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An Investigation on Aetiology, Clinical Characteristics, and Prognosis of Patients with Coma in Tertiary Care

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Abstract
Background: To investigate the causes, physical characteristics, and prognoses of coma patients.
Material and Methods:A prospective observational trial where all 70 adult participants with a GCS of less than 10 who attended triage at the emergency unit of hospital were considered.
Results: Male death (n=27/37) is higher than female death (n=22/33) since men encounter stress at work, changes in lifestyle, and food habits earlier. Individuals with a GCS of less than 5 had a 100% risk of dying; 8 of 24 participants with a GCS of 5 to 7 survived. It indicates negative results and lower GCS.
Conclusion: Age, gender, and performance don't correlate statistically. Majority were above 40. Intracranial causes were cause for most deaths. Hyponatremia and Neuroinfection patients did well. The most common comorbidity was hypertension, followed by type 2 diabetes. Chronic renal disease patients with a GCS below 10 reported 100% mortality. GCS less than 5 caused 100% mortality. Abnormal breathing and missing pupil reflexes led to poor results.
Keywords: Coma, Mortality, Aetiology, Comorbidities.

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Introduction

A "coma," from the Greek word koma, is a state of extremely deep slumber from which the victim cannot be roused. The term is also used by Thomas Willis in his influential work De anima brutorum (1672), where lethargy (pathological sleep), "coma" (heavy sleeping), and carus (sensory deprivation) are discussed in that sequence and represent varying degrees of inattentiveness.[1-3] Instances of fever that Thomas Sydenham refers to as "comas" (1624–89). The process that puts the patient in a coma impairs the thalamic-cortical circuit of the ascending reticular activating system (ARAS). Coma is described as complete loss of alertness and includes the inability to feel, speak, or move in any way. Since there is no consensus on the precise cut-off point for detecting coma, a Glasgow coma scale (GCS) lower than 10 points is commonly used. Comas can arise naturally or as a result of medical treatment. The inability to faithfully carry out a one-step command constitutes the clinical definition of a coma.[3,4]

In order to maintain consciousness, factors like wakefulness and awareness must be maintained. Wakefulness is characterised as a quantitative aspect of consciousness, whereas awareness is a qualitative assessment of the functions mediated by the cortex. From a neurological perspective, alertness is maintained via the ascending reticular activating system (ARAS), which starts in the pons and midbrain and goes to the thalamus before arriving at the bilateral cerebral cortex.[3-5]

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Coma is a serious, life-threatening condition that needs to be treated right away to preserve the patient's life and brain activity. In addition to these non-trauma-related medical disorders, coma can also result from drug usage, hypoxia, stroke, liver or renal failure, severe sepsis, or poisoning. The difference between structural and non-structural nontraumatic coma (NTC) can be determined using imaging techniques like a computer tomography (CT) scan. Impaired sensorium in mental patients may result from drug overdose or side effects. Because structural brain illnesses can occasionally mirror psychiatric issues, a thorough medical and neurological assessment should be carried out before coming to a mental cause determination.[5-7] Sometimes patients receiving mental health care will arrive in the last stages of coma.

Neuroimaging tests are not usually required to determine the majority of medical reasons of coma. Non-traumatic comas are medically caused in 90% of cases. The majority of the time, simple therapy is helpful. Coma is a life-threatening condition that requires immediate medical attention (ICU). Coma is a challenging condition that can have a variety of causes. 5% of ER patients have altered sensorium. 1% of admissions involve coma. CT scans distinguish structural and non-structural reasons of nontraumatic coma (NTC).[6-8]

Material and Methods

All 70 consecutive adult patients visiting triage at with GCS less than 10, were included in this prospective observational study. Sri Venkateswara Institute of Medical Sciences (SVIMS) Tirupati is where study conducted between March 2020-July 2021. Institutional Thesis Protocol Approval and Institutional Ethics committees approved the study.

