

Acute Poisoning in Children; a Population Study in Isfahan, Iran, 2008-2010

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Abstract

Objective: Acute accidental poisoning in children is still an important public health problem. The epidemiological investigation specific for each country is necessary to determine the extent and characteristics of the problem. The aim of our study was to elucidate the current pattern of acute poisoning among children.

Methods: The present retrospective study describes the epidemiology of acute accidental poisoning in children (less than 10 years old) admitted to the Emergency Department of two teaching hospitals during a period of two years.

Findings: Three hundred and forty four children under 10 years old were admitted to emergency department of two teaching hospitals due to acute accidental poisoning. Drugs were the most common agents causing the poisoning (58.1%), followed by Hydrocarbons (13.1%), and opioids (9.3%). Common signs were neurological (42.6%) with lethargy being the most common (39.1%). 50.6% of cases were discharged from hospital within 6-12 hours, 91.6% of them without any complication.

Conclusion: Accidental poisonings are still a significant cause of morbidity among children in developing countries. Regarding the high prevalence of pharmaceutical drug poisoning and because lethargic was the most frequent neurological sign, comprehensive toxicology screen tests should be included as part of the routine evaluation of children presenting to an ED with an apparent life-threatening event.

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Introduction

Despite various preventive measures, poisoning in children still remains an important public health matter worldwide, resulting in a large number of hospitalizations in emergency units. Poisoning accounts for about 7% of all accidents in children under 5 years and is implicated in about 2% of all

childhood deaths in the developed world, and over 5% in the developing countries^[1].

Substantial differences in socioeconomic and cultural situations in different countries cause various patterns of poisoning with different poisonous agents. These differences vary from country to country and between geographical areas within the same country.

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Previous researches indicated that a variety of social and demographic factors influence the acute accidental poisoning in children^[2,3]. Factors such as family size, socioeconomic condition, child care and place of storing poison are important.

There is a lot of data and research about acute accidental childhood poisoning from developed and developing countries^[4-6]. However, there is a scarcity of data from Iran because there is neither a national database nor any authority in charge, but individual local studies have been carried out in cities in the past^[7-12].

The main objective of our study was to determine the agents of poisoning, demographic distribution, clinical manifestations of poisoned children and to investigate the various risk factors associated with it.

Subjects and Methods

This hospital based, retrospective and non-interventional case series study was carried out at Department of Pediatrics, Alzahra University Hospital, a referral children's hospital, and referral clinical toxicology emergency department of the Noor Hospital, both in the region of Isfahan, located in central Iran, with a population of 4,815,000. The cases were included from April 1, 2008 to March 31, 2010.

The inclusion criteria were patients less than 10 years of age admitted to the two mentioned hospitals with a main diagnosis of acute poisoning based on history, practitioner's judgment or laboratory findings. All suspected poisonings were initially included, but patients were excluded from the study if the initial diagnosis of poisoning was rejected clinically or otherwise.

The information about each case was recorded in standardized forms. The occurrence of childhood poisoning was described according to time trends, age and gender of the child, route of exposure, symptoms at presentation to the emergency room, role of the child or others, and substance involved in the poisoning, duration between exposure and admission, duration of stay in the hospital, measures carried out by parents before admission, and outcome.

Statistical analysis of the data was performed using the Statistical Package for the Social Sciences (SPSS), version 15.0 (SPSS, Inc., Chicago, IL, USA). All quantitative variables were expressed as the median and standard deviation, while qualitative variables were expressed as frequencies and percentages. All treatment was given according to standard protocols, and in accordance with the Helsinki declaration.

Findings

Three hundred and forty-four patients under 10 years old were admitted to ED of two teaching hospitals due to accidental poisoning during period of two years. Complete clinical data were obtained for all of the children.

Age and sex

Of 344 intoxicated patients 174 (50.6%) were males and 170 (49.4%) females. The mean age of all these children was 3.07 ± 1.43 years. Most (89.5%) of the children were under 6 years and 10.5% were between 6 and 10 years. Children between 1 and 3 years of age accounted for 44.7% of poisonings (Table 1).

Table 1: Total number of children with accidental poisoning according to age groups

Age (year)	n (%)
<1	56 (16.3)
1-3	154 (44.6)
4-6	98 (28.6)
7-10	36 (10.5)
Total	344 (100)

Route of exposure and monthly distribution

Ingestion in 95.1% (327 cases) was the main route of exposure and then transdermal in 9 (2.6%), inhalation in 6 (1.7%) and ingestion with inhalation together in 2 (0.6%).

Autumn had the most number of poisonings with peak of 10.8% (37 cases) in august and lowest rate (5.2%) of poisoning was observed in November.

