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Evaluating Non-Traumatic Loss of Consciousness in Children Admitted to the Emergency Room

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Abstract

Background

Non-traumatic loss of consciousness is a nonspecific symptom resulting from a broad range of diseases in children, and its outcome depends on factors, including its primary etiologies, age, sex, and patient clinical condition at the time of admission. The purpose of this study was to evaluate the etiology and outcome of children's non-traumatic loss of consciousness and to determine predictive clinical and paraclinical features.

Materials and Methods: This retrospective cross-sectional study was conducted in Imam Hossein Hospital, Isfahan, Iran. Documents of 101 children aged one month to fifteen years old who were admitted with non-traumatic loss of consciousness from March 2016 to March 2017 were reviewed. Data regarding patient's profile, signs and symptoms, para-clinical findings, progression, and outcome were collected and analyzed using SPSS software version 23.0.

Results: Results showed that the most common cause was infections (40.6%), followed by seizure (23.8%) and intoxication (19.8%). Also, infection was the main cause of mortality. The mortality rate was 18.8% and it was significantly and directly correlated with duration of hospitalization, intensive care unit (ICU) admission, and emergency interventions such as intubation or cardiopulmonary resuscitation (CPR) at the time of admission, seizure status, dehydration, irritability, poor feeding, oliguria, hypotension, non-reactive pupils, low oxygen saturation, hyporeflexia, and hypotonia. Moreover, paraclinical factors such as thrombocytopenia, neutropenia, impaired liver and kidney function tests, and high coagulation test predicated poor outcomes.

Conclusion

The most common cause of non-traumatic loss of consciousness and the most common cause of mortality was infection. Longer duration of hospitalization, ICU admission and interventions were associated with poor outcomes. It seems physicians should pay more attention to these predictive factors.

Key Words: Children, Loss of consciousness, Etiology, Outcome, PICU.

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1- INTRODUCTION

Consciousness represents awareness of self and environment (place and time). Consciousness is mediated by the cerebral cortex and its initiation and Ascending Reticular Activating System (ARAS), and its association with thalamus, hypothalamus, and cortex initiates and maintains it. Any disturbances in these connections can lead to loss of consciousness and coma (1). Coma is a state of non-consciousness that patient is unresponsive to external stimulation. Stupor is a clinical state between alertness and coma, in which patients have impaired responsiveness. Arousal alteration and loss of consciousness (LOC) is a life-threatening emergency, needing immediate intervention to save life and brain function (2). The outcome is different from recovery, with either normal brain function or neurologic impairment, to death. Many children have complete recovery (3-5).

Ahmed et al. have proven a significant correlation between hypothermia, hypotension, non-reactive pupils, hypotonia, and hyporeflexia with mortality (6). Accordingly, in these children, the outcome is correlated with primary etiology and patient clinical state (3, 7, 8). Golden time for diagnostic and therapeutic intervention is usually short. Many of these children may need emergent intervention or intensive care unit (ICU) admission (9, 10). Clinical presentations that manifest with LOC and coma are non-specific, and their overlap complicates diagnosis of etiologies (11). Moreover, etiology's frequency is different in any region (6, 12-15). In Iran, based on our knowledge, only two studies are available on non-traumatic LOC of children. In Tehran, the most common cause is infection (13). Intoxication is the most frequent cause of children's LOC in the south-east of Iran (14). LOC mortality rate varies from 16.6% to 50% in different regions (3, 12, 13, 15-17). Therefore, knowledge of the correlation between primary etiology, clinical and para-clinical factors, and outcome, particularly in a resource-poor setting, can help the physician to approach these patients effectively. Also, it can improve the outcome and reduce the burden on the community (6, 12, 15). So far, no previous studies have evaluated and investigated on child non-traumatic LOC etiology and mortality. Previous studies in Iran have focused only on etiologies and clinical presentations of LOC. Factors such as LOC duration before admission, hospitalized duration, mental status, vital signs, para-clinical finding, and their effect on these patients' outcome have not been evaluated yet. Here in the current study, regarding the importance of non-traumatic LOC in children and lack of sufficient studies about the etiologies and predictive factors, we aimed to evaluate outcome predictor factors along with etiologies in children with non-traumatic LOC in Isfahan, Iran.

2- MATERIALS AND METHODS

2-1. Study design and population

This retrospective cross-sectional review that was conducted from March 2016 to March 2017 was approved by research committee of Isfahan University of Medical Sciences and the ethical committee has confirmed it.

