

Patterns Of Comatose Patients Admitted In Pediatric Intensive Care Unit In Sohag University Hospital: A Prospective observational study

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Abstract

Background: Coma is common in critical pediatric Intensive care, it is a pathological state of sustained, unarousable unconsciousness in which patients show no response to surroundings.

Objective: determine patterns of coma in patients admitted at the Pediatric Intensive Care Unit, Sohag University Hospital

Methods: over one year, we collected data from 58 children with different age groups presented with coma -exclusion of traumatic causes-they had detailed medical history especially to previous attacks of convulsions, epilepsy, family history of neurological diseases, metabolic diseases or stillbirth. Full clinical examination with special concern to the degree of consciousness by Glasgow Coma Scale, neurological examination, the manifestation of increased intracranial tension and neck rigidity. Investigations include Laboratory evaluations: CBC, liver, and kidney function tests, ABG, C.S.F, EEG, brain CT, brain MRI for all included children except critically ill patients.

Results: A total of 58 patients were included in the study. Most common causes and risk factors for coma in PICU were complicated Pneumonia in 11 patients (18.97%) {9 patients (81%) were less than one year}, followed by complicated CHD in 8 patients (13.79%), DKA in 7 patients (12.07%), Encephalitis in 7 patients (12.07%), GE 5 patients (8.62%) ,ICH in 4 patients (6.90%) All of them were less than one year, RF in 4 patients (6.90%), Scorpion bite in 4 patients (6.90%), Sepsis in 2 patients(3.45%) male-female 1:1 , Metabolic acidosis in 2 patients (3.45%) all less than one year all males ,Arrhythmia in 1 (1.72%) all less than one year ,cannabis toxicity in 1 (1.72%) Organophosphorus poisoning in 1 patient (1.72%) HSM in 1 patient (1.72%).

Conclusion: These data confirm that infection is the first cause of comatose pediatric patients in PICU, half of them less than one year, The most common cause and risk factors for coma in PICU is complicated Pneumonia. There is a significant correlation between the GCS grade and the outcome as increased in GCS associated with improved outcome

Keywords: Children, Coma, GCS Infection

1-Introduction:

Coma was defined as a pathological state of sustained, unarousable unconsciousness in which patients show no response to surroundings. (*DiMario, 2012*)¹.

Coma is common in critical pediatric care, studies divide coma to traumatic and non-traumatic (**Wong and Forsyth, 2001**)².

Etiology - Most common etiologies of coma/ altered mental status by age include:

A-Infant: Infection, Inborn error of metabolism, seizures, trauma, abuse

B-Child: toxins Ingestion, infection,

seizures, trauma, abuse, intussusception

Assessment of coma: Glasgow Coma Scale for children Diagnosis - Arterial blood gases, Serum toxin levels, Urine drug screen, CT, MRI.

Management - Airway, Breathing, Circulation, Administer IV glucose Broad-spectrum antibiotic therapy, Anti-convulsants.

Specific antidotes if suspected ingestion: opiates-naloxone, benzodiazepines, flumazenil, anticholinergics, physostigmine.

Hypertonic saline infusions- Mannitol: 0.5-1 mg/kg IV push

Urine output should be monitored

Prognosis- Dependent on etiology of coma, level of depression and rapidity of recovery of neurologic signs (*Michelson et al., 2016*)³.

2-Material and methods:

2.1. Study design: Prospective observational study was conducted in the Pediatric Intensive Care Unit, Pediatric Department Sohag University Hospital over one year from 1st November 2017 to 31st October 2018. Sohag University Hospital is a tertiary institution, in upper Egypt.

2.2. The Patients:

2.2.1 Inclusion criteria:

Any pediatric patient with a disturbed conscious level.

2.2.2 Exclusion criteria:

Traumatic causes of coma.

2.3 Diagnosis and collected data:

Children included in this study were subjected to the following:

1. Complete medical history

With special concern to full perinatal history, sex, age, family history, convulsions, epilepsy, metabolic diseases, previous similar condition.

2. Full clinical examination:

With special concern to the degree of consciousness by Glasgow Coma Scale, neurological examination, the manifestation of increased intracranial tension and neck rigidity

3. Investigation:

- Laboratory evaluations: routine investigations include Complete Blood Count, liver and renal function tests, cerebro.spinal.fluid analysis, arterial blood gases.

