

A Survey of Non-Traumatic Coma Etiology and Outcome in Iran

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Abstract

Background: The aim of this study was to assess the most common causes of Non-Traumatic Coma (NTC) and to identify outcome predictive factors.

Method: This study was performed on non-traumatic comatose children aged 2 months to 14 years old were referred to emergency wards of Birjand's Valiasr and Imam Reza hospitals from 2017 to 2018. Questionnaires including her/his clinical status, demographic data, and Para-clinic results, were completed by parents of the patients. The cause of Coma was determined based on the diagnosis of the patient's clinician.

Findings: The most common cause of coma in children were toxic causes (38 persons, 37.25%), other causes were respectively consist of infectious, congenital, neurologic, metabolic, hematologic, foreign body aspiration and malignancies. There was a significant correlation between mortality and the history of previous diseases, primary GCS, vital signs in the time of referral, pupil's size, pupil's reflex, deep tendon reflex, foot skin reflex, MCH, MCV, platelet, Calcium, PH, BUN, CRP, sonographic results and final diagnosis of the patients.

Conclusions: This study showed that the history of previous diseases, primary GCS, vital signs in the time of referral, and clinical properties such as pupil size, pupil reflex, and foot skin reflex were the most important factors had predictive value for outcome in non-traumatic unconscious pediatric patients.

Keywords: Coma; Children; Prognosis; Non-traumatic

Introduction

Consciousness has two parts: awakening, and awareness or content of consciousness. Awakening is a set of primary responses that their origin and center is in brain stalk (so called "Arm Reticular Activator System (ARAS)"). Awareness is analysis of sense impulses and its origin is in both hemispheres of brain. So, for consciousness, both brain cortex and ARAS should be active and intact. In the case of any disorder, which involves cortex of brain, hemispheres and/or brain

stalk, based on location and intensity of lesion, and type and intensity of consciousness disorder will be different [1]. Non-traumatic Coma (NTC) is an important emergency in pediatrics, and because of better response of children to treatment in comparison to adults and also higher mortality rate, in the case of inappropriate management, has a special importance. Regarding most of studies, these patients are 3-5% of all referrals to big urban emergency units.

The most important part in the assessment of patients who are affected by coma is to determine etiology and to categorize it in one or two brain structural lesions or metabolic causes [2]. A vast spectrum of factors and diseases are introduced as etiology of coma level in children. Determination of etiology of coma level and differentiation of different causes performed based on a complex of clinical signs and diagnosis methods that the most important part of all of them, is to have an exact history and clinical examination [1-3].

Determination of etiology of coma level is the most important step in selection of a systematic approach for fast detection of the disease, appropriate treatment, and prediction of clinical changes. On the other hands, determination of this etiology has an important role in prediction of prognosis [4]. Based on a general rule, recovery in the metabolic group is significantly higher than structural group. Also, prognosis in children is better than adults [4]. Moreover, a spectrum of clinical and laboratorial variables could be effective in prognosis of coma level, which should be considered. For example, approximately in all studies, prognosis of NTC is closely correlated to GCS of patients. However, this idea is not approved in the most of references and literatures [5]. Prevalence rate and importance of coma level, in different geographic area and in special age and sex groups are significantly variable. So, determination of causes of coma in different area and age and sex groups are critical and significantly help to select the most appropriate therapeutic approach. Unfortunately, studies in this field are dispersed, insufficient, and non-generalizable to patients of Birjand. Most of these studies are retrospective and are performed in a different geographical, social, and economical condition, in comparison to Iran. Limited studies are performed in Iran, which considered adult age groups that cannot be generalized to children, at all. Based on this, and as no similar study is performed in Iran, doing a comprehensive futuristic study, which assesses etiology and prognostic factors of NTC, in children of this area is critical. So, the aim of present study was to assess causes of NTC and its prognosis related factors, in children referred to emergency wards of Birjand's Emam reza and Vali ASR hospitals, between years 2017-2018.

Material and Methods

This study was a descriptive- analytical one, which performed from May 2017 to May 2018 (one year) in Birjand. After obtaining required authorities and approval of ethnicity committee of Birjand university of medical sciences (Ir.bums.REC.1396.197), all children with ages 2 months to 14 years that were referred to emergency wards of Emam Reza and Valiasr hospitals, with coma (which began 1 week before referral in maximum) and without history of trauma, were entered in the study. Children with neurologic developmental disorders and those with history of previous neurologic problems (such as mental paralysis) were excluded. After obtaining aware consent from parents of patients, a questionnaire including demographic information of patient, and also her/his clinical situation (such as body temperature, GCS, BP, RR, HR, breathing pattern, pupil reflex, foot skin reflex), and

para-clinic information (including tests of CBC, electrolytes, blood sugar, and (in the case of any need) specialized tests, as well as CXR pictures) were completed. The cause of coma were determined and recorded after evaluations and examinations, and based on the opinion of clinician. Results of the disease were categorized in the form of death, recovery, and referral to other centers, which was completely recorded for each patient. Collected data were analyzed using SPSS version 19 software. Independent T-test, Man Whitney, qui-square, and regression logistic statistical tests, were used for data analysis. $P < 0.05$ were considered statistically significant.

Results

102 children with coma were assessed in this time section. Most of them were male (55 cases, 53.9%). Means \pm SD of studied children was 2.84 ± 3.60 years. Most of their fathers had high school or lower education (32.4%), and most of their mothers had basic education or were completely illiterate (38.2%). 5.9% of children with coma and 28.4% of their patients had drug addiction. Most of children were living along with their parents (98%). Also, most of them were living in city (61.8%). Most of affected children were the second child of their family (35.3%), and their percentile weight were fewer than 3% (40.2%).