2-2. Measuring tools: Laboratory measurements

All children, aged one month to fifteen years old, admitted to the Imam Hussein hospital Emergency room (Isfahan, Iran), with non-traumatic loss of consciousness were enrolled in the research. The inclusion criteria were: complete documents and signed informed consent from the parents and the exclusion criteria were: refusal of parents to participate in this study and more than 20% incomplete data. In order to assess and grading the

children's mental status in the emergency room, we used AVPU scale. AVPU scale (Alert, Voice, Pain, and Unresponsive) is a simple qualitative classification to determine the level of consciousness (25). This scale is usually used for prompt assessment in prehospital care and emergency room. AVPU scale includes four levels.

- Alert (A) ~ GCS 15: the patient is aware, responds to the environment, they obey commands, open their eyes spontaneously, and follow objects.
- Verbally responsive (V) ~ GCS 12-13: the patient opens their eyes only in response to a verbal stimulation directed toward them in a meaningful way.
- Painfully responsive (P) ~ GCS 5-6: the patient will only react to the application of painful stimulus. This response can be movement, moaning, or crying out directly in response to this pain. Unresponsive (U) ~ GCS 3: the patient does not respond to external stimulation (18, 19).

Children's level of consciousness with V, P, and U were collected. Patient data such as age, gender, LOC duration before admission, history, mental status, vital signs, physical exam, laboratory data (CBC, VBG, BS, electrolytes, liver function test, kidney function test, Ammoniac, blood culture, urine analysis and culture, lumbar puncture, metabolic screening test), ECG, EEG, radiologic finding (Chest X-ray, brain CT and MRI), ICU admission and need of CPR were also collected from patient records. Etiologies of LOC were determined based on the following data: Non-traumatic LOC etiology subcategories including infection, epilepsy, metabolic, intoxication, intracranial hemorrhage (ICH), and brain tumor. According to two previous studies, we classified clinical manifestations into three categories (13, 20). CNS related: seizure, headache, irritability, and behavioral changes. Systemic symptoms: fever, poor feeding, nausea, and vomiting. Organs specific presentations: rash, respiratory, gastrointestinal, and urinary related symptoms. Patient mental status, vital signs, and neurologic examination were recorded 48 hours after admission and discharge time (in patients with less than 48 hours hospitalized duration just in discharge time). Depending on brain functions (neurologic examination) at the discharge time, outcome was classified as complete recovery, neurologic impairment, and death. Same neurologic examination in patients with a previous neurologic impairment (such as cerebral palsy, congenital neurometabolic disorder, neurodevelopmental delay) did not mean complication is considered complete recovery. The complication could be mild, moderate, and severe based on cranial nerve, sensory and motor examination, and cerebellum function test (26).

Mild: mild weakness or ataxia, one cranial nerve palsy. *Moderate*: moderate weakness or ataxia, bilateral, two or more cranial nerves impairment. *Severe*: severe weakness or ataxia, quadriplegia, or brain death (3, 13). If the patient was discharged with the vegetative state, it was considered severe complication, if the patient died in hospital, it was considered death.

2-3. Data analysis

Data were collected and SPSS software version 23.0 was used for statistical analysis. Frequencies were compared with the Chi-square test. P-value <0.05 was considered as significance threshold.

3- RESULTS

One hundred one children were admitted with non-traumatic LOC. 53.5% of these children were girls and 46.5% boys. Their mean age was 3.4 ± 3.35 years. Age and sex distribution and etiologies of LOC are summarized in Table.1. We showed that infection was the most

common cause in all age groups. Brain tumors and intracranial hemorrhage were also more common in patients over six years old (P = 0.03).

Table-1: Age and sex distribution and etiology of non-traumatic LOC in children.