In this study, patients are enrolled if their GCS is less than or equal to 10 when they arrive. At presentation, a thorough history, clinical exam, vitals, and random blood sugar readings were acquired. Patients are subsequently monitored in wards, the Medical Intensive Care Unit (MICU), the Respiratory Intensive Care Unit (RICU), the Neurology Intensive Care Unit (NICU), and any additional intensive care units (ICU's). According to Institute norms, department residents diagnose patients' weak GCS after a full workup (investigations and scans) [7,8]. The etiological diagnosis will determine patient care. This will be done in ICUs or wards. Patients are followed in their wards until their final outcome, which is recorded as GCS recovery or death (patients who went on lama were also considered as death as their status was unknown after discharge).

Inclusion criteria

- 18–65-year-old patients
- GCS less than 10 in individuals

Exclusion criteria

- Pregnant and breastfeeding women
- 18 years and above 65 year olds.
- Traumatic coma.
- Patients unwilling to participate.

RESULTS

The majority of the patients (n=50/70) were over 50 years old. The mean age group was 47.10+ 13.06 years, and the median age was 47.

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Table 1: Gender distribution

Gender	No. of patients
Male	37 (53%
Female	33 (47%)

There were more men than women among the study's total of 70 patients, with 37 of them being men.

Due to an increase in aging-related risk factors and drug compliance, 70% of patients with lowered therapy were over the age of 40, leaving the remaining 20% to be under this age.

Most patients arrive at our tertiary care facility in the last, most severe stages of the illness, exhibiting altered sensorium (n = 20), weakness of the limbs and slurred speech (n = 17), fever (n = 15), seizures (n = 12), vomiting (n = 12), shortness of breath (n = 11), loss of consciousness (n = 9), headache (n = 4), drowsiness (n = 7), pain in the abdomen (n = 4) and chest.

Table 2: Total number of patients with comorbidities

S.no	Comorbidities	No.of patients
1	Chronic kidney disease(CKD)	10
2.	Systemic lupus erythromatosis(SLE)	3
3.	Type 2 Diabetic mellitus	26
4.	Hypertension	31
5	Cardiovascular accident	10
6	Coronary artery disease	9
7	Gloima	1
8	Tuberculoma	1

The majority (n=27) of the patients who arrived at casualty, a tertiary care centre, had one or more comorbidities. Only seven patients (n=7) were free of comorbidities. Type 2 diabetes mellitus (n = 26), hypertension (n = 31), chronic kidney disease (n = 10), cerebrovascular accident (n = 10), coronary artery disease (n = 9), systemic lupus erythematosus (n = 3), epilepsy (n = 2), seizure disorder (n = 1), retroviral disease (n = 2), and good Pasteur (n = 2) were the other conditions present in the patients.

Table 3: Patients with various coma aetiologies.

S.no	Etiology for poor GCS	No.of patients
1.	Cerebrovascular events	28(40%)
1a.	Hemorrhagic stroke	16(22.9%)
1b.	Ischemic stroke	12(17.1%)
2.	Metabolic encephalopathy	23(32.9%)
2a.	Hypoxemic Ischemic encephalopathy	6(8.6%)
2b.	Hyponatremia	8(11.4%)
2c.	Hypertensive encephalopathy	1(1.4%)
2d.	Hypoglycemic encephalopathy	2(2.9%)
2e.	Hyperglycemic encephalopathy	2(2.9%)
2f.	Diabetic Ketoacidosis	4(5.7%)
3.	Infective etiology	10(14.3%)
3a.	Septic encephalopathy	7(10%)
3b.	Meningoencephalitis	3(4.3%)
4.	Status epilepticus	6(8.6%)
5.	Alcholic Intoxication	2(2.8%)
6.	Organophosphorous poison	1(1.4%)
7.	Total	70(100%)