- Electroencephalogram.

- Computerized tomography scan of the brain.

- Magnetic resonance imaging of the brain.

2.4. Statistical analysis: SPSS software was used for statistical analysis. Presentation of Quantitative data as mean, standard deviation, median, and range. As the data was not normally distributed for two groups comparison Mann-Whitney test was used. Qualitative data were presented as numbers, percentages and compared by using the Chi-square test. Excel or STATA program was used for Graphs. if P-value was less than 0.05 was considered significant.

2.5. Ethical considerations: consent was taken from caregivers of patients in the study and also was approved by the ethics scientific committee at Sohag Faculty of Medicine

Results:

During this study, we reviewed the data of 58 Children diagnosed with coma and admitted to PICU. Male patients were detected in 32 cases(55.17%) while 26 patients were females (44.83%). Those were less than one year 30 patients (51.72%) and from 1-5 years were 20 patients (34.48%). The mean age was 25.17 ± 34.93 months. Complicated pneumonia and septicemia were the most common risk factor for coma in PICU patients , complicated Pneumonia in 11 patients (18.97%) {9 patient (81%)}

less than one year} 8 males 72% and 3 females 27% followed by complicated CHD in 8 patients (13.79%), DKA in 7 patients (12.07%), Encephalitis in 7 patients (12.07%),GE 5 patients (8.62%) ,ICH in 4 patients (6.90%) all of them were less than one year, RF in 4 patients (6.90%), Scorpion bite in 4 patients (6.90%), sepsis in 2 patients(3.45%) male-female 1:1 , Metabolic acidosis in 2 patients (3.45%), all less than one year ,all males., Arrhythmia in 1 patient (1.72%) (less than one year) ,cannabis toxicity in 1 (1.72%) organophosphorus poisoning in 1 patient (1.72%). HSM in 1 patient (1.72%). There was a significant positive correlation between pneumonia and age <1 year (**Table1**).

Diagnosis	No.	Age (<1 year)	Age (1-5 years)	Age (>5 year)	P value
Complicated Pneumonia	11	9 (81.8%)	2 (18.2%)	0	<0.0001
Complicated CHD	8	3 (37.5%)	4 (50.0%)	1 (12.5%)	
DKA	7	0	3 (42.9%)	4 (57.1%)	
Encephalitis	7	4 (57.1%)	3 (42.9%)	0	
GE	5	5 (100%)	0	0	
ICH	4	4 (100%)	0	0	
RF	4	0	1 (25.0%)	3 (75%)	
Scorpion bite	4	0	4 (100%)	0	
Sepsis	2	1 (50.0%)	1 (50.0%)	0	
Metabolic acidosis	2	2 (100%)	0	0	
Arrhythmia	1	1 (100%)	0	0	
cannabis toxicity	1	0	1 (100%)	0	
Organophosphorus poisoning	1	0	1 (100%)	0	
HSM	1	1 (100%)	0	0	

Table (1) Causes and risk factors by age group

Laboratory investigation including CBC, liver function tests, renal function were done for all patients. In the study, the mean WBCs was $13.9 /mm^3 \pm 8.16$, while the mean RBCs was $4.37 \pm 0.86 /mm^3$, The mean hemoglobin level was 9.18 ± 2.13 gm/dl while the mean ALT was 130 ± 286 U/L and AST 162 ± 382 U/L

EEG study results revealed that 10% of cases were normal, 6.9% had generalized epileptic discharges, 45% not applicable. CSF study shows that 8.6% had bacterial meningitis, 6.9% viral encephalitis, 84% normal/not applicable.

CT study revealed brain edema in 31% of cases, encephalitis in 8.6%, ICH in 6% while 44% were normal or not done

MRI finding results showed 17.2% had strokes, 63% were normal/not done. The outcome showed that 56.9% of the comatose patients in PICU improved while 43.1% of patients died and There

Encephalitis, 6% had ICH, 3% had was no significant correlation between outcome, age, and gender. (**Table2,**)

Variable	Death N=25	Improved N=33	P-value
Age group			
Less than 1 years	16 (53.33)	14 (46.67%)	
From 1 to 5 years	8 (40.00%)	12 (60.00%)	
More than 5 years	1 (12.50%)	7 (87.50%)	0.11
Sex			
Female	12 (46.15%)	14 (53.85%)	
Males	13 (40.63%)	19 (59.38%)	0.67

Table (2) Relation between outcome and age and gender.