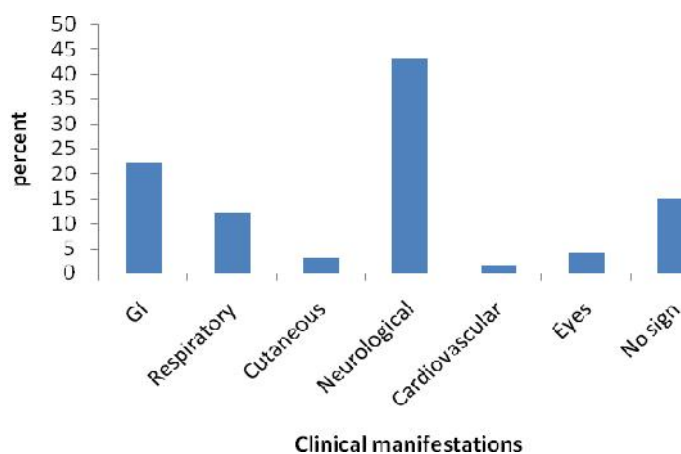


Fig. 1: Clinical manifestations of poisoning in children under 10 years

Time elapsed before admission

The mean (standard deviation) time interval to reach hospital was 6.9 ± 3.1 hours. About one half (46.2%, $n=159$) of the children reached hospital within 4 hours following poisoning and 3.2% (11 cases) of patients arrived after 24 hours.

Neurological signs were the most common (42.6%, $n=203$) complaints of children at admission, among these lethargy was the most frequent (39.1%, $n=90$) neurological sign while extrapyramidal sign had the lowest rate (1.7%, $n=4$). Gastrointestinal symptoms (vomiting or abdominal pain) were noted in 106 (22.2%) children. 71 (14.9%) patients were asymptomatic (Fig 1). In one half of the cases parents had not done any appropriate action and 44% had brought their child to a local hospital before admission to the referral hospitals. Just in 8 (2.3%) cases parents had undertaken an appropriate performance before arriving to the hospital.

Agents Involved

Drugs were the most common agents causing poisoning (58.1%, $n=200$), followed by hydrocarbons, opioids, pesticides, plants, insect stings and cleansing products (Table 2).

Duration of hospitalization and outcome

One hundred and seven (31.1%) patients were discharged within 6 hours and 170 (50.6%) cases were discharged between 6 to 24 hours. Only 63 children remained in hospital after 24 hours.

Three hundred and fifteen (91.6%) patients were discharged with full recovery, 6.7% (23

cases) were discharged with few complications and 5 (1.5%) patients died as a result of poisoning. Two of deceased children were intoxicated with drugs, two intoxicated with hydrocarbons and one with opioids.

Table 2: Agents causing acute poisoning

Agent	n (%)
Drugs	200 (58.1)
Hydrocarbons	45 (13.1)
Opioids	32 (9.3)
Pesticides	22 (6.4)
Plants	12 (3.5)
Insect stings	10 (2.9)
Cleansing products	10 (2.9)
Drug-opioid	1 (0.3)
Drug-toxin	1 (0.3)
Unknown	11 (3.2)
Total	344 (100)

Discussion

Intoxication represents one of the most frequent emergencies in childhood. Its epidemiological characteristics differ from country to country, so special epidemiological studies in each country and each region is necessary to determine how this health problem can be prevented. Many studies have revealed that children under 5 years are particularly at risk for accidental poisoning^[1-3]. The results of our study showed that children below 5 years of age included about 84% of

poisonings in children under 10 years. Similar to the findings in USA about 60% of children were under three years of age and slightly more than one half (50.6%) were boys^[2,3].

Consistent with reports published by Toxic Exposure Surveillance Systems of the American Association of Poison Control Centers (TESS) database and National Health Interview Survey (NHIS) the most common route of poisoning in children was by the way of ingestion^[13]. It seems that higher prevalence of ingestion in this age group is related to their attitude in putting small foreign objects into the mouth.

Poisonous agents show geographical variations influenced by economical status. In developed countries, poisoning mostly happens because of drugs, cosmetics and beauty products, household cleansing products and alcohol, while for developing countries, where the economy is based on agriculture, common causes of poisoning are hydrocarbons, pesticides, traditional medicines and mushrooms^[14-17]. As reported by previous studies, drugs are the most poisonous agents in children^[2,3,18]. Similar to other studies in EMR region approximately 58.1% of the poisonings in our surveillance involved medications^[10,19]. Acetaminophen, vitamins, benzodiazepine and antibiotics which are the most accessible drugs in homes, were the most common causes of drug-related poisonings. The other common agents involved in accidental poisoning were hydrocarbons and opioids. According to a study in north Iran, opium was the most frequent cause of poisoning in children under 4 years of age and medications were more common in patients older than 4 years^[19]. Moreover other studies in Iran show higher prevalence of opioid poisoning in comparison with other countries^[12,19]. In contrast to other studies household products were not common among children in the present study.

According to our retrospective search in emergency unit the most admissions due to child poisoning were in August, in which children in Iran spend more time in closed places and their home.

Although gastrointestinal symptoms and psychological signs have been reported as the most frequent complaints of children poisoning in other studies, our study revealed that neurological signs including lethargy and unconsciousness are the main causes of children's arrival to ED^[10,12].

About one half of the patients presented within four hours following poisoning and about 81 percent of the patients have been discharged in the first 24 hours.