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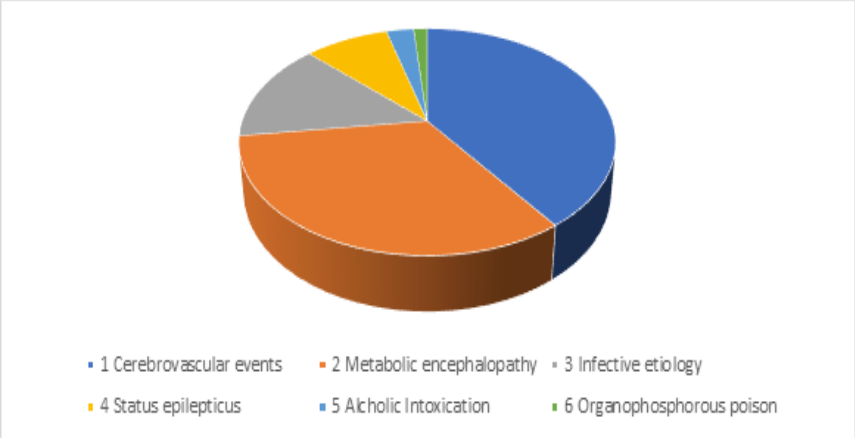

Patients' comas were most frequently brought on by cerebrovascular accidents (n=28), followed by metabolic encephalopathy (n=23). The causes of coma include status epilepticus (n = 6), alcohol intoxication (n = 2), viral illnesses (n = 10) and organophosphorus poisoning (n = 1). The most common reasons for cerebrovascular accidents are metabolic, followed by aging and risk factors including HTN, T2DM, CKD, atherosclerosis, etc., as well as using a lot of medications and not taking them as prescribed. Ignorance about the situation among illiterate people was the most prevalent reason for seeking medical care at a late stage and presenting as a coma.

The mortality rate is higher in the older age group (> 40 years old), with 49 fatalities out of 70 patients, or 75.5% (n=37). Risk factors and ageing are related, hence death rates are high.

Male mortality is higher (n=27/37) than female mortality (n=22/33) because men experience stress at work and changes in lifestyle and eating habits earlier than women do.

Type 2 diabetes is the second most common cause of high mortality (n=16/26), with HTN being the most frequent cause of high mortality (n=21/31). Patients with CKD have a 100% total death rate. Other comorbidities found in coma patients included cerebral vascular accident (CAD), coronary artery disease (CAD), systemic lupus erythematosus (SLE), retroviral disease (RVD), goodpasteur disease, rheumatic heart disease, epilepsy, tuberculoma, Parkinson's, glioma, mental retardation, and seizure disorder.

The major cause of death in coma patients is cerebral vascular accidents (n=21/28), followed by metabolic encephalopathy (16/23). The additional reasons were infection (5/10), status epilepticus (1/6), alcohol intoxication (1/2), and organophosphorous poisoning (0/1).

In the present study, patients with a GCS of less than 5 had a mortality rate of 100%, whereas those with a GCS of 5 to 7 had a mortality rate of 66.7%, with 8 of the 24 patients surviving. The mortality rate for 32 GCS patients between the ages of 8 and 10 was 32 fatalities, or 59.4%. It predicts outcomes that are worsened and a lower GCS.

DISCUSSION

Comparing the age distribution in non-traumatic comas to other Indian and international research. In this study, 50/70 of the patients are over 50. In a study on the clinical profile, cause, and prognosis of non-traumatic coma in a tertiary care institution in Goa, 100 patients were included, and the mean age of the group was 54. (range 14-95). The average age of the 80 nontraumatic coma patients at Assam's Gauhathi Medical College was 47.61. Non-traumatic coma: causes and outcomes of adult patients at University of Gondar Hospital in Northwest Ethiopia (2014) with an average age of 4118.7 years (a range of 15-84 years); another study on prognosis in individuals diagnosed with non-traumatic coma at Karolinska

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University Hospital in Stockholm, Sweden (2003–2005) with a mean age of 59 [8,9,10]. (a range of 15-98 years). In line with the study previously cited, our investigation's mean age at presentation was 47.10+13.06.