Death outcome tended to be more common in patients with complicated pneumonia, encephalitis, ICH, sepsis, while improved outcome were common

in complicated CHD, DKA, GE, RF, scorpion bite (Table 3). High GCS was more common to have improved outcome than lower GCS(**Table 4**)

Variable	Death N=25	Improved N=33	P-value
Complicated Pneumonia	6 (54.55%)	5 (45.45%)	
Complicated CHD	3 (37.50%)	5 (62.50%)	
DKA	0	7 (100%)	
Encephalitis	6 (85.71%)	1 (14.29%)	
GE	1 (20.00%)	4 (80.00%)	
ICH	3 (75.00%)	1 (25.00%)	
RF	1 (25.00%)	3 (75.00%)	
Scorpion bite	1 (25.00%)	3 (75.00%)	
Sepsis	2 (100%)	0	
Metabolic acidosis	1 (50.00%)	1 (50.00%)	
Arrhythmia	0	1 (100%)	
Hashish toxicity	0	1 (100%)	
Organophosphorus poisoning	0	1 (100%)	
HSM	1 (100%)	0	

Table (3) Relation between outcome and Diagnosis.

	Death N=25	Improved N=33	P-value
GCS			
Mean ± SD	7.4±0.91	9.18±1.13	<0.0001
Median (range)	7 (6:9)	9 (7:12)	

Table (4) Relation between outcome and GCS

Discussion:

Coma is common in critical pediatric Intensive care unit. The most common cause of coma was an infection in childhood, The mortality by about 46%.⁴ In this study of 58 pediatric patients diagnosed with coma and admitted in PICU. The sociodemographic characteristics of the studied population showed 32 male patients represented (55.17%) and 26 female patients represented (44.83%). Also a study in Children in South-East Iran of Non-traumatic Coma of 123 children, 76 cases were males (61.8%) and 47 females (38.2%).⁵ Another study of 270 children to assess the relationship between survival in children with acute coma and Modified Glasgow Coma Scale (MGCS), its components, Males 142 (52%) females 128(47%).⁶ In a study done by (Arun et al., 2005)⁷ of 100 cases of non- traumatic coma (sixty-five boys, thirty-five girls).Also, another study by (Vijayakumar et al .,2003)⁸ aims to define the neurological outcome of all cases of non-traumatic coma over 5 years from 1997 to 2001 of 328 children admitted in PICU with NTC 188 (57%) males and 40 female (43%). In similarity to our study, in (Ikhlas al., 2015)⁹ 61 cases with NTC; 34 (55.7%) were males and 27 (44.3%) were females. In this study Less than one year < 1 year;30 patients (51.72%) and from 1-5 years 20 patients (34.48%) more than five years >5 years 8 (13.79%), Wheres (15%) below 1yr age, (25%) were one-three yr, (34%) were four-five yr and (26 %) were six to twelve ys old.⁷. Other researchers found thirty-three (54.1%) were of age less than three years and twenty-eight (45.9%) were more than three years of age⁹.And in (Ali Khajeh et al.,2014)⁵ found that 85 children (69.1%) aged from one month

to five years, sixteen children (15.5%) aged from six years to ten years, and sixteen children (15.4%) aged from ten to fifteen years. while in (*Nayana Prabha et al ., 2003*)⁶ 3 -36 months 100(37%) and 37 -72 months 74 (27%)and from 73-108 months 54(20%) and from 109 -144 months 42(15%) .In this study the mean age was 2 years, while the study of (*Ali Khajeh et al., 2014*)⁵, mean age of 3.2 years and mean age: 5 yrs 3 months in (*Nayana Prabha et al. , 2003*)⁶. In this study most common disease and risk factor leading to coma in PICU is complicated Pneumonia and septicemia in 11 patients (18.97%) ;9 patient (81%) less than one year; 8 males 72%and 3 females 27% .while Intracranial Infection (pyogenic meningitis, viral encephalitis, and tuberculous meningitis) was the commonest cause of coma in one study (n = 218, 80.7%) with viral encephalitis (n = 115, 41.5%).⁶ In another study Central, nervous system infections represent 60% of the cases⁷. The study of (*Vijayakumar et al., 2003*)⁸164(50%) had CNS infection, 88(27%) status epilepticus,39(12%) toxic or metabolic encephalopathy, 13(4%) hypoxic-ischaemic encephalopathy, 21(6%) other encephalopathies and 3 (1%) not identified .Another study by (*Ikhlas Ahmad et al., 2015*)⁹ the commonest cause of coma of the non-traumatic cause was Infection about twenty-four (41%) cases. metabolic and Toxic sixteen (26.2%), epilepsy in ten (16.4%), five (8.2%) were caused by central nervous system lesions and in five (8.2%) cause was unknown. encephalitis was the commonest represent ten (16.4%) cases. pyogenic meningitis seven (11.5%), tubercular meningitis four (6.6%), viral encephalitis

