



## Epidemiological and Socio-Demographic Characteristics of Children with Acute Poisoning in Northeast of Iran

Ali Alami (MD)<sup>1</sup>, Maryam Aghaei (MD)<sup>2</sup>, Sepideh Shayan Karkon (MD)<sup>3</sup>, Raheleh Derafshi (MD)<sup>\*4</sup>

<sup>1</sup>Social Medicine Department, Social Determinants of Health Research Center, School of Medicine, Gonabad University of Medical Sciences, Gonabad, Iran.

<sup>2</sup>Student Research Committee, School of Medicine, Gonabad University of Medical Sciences, Gonabad, Iran.

<sup>3</sup>Social development and Health promotion Research Center, Gonabad University of Medical Sciences, Gonabad, Iran.

<sup>4</sup>Department of Pediatrics, Medicine Faculty, Gonabad University of Medical Sciences, Gonabad, Iran.

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### ABSTRACT

**Introduction:** Acute Poisoning in the developed countries include about 2% of all childhood deaths and more than 5% cause of death in the developing countries. Poisoning usually is defined as taking a substance which can cause an organism becoming injured. The purpose of this study was to identify sociological factors that are important in improving prevention, prognosis, and management of poisoning. **Methods:** This retrospective evaluated 1200 children in the pediatric ward of the 22 Bahman hospital, Gonabad, Iran, from March 2015 to July 2018. The information about Children was recorded by individual examination of the files in standardized forms including epidemiological and demographic features for statistical analysis and data were analyzed by using the U Test Chi square, Pearson correlation analysis and variance analysis in SPSS Version 21.0.

**Results:** Acute poisoning included 2.3% of referring causes with mean age  $3.7 \pm 1.3$  years. The mean age of poisoned children was significantly lower than other children ( $p$  value = 0/002). The majority of cases were accidental poisonings with opium (ICD-10 T40.0X1) and methadone (ICD-10 T40.3X1). Most common symptoms were neurological disorders, vomiting, tachypnea and tachycardia. Common clinical symptoms in children diagnosed with poisoning include: Neurological symptoms including seizures, hallucinations, drowsiness, decreased level of consciousness and confusion (50%), nausea and vomiting (25%), tachypnea and tachycardia (7.1%). Respiratory depression, meiotic pupil, shortness of breath, cough, tears and hallucinations (3.6%) due to referring severe toxic patients to more equipped center no death was recorded in our center.

**Conclusion:** Acute poisoning is one of the most abundant emergencies in children. This study with identifying epidemiological and demographic factors of acute poisoning in children would help to improve prevention, and management of future programs.

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### Introduction

The prevalence of acute poisoning in children aged 1 to 5 years old in multiple studies differs from 0.33% to 7.6% which is associated with frequent cause of hospitalizations in emergency units and includes 80% of all poisoning cases (1).

Acute poisoning in the developed countries is blamed for about 2% of all childhood deaths, over 5% causes of deaths in the developing countries (2). Acute poisoning is most commonly observed in children at 1–5 years old specially in boys because they are more active and

**\*Corresponding author:** Raheleh Derafshi.

Department of Pediatrics, Medicine Faculty, Gonabad University of Medical Sciences, Gonabad, Iran.

**E-mail:** raheleh\_derafshi@yahoo.com

**Tel:** 09155118829

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curious for discovering the environment (3,4). More cases occur accidental at home with a single substance (5).

Drugs, petroleum products, Alkaline cleaners, Opiates, Tricyclic Antidepressants and Benzodiazepines were the most common poisoning causes in some studies (6).

The most common causes of childhood poisonings in developed world are household chemical agents and prescribed drugs, but in developing countries are substituted by agro-chemicals (7).

In khaje and et al s study, has been stated that opium poisoning is increasing from 1998 to 2008 which was due to neighboring countries (3), which is somewhat similar to our conditions in study. In one study had been shown that the fathers educational degree of narcotic s poisoned patient was lower than others (6).

For diagnosis of poisoning, it is essential to pay attention to breath odors, findings of vomitus, skin color, abnormal body temperature, autonomic nervous system findings, and seizures (8).

Poisoning usually is defined as taking a substance that can cause an organism becomes injured severely after it is ingested, inhaled, injected, or absorbed (4).

Studies have shown that the etiology and demographics of acute poisoning is different in every region or country and depends on several factors including demography, socio-economic status, education, local believes and customs; even over the time (9-11).

There are various strategies and prevention programs including education, legislation, environmental modification, and engineering techniques that can reduce poisoning rates (12).

Based on data, the medical treatment for children with poisoning is substantially costly (13).

Hospitalization is usually not required, but in some cases with clinical symptoms, it is essential to hospitalize for monitoring patients and regularly checking vital signs (14).

