVA (First/Recurrent)	5.1%
			Meningitis/Encephalitis/Meningo-encephalitis	3.1%
			TIA	0.2%
			Epilepsy (Primary/Secondary)	0.5%
			Ecclampsia	0.2%
			Hypertensive Encephalopathy	0.4%
			Neuro-glycopenic Brain Injury	0.1%
			Hydrocephalus (Obstructive/Non-Obstructive)	0.2%
			SOL	0.1%
			TBM	0.5%
			Cerebral Malaria	0.1%
		Malignant	Metastatic Brain Disease	0.1%
			SOL	0.1%
7.	Genito-Urinary	Non-Malignant	UTI	2.2%
8.	Others	Non-Malignant	DKA/HHS	1.1%
			Recurrent Hypoglycemia	1.2%
			Sepsis	1.5%
			Shock (Hypovolemic/Septic/Cardiogenic/Anaphylactic)	0.43%
			Poisoning (Organophosphates/$CuSO_4$/Paracetamol/Unknown)	0.7%
			Withdrawal Syndrome	0.1%

Table 1. Diagnoses made in Patients with ASOC

156 patients (36.4%) expired during the course of hospital stay.

A number of various other studies support our results. Aimed at identifying the various clinical features of patients with ASOC and tracing their outcomes, a prospective observational study based in Singapore recruited patients aged 18 and above over a period of 10 months, and found neurological (34.4%) causes to be leading – as in our study –, followed by infectious (18.3%) and metabolic (12%) etiologies. The in-hospital mortality rate was high (11%), the major cause of which was attributed to CVA (44.9%) – consistent with our study. Emphasis was laid on timely diagnosis and adequate intervention for preventing mortality. [8]

Likewise, prospective identification of patients with ASOC followed by a retrospective review of their medical records was performed in a university hospital in another study to determine the etiologies responsible for ASOC among ED populations. The commonest diagnoses stemming from a presenting complaint of ASOC included neurologic (28%), toxicologic (21%), traumatic (14%), psychiatric (14%), infectious (10%), endocrine/metabolic (5%), pulmonary (3%), oncologic (3%), cardiovascular (1%), gastrointestinal (1%), and renal (1%) among 317 patients. The mean hospital stay was of 7.6 days resulting in 9% deaths. Despite a less common presenting complaint in the ED, ASOC is linked to high rates of ED resource use, hospital admissions and mortalities, as demonstrated in our study as well. [16]

With the aim to provide a framework for the assessment of patients with ASOC so that etiologies of ASOC are better understood and diagnostic skills plus management are improved, another China-based prospective cohort observational study recruited 1934 adult patients with ASOC over a period of 2 years, and found ASOC as 0.93% of all chief ED complaints, with a slight male predominance (53.1% versus 46.9%). The average age of onset was 51.95 years ± 15.71 years. Principal causes included neurological (35%), pharmacological and toxicological (23%), systemic and organic (14.5%), infectious (9.1%), endocrine and metabolic (7.9%, psychiatric (3.9%), traumatic (2.1%), and gynecologic and obstetric (1.9%). The mortality rate was 8.1%, and higher in the elderly patients than the younger ones (10.8% versus 6.9%). (Xiao, et al., 2012) Through a review of medical records of 790 patients, yet another study aimed to determine the

frequency and etiology of ASOC in adults presenting in EDs. Predominantly males (52.3% versus 47.7%), and with a mean age of 45.65 ± 15.5 years, the main causes were, again, neurological (71.6%), traumatic (10.4%), endocrine/metabolic (6.1%), cardiovascular/pulmonary (6.2%), infectious (3.8%), obstetric/gynecologic (0.4%), and toxicologic (1.5%). HTN was associated with 18% of these patients, the same as in our study. 20.1% patients expired, with CVA and trauma being the leading culprits. [14]

Both of these studies differ from ours in their male predominance and the fact that their study includes cases of ASOC following head trauma as well.