Age		Infection	Intoxication	Epilepsy	Metabolic	Brain tumor	ICH	Total
< 2 year	Girl	7 (24.1%)	8 (27.6%)	9 (31.0%)	5 (17.2%)	0 (0.0%)	0 (0.0%)	29 (28.7%)
	Boy	11 (47.8%)	5 (21.7%)	4 (17.4%)	2 (8.7%)	0 (0.0%)	1 (4.3%)	23 (22.8%)
	Total	18 (34.6%)	13 (25.0%)	13 (25.0%)	7 (13.5%)	0 (0.0%)	1 (1.9%)	52 (51.5%)
2-6 year	Girl	11 (73.3%)	1 (6.7%)	1 (6.7%)	2 (13.3%)	0 (0.0%)	0 (0.0%)	15 (14.9%)
	Boy	5 (38.5%)	3 (23.1%)	1 (7.7%)	3 (23.1%)	1 (7.7%)	0 (0.0%)	13 (12.9%)
	Total	16 (57.1%)	4 (14.3%)	2 (7.1%)	5 (17.9%)	1 (3.6%)	0 (0.0%)	28 (27.7%)
6-15 year	Girl	4 (40.0%)	2 (20.0%)	0 (0.0%)	2 (20.0%)	0 (0.0%)	2 (20.0%)	10 (9.9%)
	Boy	4 (36.4%)	1 (9.1%)	2 (18.2%)	1 (9.1%)	2 (18.2%)	1 (9.1%)	11 (10.8%)
	Total	8 (38.1%)	3 (14.3%)	2 (9.5%)	3 (14.3%)	2 (9.5%)	3 (14.3%)	21 (20.8%)
Total	Girl	22 (41.6%)	11 (20.4%)	10 (18.5%)	9 (16.7%)	0 (0.0%)	2 (3.7%)	54 (53.5%)
	Boy	20 (42.6%)	9 (19.1%)	7 (14.9%)	6 (12.8%)	3 (6.4%)	2 (4.3%)	47 (46.5%)
	Total	42 (41.6%)	20 (19.8%)	17 (16.8%)	15 (14.9%)	3 (3.0%)	4 (4.0%)	101(100%)

ICH: Intracerebral hemorrhage.

Patient's history and clinical features, laboratory and radiologic parameters, and their association with the outcomes are also summarized in **Table.2**. Fever (54.5%), seizure (49.5%), and vomiting (39.6%) were the most common clinical presentations associated with LOC. 16.8% (n=17) of patients had apnea at the time of admission and therefore needed emergent intubation. In addition, 5% (n=5) with cardiac arrest needed CPR in triage. The most common cause of non-traumatic LOC is infection (42.6%) followed by intoxication (19.8%), epilepsy (16.8%), and metabolic (14.9%). Forty-two children with infection include 45.2% viral encephalitis, 40.4% sepsis and septic shock, and 11.9% bacterial meningitis. Further related issues to intoxication, epilepsy and metabolic diseases are summarized in **Table.2**. Primary cause in 50% of unresponsive patients was infection and 18.8% was due to intoxication (P = 0.01). 76% (n=13) of patients required CPR during the hospitalized time, and 53.2% of patients were admitted to ICU due to infection (P=0.01). 95% of intoxication and 91.6% of epilepsy cases came to the hospital before 12 hours from the onset of LOC (P <0.05). Duration of hospitalization was significantly associated with primary etiologies. Duration of hospitalization in infected patients was 10-30 days in 77.3% and 3-10 days in 38.5% of them (P <0.001). Further analysis in those patients whose mental status did not recover or worsened was infections 57.8% (n=11), metabolic disorders 21.3% (n=4) and brain tumor 15.9% (n=3), respectively (P <0.001). Mental status in 80% (n=17) of intoxicated patients improved in the first 48 hours and 20% (n=3) after 48 hours (P<0.001).

Table-2: History factors, clinical features, laboratory and radiologic parameters and their association with the outcome.