Acute Poisoning is most common in children and also preventable. Epidemiological factors including age, sex, socioeconomic status and patients' educational level affect the occurrence of the poisoning. The purpose of this study was to identify sociological factors that are helpful in improving prevention, prognosis, and management of poisoning

## Methods

This retrospective descriptive cross-sectional study was conducted in the children emergency unit of the 22 Bahman hospital, Gonabad, Iran, from March 2015 to July 2018. Gonabad is a county in Razavi Khorasan Province with two

districts, its population was 88753 in 2016 and only one hospital admit poisoning cases. In this observational study, 1200 children aged 2 to 12 years were admitted in the emergency ward and after informed written consent were entered in the study. The study procedure and method was accepted by the Ethics Committee (IR.GMU.REC.1396.134) before starting the study.

The information about Children was recorded by individual examination of the files in standardized forms including epidemiological and demographic features for statistical analysis. Children with allergic symptoms to food or poisoning caused by infectious agents were excluded from study.

Cases evaluated for age, sex, weight, patient education level, poison agents, and poisoning symptoms. Acute toxicity refers to harmful effects on the human body occurring following oral or dermal administration of a solitary or repetitious numerous exposures to a compound in a short time.

Poisoning was defined as the exposure to a specified type and/or chemical substance, with the pretension of biochemical reaction, functional alterations, and/or clinical signs compatible with the poisoning.

Acute poisoning mainly involves children younger than 6 years especially in boys and it is detected by physical examination and serological test. Symptoms can vary from mild to severe including behavior changes, drowsiness, severe drooling, intermittent or continuous abdominal pain, sweating, vomiting, seizure, hallucination, tachypnea, tachycardia, tear, cough, myosis and respiratory depression. In most of cases, general decontamination and supportive-symptomatic therapy was enough. Gastric lavage and hyperbaric oxygen therapy was performed in some children who had severe symptoms.

We entered all of the variables to the software program Statistical Package for the Social Sciences (SPSS), Version 21.0, and then Statistical Analysis was analyzed using the U Test Chi square, Pearson correlation analysis and variance analysis. Statistical significance was considered at  $p \leq 0.05$  and Statistical analysis was completed. The results of the study were presented by using tables of distributions for classified variables.

## Result

During the study period 1200 children, aged from 2 to 12 years, with mean age  $4.6 \pm 2.5$  years were visited in the pediatric emergency department. The patients consisted of 654 (54.5%) boys and 546 (45.5%) girls. The mean weight of

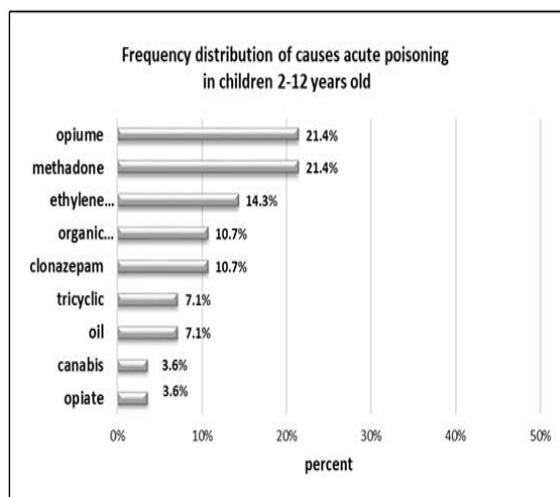
all patients was  $15.5 \pm 5.1$  (kg). The most causes of hospitalizations were gastrointestinal, respiratory and inflectional disorders in 978 (81.5%) patients. The causes for referral to the emergency room are listed in Table 1.

**Table 1:** The causes for referral to the emergency room

Cause of referring Emergency	percent
Gastrointestinal disorders	31.9% (383 case)
Respiratory disorders	30.1% (361 case)
Inflectional disorders	19.5% (234 case)
Neurological disorders	7.2% (87 case)
Nephrology disorders	6.1% (73 case)
Poisoning disorders	2.3% (28 case)
Rheumatology disorders	2% (24 case)
Bite disorders	0.5% (6 case)
Metabolic disorders	0.2% (2 case)
Other disorders	0.2% (2 case)
total	100% (1200 case)

Acute poisoning (ICD-10-CM Codes>S00-T88 Injury, poisoning and certain other consequences of external causes) included 2.3% of referring causes with mean age  $3.7 \pm 1.3$  years. Incidence rate of poisoning in pediatrics who referred to emergency department was 23 per 1000 children (separate by year was 22 per 1000 in 1395, 26 per 1000 in 1396, and 18 per 1000 in 1397). The most common age group was 2 to 5 years with 25 (89.3%) patients, followed by 5-12 years-old with 10.7% patients. There was a male predominance in poisoned children. The mean age of poisoned children was significantly lesser than other children ( $p$  value = 0/002).