Regarding the vital signs of patients in the time of arrival, 82.4% of studied children had tachycardia, and 44.1% had tachypnea. Mean \pm SD systolic and diastolic blood pressure criteria, respectively were 91.77 ± 21.05 and 14.48 ± 55.20 mmHg. Most of parents had normal body temperature (81.4%) and mean \pm SD of body temperature was 37.20 ± 0.82 degrees.

Most of studied children had 13 or 14 GCS (38.2%). Blood oxygen saturation level in 66.7% of them was lower than normal.

Pupil size in most of patients was normal (58.8%). Pupil reflex was seen in 86.3% of patients. 96.1% of them had pupil reflex. Neck stiffness just was seen in 4 cases (3.9%). Deep tendon reflex was normal in most of children (64.7%). Foot skin reflex was flexor in 69.6% of patients.

Regarding laboratorial properties of the patients, most of studied children had leukocytosis (54.6%). 31.6% of patients were anemic and platelet was normal in 62.8% of them.

Table 1 indicates final diagnosis in patients with coma. Toxic causes are the most common causes of coma in children.

Disease group	Frequency	Percent
Metabolic	6	5.88
Toxic	38	37.25
Infections	17	16.66
Malignancies	1	0.98
Hematologic	3	2.94
Congenital diseases	17	16.66
Neurologic	9	8.82
Other	2	1.96
Undiagnosed	9	8.82
Total	102	100

Table 1: Final diagnosis in children with Coma.

51% of studied children recovered, 28.4% passed away, 12.7% leaved hospital with personal consent, and 7.8% were referred to more specialized centers.

There were a significant difference in GCS, diastolic and systolic blood pressure, heart beat rate, pupil reflex, deep tendon reflex, and foot skin reflex, between two recovered and passed away groups, in the examinations of arrival time. Table 2 shows the regression model of correlation variables with mortality rate of children with Coma.

Variable	B	SE	P Value	Chance ratio	95 CI	
					Lower	Upper
GCS	-0.21	0.09	*0.01	0.8	0.67	0.96
Systolic blood pressure	-0.01	0.02	0.66	0.99	0.94	1.03
Diastolic blood pressure	0.007	0.03	0.82	1.007	0.94	1.07
Heart beat rate	0.02	0.009	*0.03	1.02	1.002	1.03
Pupil reflex	1.12	0.98	0.25	3.07	0.44	21.03
Deep tendon reflex	0.25	0.66	0.69	1.29	0.34	4.8
Foot skin reflex	0.97	0.33	*0.004	2.65	1.37	5.13

Table 2: Regression model of variables related to disease results.

Discussion

The aim of present study is to assess the causes of Coma in children that were referred to emergency wards of Birjand's educational

hospitals. Also, determining factors which are effective on prognosis of Coma level in these children was another aim of this study.

In our study, the most important etiology of Coma in children were toxic factors, from which, the most important factor was Opium

toxicity. In the case of etiology, Coma in children have studied in several researches. In the study of Bansal and colleagues, which has performed in India, the most important etiology for Coma in children were infectious factors; especially CNS infections such as tuberculous meningitis [6]. In our study, infectious factors placed in the second position and in this case, our study differs from other studies. It seems that the most important cause of this difference is natural conditions and endemic diseases of each area. Regarding low levels of health services in countries such as India and Pakistan, and also high prevalence of some infectious diseases (such as malaria) in these countries, high prevalence of Coma due to infectious factors is logical. Mortality rate in our study was 28.4%, and the most common causes of mortality were infection diseases. Similar to what we have said for etiology, different rates have been reported for mortality, in different studies. The closest rate is reported by Ahmad, which indicated a 29% mortality rate [7]. In the study of Ogunmekan and colleagues, this rate reported to be 26% [8], and in the study of Bamsal in India, the mortality rate is higher (35%) [6]. Some studies reported significantly lower mortality rate. For example, Khodabandeh and colleagues, in their study in Iran, reported that mortality rate of children due to Coma is 16.6% [9]. In the study performed in UK, mortality rate reported to be 12%, which is the lowest reported rate in this field [10]. It seems that the differences between these rates and our reported mortality rate is due to difference in etiologies which cause Coma difference in levels of therapeutic cares, and/or probably difference in intensity of disease in the time of arrival. Based on our results, GCS evaluation could determine prognosis of Coma. This is also reported in different studies. In the study of Bansal, GCS also reported as a prognostic factor [6] that our study is an approval for this finding. Also, Ahmad and colleagues reported similar correlation [7]. Moreover, some other researchers such as Nayana and colleagues [11] has assessed the correlation between GCS and mortality due to Coma and approved what we have seen in our study.

Based on our results, primary vital signs of patients including heart beat rate, could play a role as a prognostic factor, and determine prognosis (or mortality) due to Coma. In the case of heart beat rate, our finding are in consistent with Ahmad and colleagues [7] which reported that unstable cardiovascular status and especially heart beat could be a strong predictive factor for results of disease.

Finally, it could be concluded that toxic factors are the most common causes of Coma in children of Birjand, and it is recommended to perform educational program for parents to make them aware of cares and protections related to Opium toxicity. Also, it is required for therapeutic personnel to teach them about primary vital cares and the ways to manage a child with acute poisoning.

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