Variables		Frequency %	Survived %	Death %	P-value
Age, year	< 2	52(51.5%)	80.8	19.2	0.9
	2-6	28(27.7%)	82.1	17.9	
	6-15	21(20.8%)	81	19	
Gender	Girl	54(53.5%)	79.6	20.4	0.8
	Boy	47(46.5%)	83	17	
Prehospital duration	<6h	55(54.5%)	89.1	10.9	0.03
	6-12h	31(30.7%)	77.4	22.6	
	>12h	15(14.9%)	60	40	
Mental status	V(verbal)	39(38.6%)	94.9	5.1	<0.0001
	P(pain)	46(45.5%)	82.6	17.4	
	U(unresponsive)	16(15.8%)	43.7	56.3	
Recovered mental status	<48h	61(60.4%)	98.4	1.6	<0.0001
	>48h	21(20.8%)	95.2	4.8	
	No recovery	19(18.8%)	10.5	89.5	
ICU admission	Yes	47(46.5%)	61.8	31.9	0.002
	No	54(53.5%)	92.6	7.4	
Hospitalized duration	<48h	25(24.7%)	80	20	0.39
	3-10 day	52(51.5%)	86.5	13.5	
	10-30 day	22(21.8%)	72.7	27.3	
	>30 day	2(2%)	50	50	
Seizure	Status seizure	26(25.7%)	69.2	30.8	0.03
	No status	24(23.7%)	95.8	4.2	
	No seizure	51(50.6%)	82	18	
Headache	Yes	10(9.9%)	90	10	0.7
	No	91(90.1%)	80.2	19.8	
Ataxia	Yes	10(9.9%)	70	30	0.3
	No	91(90.1%)	82.4	17.6	
Redor neck	Yes	11(10.9%)	72.7	27.3	0.7
	No	90(89.1%)	82.2	17.8	
Paresthesia/paresis	Yes	4(4%)	75	25	0.7
	No	97(96%)	81.4	18.6	
Incontinency	Yes	4(4%)	75	25	0.7
	No	97(96%)	81.4	18.6	
Cranial nerve palsy	Yes	2(2%)	100	0	0.4
	No	99(98%)	80.8	19.2	
Bizarre behavior	Yes	2(2%)	100	0	0.4
	No	99(98%)	80	19.2	
Nausea-Vomiting	Yes	40(39.6%)	82.5	17.5	0.9
	No	61(60.4%)	80.3	19.7	
Dehydration	Yes	25(24.8%)	60	40	0.005
	No	76(75.2%)	88.2	11.8	
Irritability	Yes	28 (27.7%)	67.9	32.1	0.03
	No	73(72.3%)	86.3	13.7	
Poor feeding	Yes	23(22.8%)	65.2	34.8	0.05
	No	78(77.2%)	85.9	14.1	
Cough	Yes	14(13.9%)	92.9	7.1	0.4
	No	87(86.1%)	79.3	20.7	
Diarrhea	Yes	22(21.8%)	77.3	22.7	0.8
	No	79(78.2%)	82.3	17.7	
Hepatosplenomegaly	Yes	5(5%)	20	80	0.03
	No	96(95%)	84.4	15.6	
Peteshiae	Yes	3(3%)	0	100	0.05
	No	98(97%)	83.7	16.3	
Icter	Yes	2(2%)	0	100	0.04
	No	99(98%)	82	17.2	
PR	Normal	27(26.7%)	88.9	11.1	0.05
	Tachycardia	66(65.3%)	90.3	9.7	
	Bradycardia	3(3%)	100	0	

	Arrest	5(5%)	40	60	
RR	Normal	41(40.6%)	92.7	7.3	0.004
	Tachypnea	38(37.6%)	78.9	21.1	
	Bradypnea	5(5%)	100	0	
	Apnea	17(16.8%)	52.9	47.1	
BP	Normal	83(82.2%)	92.8	7.2	<0.0001
	Hypertension	4(4%)	50	50	
	Hypotension	14(13.8%)	21.4	78.6	
T	Normal	43(42.6%)	88.4	11.6	0.07
	Febrile	55(54.5%)	78.2	21.8	
	Hypothermia	3(3%)	33.3	66.7	
O2 Sat	Normal	64(63.4%)	87.5	12.5	0.03
	Low	37(36.6%)	70.3	29.7	
Pupil reactivity	Reactive	84(83.2%)	86.9	13.1	0.003
	Nonreactive	17(16.8%)	52.9	47.1	
Urine output	Normal	78(77.2%)	88.5	11.5	0.003
	Polyuria	1(1%)	100	0	
	Oliguria	22(21.8%)	54.5	45.5	
DTR	Normal	85(84.2%)	84.7	15.3	0.01
	Increased	8(7.9%)	87.5	12.5	
	Decreased	8(7.9%)	37.5	62.5	
Muscle tone	Normal	87(86.1%)	83.9	16.1	0.04
	Increased	2(2%)	100	0	
	Decreased	12(11.9%)	58.3	41.7	
BS	Normal	87(86.1%)	82.7	17.2	0.4
	High	7(6.9%)	85.7	14.3	
	Low	7(6.9%)	57.1	42.9	
WBC	Normal	64(64%)	89.1	10.9	0.1
	High	27(27%)	74.1	25.9	
	Low	9(9%)	55.6	44.4	
PLT	Normal	86(86%)	89.5	10.5	<0.0001
	Low	14(14%)	35.7	64.3	
Neutropenia	Yes	5(5%)	20	80	0.002
	No	95(95%)	85.3	14.7	
VBG	Normal	41(54.9%)	95.6	4.4	0.001
	Metabolic acidosis	30(36.6%)	53.3	46.7	
	Metabolic alkalosis	2(2.4%)	100	0	
	Respiratory acidosis	4(4.9%)	75	25	
	Respiratory alkalosis	1(1.2%)	100	0	
LFT	Normal	44(68.8%)	86.4	13.6	0.001
	High	20(31.2%)	45	55	
KFT	Normal	85(85%)	87.1	12.9	0.002
	High	15(15%)	53.3	46.7	
PT/PTT/INR	Normal	23(62.2%)	87	13	0.001
	High	14(37.8%)	28.6	71.4	
Brain CT	Normal	18(41.9%)	94.4	5.6	0.002
	Abnormal	25(58.1%)	68	32	
EEG	Normal	9 (31%)	100	0	0.008
	Abnormal	20 (69%)	60	40	