The mean weight of poisoned children was  $14.1 \pm 3.2$  and significantly lesser than other children ( $p$  value = 0/027). The causes of child poisoning are shown in Figure 1.



**Figure 1:** The causes of child poisoning

The majority of cases were accidental poisonings with opium (ICD-10 T40.0X1) and methadone (ICD-10 T40.3X1). The majority of symptoms were neurological disorders (50%); following that nausea and vomiting (25%), tachypnea and tachycardia (7.1%), heavy drooling, abdominal pain, sweating, seizure, hallucination, tear, cough, myosis and respiratory depression were seen.

In this study, the mean (standard deviation) weight of children referred for acute poisoning (3.2) was 14.1 kg, which was significantly lower than children who were referred to the hospital for other reasons which was 15.5 kg. However, due to the relatively extensive research of researchers, no similar study was found to investigate the relationship between children's weight and acute poisoning. Not many studies have been done to examine the level of education and occupation of the parents of poisoned children. In our study, 10.7% of fathers and 7.1% of mothers had a bachelor's degree, and others had lower educational degrees. The highest frequency of occupational mothers of children due to poisoning is related to housekeeping (60.7%) and the lowest frequency is related to the job of employee (7.1%). Also, the frequency of working mothers was 10.7% and the frequency of self-employed mothers was 21.4%.

## Discussion

The results of this study shows a significantly high occurrence of gastrointestinal, respiratory and inflectional disorders. Also acute poisoning includes 2.3% of referring causes and the most prevalent toxic agents were opium and methadone with mean age  $3.7 \pm 1.3$  years. Due to studies, acute poisoning represent one of the most seen medical emergencies in children (15). Specification of epidemiological features of childhood poisoning is important for preventive programs and treatment plans (16). parent's awareness has high importance in programs performance (17). The poisoning agent type, symptoms and time have a vital role in the treatment procedures like ipecac induced emesis, gastric lavage and administration of activated charcoal (18,19).

Levidiotou S et al., Jennings LC et al. and Tran A et al. studies indicated gastrointestinal, respiratory and inflectional disorders are most common referring children to hospital (20-22).

The results of M. Jayashree and S. Singhi study in North India from January 1993 to June 2008 showed that Acute poisoning constituted 3.9% of total admissions and The mean age of study patient's was  $3.3 \pm 3.1$  (23). A geographic area can be the cause of this difference. R.J.Flanagana and C.Rooneyb study reported that rate of boys poisoning and death from poison is higher than girls

(24). In other study by Yan-Ran Lin reported that Nonaccidental poisoning was seen more frequently in older girls and accidental poisoning was more prevalent in younger boys ( $P < 0.001$ ) (25). That was similar to our finding. In a similar study done by S Budhathoki et al., 61.5% of patients were 0-5 years and Vomiting, Salivation and Seizure were common symptoms(5). A consecutive case series study by Nabeel Manzar and cooperators represented dyspnea was the most common symptom of acute poisoning (26).

In Southern Iran by Haghghat M observed that opium is the most common cause of acute childhood poisoning (27). A study during 2009 in the Pediatric Clinic of Pristina demonstrated that The biggest number of patients were coming from rural areas and are not well informed about the poisoning in general (28). That was similar to the result of the present study.

Our retrospective study has some limitations because was a Hospital-Based Study and some of data like exact duration of poisoning and amount of poisons are not available.

In this study, a significant relationship was seen between age and acute poisoning in children; This means that the average age of children referred to complain of acute poisoning was significantly lower than other clients. Our findings were in line with the results of the study of Mohammad Hosseini et al. As well as Rostamian et al. In these studies it is mentioned that there is a significant relationship between age and poisoning.(29,30) .

In Besharat et al.'s study, more than 80% of parents had undergraduate literacy (31). In our study, 10.7% of fathers and 7.1% of mothers had a bachelor's degree.

## Conclusion

The findings of this study show Epidemiology of Pediatric Acute Poisoning in gonabad, northeast of Iran. It is necessary that parents be educated by methods of medical education and intervention about prevention and exposure with poisoning children.

In our study, the most common cause of poisoning was non-drug cases. Also, among non-pharmacological cases, the most common cause was opium and among drug poisonings, methadone was the most common drug so educating the parents and awareness of the side effects of drugs is preventative, justify families not to use opium and narcotics to relieve local pain in children because unintentional swallowing causes apnea and in some cases causes death. It seems that educating and informing health workers can be effective in reducing the incidence of acute poisoning and its complications.

## Conflict of interest

The authors declare no conflicts of interest.

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