The rate of mortality in our surveillance was 1.5% which in comparison to similar studies is relatively high^[20]. Maybe the higher mortality rate in our study is related to the fact that our study population consisted of hospitalized patients and poisonings not requiring hospitalization were not accounted. The mortality rate concluded from our study is almost similar to the rate reported by Abdollahi et al about acute poisoning in Tehran, Iran^[17].

Considering that most of children had no life-threatening symptom and could be discharged by short term observation, it seems that it is not necessary to refer all cases of poisoning to the pediatrics or clinical toxicology center.

Our study has some limitations. It was done retrospectively. So, it is possible that the exact types of drugs have not been noted in patients' records.

Conclusion

Frequency of accidental poisoning and mortality rate is relatively high in Isfahan. Regarding to high prevalence of pharmaceutical drugs poisoning and because lethargy was the most frequent neurological sign, comprehensive toxicology screen tests should be included as part of the routine evaluation of children presenting to an ED with an apparent life-threatening event.

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Conflict of Interest: The authors declare that they have no competing interests.

References

1. Jepsen F, Ryan M. Poisoning in children. *Curr Paediatr* 2005;15(7):563-8.
2. Franklin RL, Rodgers GB. Unintentional Child Poisonings Treated in United States Hospital Emergency Departments: National Estimates of Incident Cases, Population-Based Poisoning Rates, and Product Involvement. *Pediatrics* 2008;122(6):1244-51.
3. Centers for Disease Control and Prevention(CDC). Nonfatal, unintentional medication exposures among young children: United States, 2001-2003. *MMWR Morb Mortal Wkly Rep* 2006;55(1):1-5.
4. Nhachi CF, Kasilo OM. The pattern of poisoning in urban Zimbabwe. *J Appl Toxicol*. 2006;12(6):435-8.
5. Izoura GI, Adeoye A. A seven year review of accidental poisoning in children at a military hospital in Hafr Al Batin, Saudi Arabia. *Ann Saudi Med* 2001;21(1-2):13-5.
6. Obafunwa JO, Busutil A. Deaths from substance overdose in the Lothian and border region of Scotland(1983-91). *Hum Exp Toxicol*. 1994;13(6):401-6.
7. Motlagh ME, Nazari Z. Epidemiologic study of pediatric poisoning in Amir Kabir and Abozar Hospital of Ahwaz in the year 2000. *J Legal Med Islamic Rep Iran* 2002;27(8):39-42. [In Persian]
8. Nasir Mohtaram S, Forghan Parast K. A survey on accidental poisonings in children admitted to 17-Shahrivar Hospital (Rasht,1989-90). *J Med Faculty Guilan Uni Med Sci* 1995;15-14(4):18-21. [In Persian]
9. Kadivar M, Javadinia N, Nemati N. A Survey on opium and its derivatives poisoning in children's hospital medical center. *J Med Council Islamic Rep Iran* 2000;18(2):100-106. [In Persian]
10. Sabiha Sahin, Kursat Bora Carman, Ener Cagri Dinleyici. Acute Poisoning in Children; Data of a Pediatric Emergency Unit. *Iran J Pediatr* 2011;21(4):479-84.
11. Cheraghali F, Taymori M. Epidemiological study of drug toxication in children. *Acta Med Iran* 2006;44(1):37-40.
12. Hosseini F, Sedighi I, Saba S, et al. Changes of epidemiological indices of children intoxication during a 10-period I Hamadan Province. *Iran J Toxicol* 2007;1(3):117-120.
13. Polivka BJ, Elliott MB, Wolowich WR. comparison of poison Exposure Data: NHIS and TESS Data. *J Toxicol Clin Toxicol* 2002;40(7):839-45.
14. Bronstein AC, Spyker DA, Cantilena LR Jr, et al. 2006 Annual Report of the American Association of Poison Control Centers' National Poison Data System. *Clin Toxicol(Phila)* 2007;45:815-917.
15. Wananukul W, Shriapha C, Tongpoo A, et al. Human poisoning in Thailand: the Ramathibadi Poison Center's experience (2001-2004). *Clin Toxicol(Phila)* 2007;45:582-8.
16. Eddleston M. Patterns and problems of deliberate selfpoisoning in the developing world. *QJM* 2000;93(11):715-31.
17. Shadnia S, Esmaily H, Sasanian G, Pajoumand A, Hassanian-Moghaddam H, AbdoUahi M. Pattern of acute poisoning in Tehran-Iran in 2003. *Hum Exp Toxicol* 2007;26(9):753-6.
18. Azkunaga B, Mintegi S, Salmón N, et al. Poisoning in children under age 7 in Spain. Areas of improvement in the prevention and treatment. *An Pediatr (Barc)* 2012 [In Press]. [Abstract]
19. Bataineh HA, Bataineh AM. Childhood Accidental Poisoning in Tafila. *Iran J Pediatr* 2007;17(1):479-84.
20. Gauvin F, Bailey B, Bratton SL. Hospitalizations for Pediatric Intoxication in Washington State, 1987-1997. *Arch Pediatr Adolesc Med* 2001;155(10):1105-10.