The Goa Medical College and Hospital in Goa conducted research on the clinical features, underlying causes, and prognosis of non-traumatic coma in 100 patients (68 males and 32 women). An 80-patient prospective observational research with 59 men was conducted at Gauhathi Medical College in Assam. A nontraumatic coma study in Karnataka involved 50 patients, 33 of whom were men. A prospective cross-sectional observational study at Gandhi Medical College in Secunderabad looked at 100 patients, 62 of whom were men. 32 men and 21 women were involved in the study "Non-traumatic coma: aetiology and outcomes of adult patients at the University of Gondar hospital, Northwest Ethiopia" (2014). In my study, 52.9% of the patients were men, with an average age of 37, and 47.1% were women, with an average age of 33.[10-12] There was no statistically significant difference in mortality between the sexes in the current study, which included males and females making up 55.1% and 44.9% of the overall mortality (p-value 0.609). This is identical to a study of nontraumatic coma at Sri Rajarajeshwari Medical College and Hospital in Karnataka, India, where men made up 63.2% of the fatalities and women made up 36.8% with regard to aetiology and prognosis.

Vital signs and the etiological diagnosis can be used to forecast the patient's prognosis. In this 18-month investigation, 70 people were evaluated. The clinical features, underlying aetiology, and prognosis of 100 patients who experienced non-traumatic coma in a tertiary care setting were evaluated in a 2019 study at the Goa Medical College and Hospital in Goa. 2016 saw the completion of a comparable prospective cross-sectional observational study on the prognosis of coma patients by aetiology at Gandhi Medical College in Secunderabad. However, a study was carried out at Goa Medical College and Hospital, Goa Medical College, Goa, India, on the clinical characteristics, cause, and outcome of non-traumatic coma in a tertiary care facility. According to our study's aetiology and results, cerebrovascular accident—which was also the subject of a 2016 study at Sri Rajeshwari Medical College and Hospital in Karnataka, India—is the main cause of nontraumatic coma.[13-15] CVA accounts for 33% of patients in my current study, 34% of patients in a study done by the Gandhi Medical College in Secunderabad in 2016 on 100 patients, and 40% of patients in a study done by the Goa Medical College and Hospital in Goa in 2019 on the clinical profile, aetiology, and outcome of non-traumatic coma in tertiary care centres. 48.2% of deaths and morbidities in a 2016 study involving 100 patients at Gandhi Medical College in Secunderabad were related to intracranial causes. The rate of intracranial fatalities in this investigation was 42.8%. 10 infarcts, 13 hemorrhagic CVA patients, and 5 recurrent instances were all present.

Recurrent stroke had a poorer prognosis than cerebral hemorrhagic stroke, big infarct with mass impact, and low GCS. Hemorrhagic strokes were linked to a death rate of 66.6% in a Goa (2019) study on the clinical features, aetiology, and prognosis of non-traumatic coma, while infarcts were linked to a death rate of 46.6%. Recurrent strokes occurred in 66.6% of infarcts and 81.3% of hemorrhagics. Seven out of seventeen patients with HTN also had T2DM, according to a study on the aetiology of nontraumatic coma and its prognosis in Karnataka, India. Twelve patients with T2DM also had HTN. 10 of the 13 individuals who had hemorrhagic strokes had hypertension. Hemorrhagic stroke was characterised by mass effect, midline changes, comorbidities, and an inferior GCS. Rheumatic heart disease was present in three of the 34 CVA patients in a 2016 study at Gandhi Medical College in Secunderabad (RHD). In the current analysis, there were two CVA patients with RVD and one without. Both outcomes are not statistically significant, despite the fact that hemorrhagic stroke performed worse than ischemic stroke (p-value 0.317 negligible).[15,16]