ICU: Intensive Care Unit, PR: Pulse Rate, RR: Respiratory Rate, BP: Blood Pressure, T: Temperature, O2 Sat: Oxygen Saturation, DTR: Deep Tendon Reflex, BS: Blood Sugar, WBC: White Blood Cell, PLT: Platelet, VBG: Venous Blood Gas, LFT: Liver Function Test, KFT: Kidney Function Test, PT: Prothrombin Time, PTT: Partial Thromboplastin Time, INR: International Normalized Ratio, CT: Computed Tomography scan, EEG: Electroencephalography.

Table.3 shows outcome distributions and etiologies of non-traumatic LOC in children. Among our patients, 76.2% (n=77) recovered completely, 5% (n=5) were discharged with neurologic impairment, and 18.8% (n=19) expired. All intoxication and epilepsy cases recovered without any complication

(P<0.001). Neurologic complication severity was mild in 40%, moderate in 40%, and severe in 20%. 76% (n=19) miotic pupils were due to intoxication (P<0.001). In addition, 90.9% (n=10) of neck stiffness was related to infection, and 9.1% (n=1) because of intracranial hemorrhage (P=0.002). 66.7% leukocytosis, 78.6% thrombocytopenia, 70% metabolic acidosis, 86.7% abnormal kidney function test, and 65% liver enzyme elevation were also reported in patients with infectious diseases (P <0.05).

Table-3: Outcome distribution and etiology of non-traumatic LOC in children.

Status	Infection	Intoxication	Epilepsy	Metabolic	Brain tumor	ICH	Total
Recovered	26 (33.8%)	20 (26%)	17 (22.1%)	11 (14.3%)	0 (0.0%)	3 (3.9%)	77 (76.2%)
Complicated	4 (80%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (20%)	0 (0.0%)	5 (5%)
Death	12 (63.2%)	0 (0.0%)	0 (0.0%)	4 (21.1%)	2 (10.5%)	1 (5.3%)	19 (18.8%)
Total	42 (41.6%)	20 (19.8%)	17 (16.8%)	15 (14.9%)	3 (3.0%)	4 (4.0%)	101(100%)

P-value <0.0001, ICH: Intracerebral hemorrhage.

4- DISCUSSION

In this study, we aimed to evaluate and investigate the outcome predictor factors along with etiologies in children with non-traumatic LOC. Our findings indicated that the most frequent cause of non-traumatic LOC in children was infections. The second cause was intoxication, followed by epilepsy and metabolic disorder, respectively. Our findings also showed that the lowest incidence rate of these etiologies was related to tumors and brain hemorrhage. Furthermore, we indicated that the duration of hospitalization was significantly associated with primary etiologies and was higher in patients admitted with infectious diseases. We also showed that 76.2% of the studied cases recovered completely. Based on previous studies, the etiologies of non-traumatic LOC are different in each region. There have also been different results, reported by two previous Iranian studies. Khajeh et al. reported that intoxication was the most common cause in South-east of Iran (14); while, in Tehran, the first common cause was infection followed by epilepsy and metabolic disorder, and intoxication (13). Also, in England, Wong et al. reported infection as the common etiology of non-traumatic LOC (3). A study in Canada has the same result as England (21). In India, several studies are available. All of them show infection is the most common etiology (4, 11, 22). Similarly, the most frequent cause of other studies in Saudi Arabia, Kuala Lumpur, Ireland, Nigeria, and Karachi is infection (6, 7, 9, 12, 15). These data are in line with the findings of our study emphasizing on the importance of infectious diseases as the most common cause of non-traumatic LOC. In our patients, most infections were due to viral encephalitis, sepsis, and septic shock. Bacterial meningitis had the lowest prevalence. According to other studies, the pattern of infection is different in each region. Two studies in Nigeria showed that the most common infection etiology is due to cerebral malaria (8, 12). Studies in different parts of India have different results in pattern of infection; in TamilNadu (southern state), respectively bacterial meningitis, tuberculous meningitis, viral encephalitis, sepsis, and cerebral malaria lead to non-traumatic