In order to study the demographical, clinical, and etiological profile of patients with non-traumatic ASOC at a tertiary care hospital, this cross-sectional study evaluated 50 patients and found a mean age of 25.98 years ± 8.85 years and disease duration of 15.83 days ± 4.63 days. Male patients suffered more than females (64% versus 36%). CVAs were the commonest causes of ASOC (34%). Others included cerebral malaria (20%), hepatic coma (8%), and DKA (8%). [17]

A review on 14 retrospective plus prospective studies related to non-traumatic coma (NTC) were chosen for a systematic literature review, and stroke was found to be the commonest cause of NTC (6-54%), followed by infections (10-51%), anoxia (3-42%), poisoning (<1-39%), and metabolic causes (1-29%). Mortality rates ranged from 25% to 87% and were the highest for stroke (60-95%) and anoxia (54-89%) while the lowest for poisoning (0-39%) and epilepsy (0-10%). Having significant mortality rates and moderate to severe disability rates, studies like these help prioritizing the causes of ASOC by mortality for a swift and adequate work-up in diagnosis of disease and improvement of outcome. [18]

There is another study that classifies conditions causing ASOC on the bases of their mortality rates. Performed on 200 patients with ASOC, this one also found males to be the main victims to the complaint (108 versus 92 females); decreased mortality with ASOC due to poisoning, seizures, and intracranial infections, while increased mortality with stroke, infections, and cardiovascular causes of ASOC, emphasizing the importance of prognosticating ASOC patients at outset in EDs. [19]

The statistics undergo a significant change when the study changes its subject type. In this Pakistan-based retrospective study, for example, performed on 152 patients with ASOC but focusing only on patients with malignancies at the Aga Khan University Hospital, Karachi, observed most patients to be over 50 and predominantly males (male to female ratio = 1.34:1), with ASOC as the second most common (45.3%) among neurological complaints, which comprised 20% of all presenting complaints, and associated with NHL (16.3%), AML (12.9%), carcinoma of unknown pituitary site (9%), and brain metastasis (27%). As our setup does not have an oncology department or facilities related to oncology, such patients were not frequently encountered in our study. [20]

There is further variation in the statistics when the study excludes the elderly as the subjects of study. Focused on the younger age group (<50 years of age) and based in Srinagar, this study found infections to be the commonest causes of ASOC (29.46%), followed by seizures (17.85%), and cardio-embolic strokes (11.6%). Underlying seizure disorders, psychiatric diseases, HTN, type 2 DM, and CKD were the commonest co-morbidities associated. Infections, ARDS and severe DKA turned out to be the commonest causes of death in these patients. [21][22]

We did face certain limitations during the course of study. Being center-based, the results of the study cannot be generalized. Moreover, the setting our study is based on is a government facility, frequented by the lower middle class and the lower class of the society, and more by the people of the rural than urban areas, hence the results cannot generally be applied to the entire population of the area. Furthermore, our study includes subjects who get admitted in wards following presentation in the ED, so patients with ASOC who are managed and discharged in the ED without admission – either as part of the physician's decision or the patient's will – are not included in the study.

CONCLUSION:

Neurological diseases are the main diseases in medical departments that present with ASOC, and out of these, CVA stands out as the most common – ischemic more than hemorrhagic –, very closely followed by DCLD due to PSE, mostly grade 2/3. All in all, the prognosis of these patients remains strikingly poor and is associated with high in-hospital mortality rates.

LIST OF ABBREVIATIONS:

ASOC	Altered state of consciousness
GCS	Glasgow Coma Scale
DHQ	Divisional Headquarters
DM	Diabetes Mellitus
HTN	Hypertension
CLD	Chronic Liver Disease
CKD	Chronic Kidney Disease
TIA	Transient Ischemic Attack
CVA	Cerebrovascular Accident
MI	Myocardial Infarction
CCF	Congestive Cardiac Failure
CO	Carbon Monoxide
SPSS	Statistical Package for Social Sciences
AVH	Acute Viral Hepatitis
PSE	Porto-Systemic Encephalopathy
HRS	Hepato-Renal Syndrome
DCLD	Decompensated Chronic Liver Disease
HCC	Hepatocellular Carcinoma
AKI	Acute Kidney Injury
RCC	Renal Cell Carcinoma
COPD	Chronic Obstructive Pulmonary Disease
SOL	Space-Occupying Lesion
TBM	Tuberculous Meningitis
UTI	Urinary Tract Infection
DKA	Diabetic Ketoacidosis
HHS	Hyperglycemic Hyperosmolar State
$CuSO_4$	Copper Sulphate
NHL	Non-Hodgkin Lymphoma
AML	Acute Myeloid/Myeloblastic Leukemia

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