two (3.3%) HIV and septic shock and encephalopathy one (1.6%) each. While (*Ali Khajeh et al., 2014*)⁵ found toxic causes in sixty-one patients (49.6%), infectious in thirty patients (24.4%), metabolic in eleven patients (8.9%), CNS structural abnormality in four patients (3.3%) and seizure in seven children (5.7%). CNS hemorrhage (four cases). In (*Nayana Prabha et al., 2003*)⁶ study showed Metabolic disturbances (hepatic encephalopathy, dyselectrolytemia) about 9.3% (25 children). encephalopathies: enteric (ten children), toxins (eight children), hypoxic-ischemic (five children) and hypertensive (four children). In (*Arun et al., 2005*)⁷ study Convulsions were present in (46.65%) this was in agreement with who found convulsions in (40%). In this study Improved outcome was found in 33 (56.90%) patients, this was in line with (*Ikhlas Ahmad et al., 2015*)⁹ study who found survival in 39 (66.1%) cases. Also in this study Death occurred in 25 (43.10%) patients, variable incidence of mortality was obtained by many researches ;(*Vijayakumar et al 2003*)⁸ study 39(12%) died while In (*Ikhlas Ahmad et al., 2015*)⁹ study 20 (33.9%) died ,seven patients (29.2%) died by central nervous system infections, seven (43.8%) in toxic-metabolic coma, one (10%) in status-epilepticus, two (50%) structural central nervous system lesions and three (60%) of unknown cause . two (20%) with encephalitis, three (42.9%) with pyogenic meningitis, one (25%) in TBM, four (100%) in hepatic encephalopathy, two (100%) in intracranial hemorrhage and two (28.8%) in poisoning. In (*Arun Bansal et al., 2005*)⁷ study death was 48 % (seven of fifteen patients), 44% (eleven from twenty-five in children between

one to three years old, 74% (eight of thirty-four) in children of preschool age, and 27.7% in children between six and twelve years death was equally for males and females. In this study the mortality was highest in complicated Pneumonia and septicemia 6 (54.55%), However, (*Nayana Prabha et al., 2003*)⁶ study, the metabolic disease was the commonest cause of death (48%). CNS infections 36.6% and encephalopathies were 30.5%.In this study regarding GCS, death was common with mean 7, while improved outcome with mean 9. In (*Arun Bansal et al., 2005*)⁷ found GCS 8 in 15 (improved 13and died 2) while GCS 7 in 24 cases (improved 17 and died 7), GCS 6 in 21 cases(improved 16and died 5), GCS 5 in 13 cases(improved 7and died 6), GCS 4 in 10 cases(improved 6 and died 4), GCS 3 in 17 cases(improved 6 and died 11).While in (*Nayana Prabha et al., 2003*)⁶ GCS (13 -15) 15 patient (5%) and GCS (9 -12) 107 patient (39%) and GCS less than 8 148 patient 54%

In our study death was more common with age group less than one-year-old this was in agreement with (*Vijayakumar et al., 2003*)⁸ Poor outcomes related to young age less than 2 years p-value less than 0.001 low Glasgow coma scale less than 8 p-values less than 0.001.

conclusions:

These data confirm that infection is the first cause of comatose pediatric patient in PICU, half of them less than one year
It is suggested that newer protocols for vaccination and infection control, mother and family health education should be implemented

Acknowledgments:

Authors express their thanks and respect to all colleagues in the Pediatrics Department, Sohag University Hospital, (Egypt) for their support, children and their families who participate in this study.

Conflict of Interest:

No conflict to be declared.

Authors contributions:

All authors equally contributed to this project and article. All authors approved the manuscript.

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