LOC (11); whereas in Srinagar (Kashmir Valley) viral encephalitis is more common than other causes (22). Further, in Chandigarh (northern Indian states), infection cause is tuberculous meningitis, viral encephalitis, and then bacterial meningitis (4). In Yemen, similar to our patients, viral encephalitis was the most frequent etiology, but after that, bacterial meningitis and cerebral malaria were most common (20). The common clinical presentations in these children were fever, seizure, and vomiting. Several studies have the same result (3, 13, 20). Most children are under two years old. Also, in Saudi Arabia (15), Pakistan (6), and England (3) and Tehran (13) the most of the children are under one year old. In Nigeria (12), and southeastern Iran (14), most of the children are 1-5 years old, like our study, 79.2% of patients are under six years old. According to these results, non-traumatic LOC is more common at an earlier age.

However, in an Indian study, non-traumatic LOC is more frequent in 5-12 year- old children (11). The mortality rate in our patients was 18.8% and is closer to Tehran (16.6%) (13), and Brazil (22.1%) (15). In England, among the 278 children experiencing non-traumatic coma, there were 21.2% prehospital deaths. An additional 23.7% of children died during their hospital admission and two late deaths following late outcome assessments at 12 months. Consequently, overall mortality is 45.6%. However, in other studies, this rate is higher; Nigeria 32.5% (12), Pakistan 35% (6), and Egypt 50% (16). In our patients similar to patients in England, Pakistan, India, and Saudi Arabia, the highest mortality was related to the infection (3, 6, 11, 15). The best outcome in our children was related to intoxication and epilepsy with no death or neurologic complication. This good outcome can be due to the duration of LOC before admission. Epileptic and intoxicated patients referred to the hospital sooner than infected patients. By analyzing patients' files, we noticed in children with more lasting prehospital duration, ICU admission, and emergency intervention like intubation or CPR at the time of admission also had higher possibility of death than others. Also, seizure status, dehydration, irritability, poor feeding, oliguria, hypotension, non-reactive pupils, low oxygen saturation, hyporeflexia, and hypotonia were significantly associated with high mortality rate. Moreover, para-clinical factors such as thrombocytopenia, neutropenia, and impaired liver function test (ALT/AST), and kidney function test (BUN/Creatinine), and high coagulation test (PT/PTT/INR) predicated poor outcomes. A study in India also implied that high mortality is related to reduced pulse volume, hypotension, abnormal respiratory pattern, abnormal pupil, absent corneal reflex, abnormal extraocular movement, papilledema, and low GCS score (22). The level of consciousness and period of consciousness impairment correlates with outcome in our patients so that the highest mortality was related to unresponsive patients and longer mental status recovery time. In unresponsive (U) children, death is 11 times more than the verbally responsive patient (V), and three times more than the painfully responsive patient (P). Nayana et al. believe GCS is a short-term outcome predictor in non-traumatic LOC and does not have any effect on the long-term outcome, and it is more related to the primary cause of LOC (23, 24). Ali et al. show a relation between GCS score and the outcome; mean GCS score recovery, complication, and death respectively are 9.3, 7, and 5.8 (15). A Nigerian study explained that GCS was not related to the outcomes of the LOC (12). In our study, the long-term consequences of a non-traumatic LOC, such as learning or mood problems, were not considered. We believe that more studies on larger populations and longer period of study duration are required.

4-1. Study Limitations

The most important limitation of the current study was lack of sufficient personal and financial resources and also limitations in access to patients' documents. Incomplete data along with short duration of investigations were also other limitations of our study.

5- CONCLUSION

Here we indicated that infections especially viral encephalitis are the most common cause of non-traumatic LOC and related mortalities. More pre-hospital delay, ICU admission, and emergency intervention like intubation or CPR, status seizure, dehydration, irritability, poor feeding, oliguria, hypotension, non-reactive pupils, low oxygen saturation, hyporeflexia, and hypotonia were considered to be significantly associated with worse clinical outcomes and more mortality rates. Moreover, para-clinical factors such as thrombocytopenia, neutropenia, raised ALT/AST, and high BUN/Creatinine and PT/PTT/INR predicate poor outcome. Taken together, we emphasize that pediatricians should pay more attention to infections by the time of non-traumatic LOC, and also the mentioned predictors help. We also believe that more studies on larger populations and longer study durations are also required.

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7- CONFLICT OF INTEREST: None.

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