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In 22 (31.4%) cases, metabolic problems were involved, making them the second most common cause of GCS 10 and the cause of 32.6% of all deaths. During a prospective observational study of non-traumatic coma in a tertiary care facility, 37 patients developed metabolic encephalopathy, which was responsible for 38% of the overall mortality. Eight individuals with hyponatremia improved, five of them. Hyponatremia has negative effects that are severe. p is 0.047. One type 2 diabetic who went into hyperglycemic coma and had post-ictal seizures recovered completely. All six cases involved HIE. Two pastures are available. One was on dialysis for CKD, one had coronary artery disease, one had ventricular tachycardia, and one had post-CPR. Dead. Insignificant results (p-value 0.168). Four DKA patients had both type 1 and type 2 diabetes. HE caused the death of one patient. Unlike In a 2016 prospective cross-sectional observational study conducted at Gandhi Medical College in Secunderabad, one out of every three coma patients fully recovered. The Goa Medical College and Hospital conducted a prospective observational study on the clinical features, cause, and outcome of non-traumatic coma in a tertiary care hospital in 2019.[16,17] Hypertensive encephalopathy and DKA patients had full recoveries. Two of the five hypoglycemic coma patients who survived were included in a 2016 study at Gandhi Medical College in Secunderabad. Two individuals with sepsis-related hypoglycemia encephalopathy died in this study.

Nine (11.4%) incidences of infection were found. The outcome is statistically insignificant (p-value is 0.689), which is equivalent to a nontraumatic coma research carried out in India's Karnataka state in 2016. Nine different neuroinfections exist. Septic encephalopathy caused the deaths of seven patients. One patient had a retrovirus infection. Urosepsis and bacteremia were both experienced by two people. Two patients who had both neuroinfections and viral meningoencephalitis recovered completely. One patient's MRI showed encephalitis and hyperintense basal ganglia. A another patient had viral CSF. One patient passed away from viral meningoencephalitis, according to Kamat et al.Status epilepticus patients two survived. Insignificant results (P-value 1.000). Status epilepticus brought on by viral meningoencephalitis (SLE) had a better prognosis than Perry syndrome. Drug poisoning patients recovered the quickest, according to a cross-sectional observational study done on 100 coma patients at Gandhi Medical College in Secunderabad. A patient with organophosphorous poisoning was intubated and lived.[16-18]

The results of the current study's examination of each patient's pupillary reflex revealed that 1 out of 21 survivors had a poor outcome since their pupillary reflex was absent when they first presented (p-value 0.05). Twenty of the survivors had zits. A cross-sectional analysis of 100 coma patients at Gandhi Medical College in Secunderabad showed substantial mortality in individuals with absent brainstem reflexes and 36.9% mortality in patients with intact brainstem reflexes. Eight patients (67.1%) with abnormal breathing patterns at Casualty 47 made a full recovery, whereas 23 others did not. At Gandhi Medical College in Secunderabad, planned cross-sectional observational research of 100 patients revealed substantial mortality with a 0.05 p-value. A GCS below 5 resulted in 100% fatality in 14 individuals. Increased mortality was found in a 2019 prospective observational study on the clinical characteristics, underlying pathophysiology, and prognosis of non-traumatic coma in a tertiary care environment at the Goa Medical College and Hospital, Goa. For GCS 5 to 7, a statistically insignificant mortality of 66.7% was seen (P-value 0.785). Statistically, mortality at 59.4% is not noteworthy (p-value 0.116).[18,19]

One hundred percent of patients with chronic renal disease died (p=0.027; statistically significant) and the majority of the 70 individuals had coexisting illnesses. Hypertension affected the majority of the patients. Death rates were statistically negligible at 67.7%. p=0.795 More patients with type 2 diabetes pass away, by 61.5%. The p-value is 0.285. One rheumatic heart disease patient passed away, while another had a cardioembolic stroke.

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CONCLUSION

Age, gender, and the outcome don't statistically correlate with one another. Most of the participants were over 40 years old. Intracranial aetiology represents the most common complication of instances and the one that has the greatest fatality. Individuals with hyponatremia experienced notable outcomes. There is positive prognosis for people suffering neuroinfections. Hypertension constituted the most prevalent comorbid amongst sufferers, following by type 2 diabetes mellitus, having the highest death rate.

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