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Patterns of Acute Poisoning in Childhood and Relative Factors in Zahedan, Southeast Iran.

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Abstract:

Background: Acute poisoning, a common pediatric emergency, is one of the important causes of morbidity and mortality in children, especially in developing countries. Thousands of unwary children under the age of five years are poisoned accidentally every year throughout world.

Material & Methods: This cross-sectional study included children with acute poisoning admitted to Ali ebn-e Abitaleb hospital of Zahedan. All cases of poisoning, except for food poisoning, in patients under 17 years old presenting to Pediatrics Emergency Department (PED) from April 2008 to April 2009 were selected. The information about each case was recorded on standardized forms. Complete epidemiological and clinical data were obtained for 147 patients.

Results: The mean age of all poisoned patients (mean ± SD) was 2.93 ± 3.05 years, and the age range was 0.12 to 14 years. Of these, 59 children (86.8%) were under five years of age. Slightly more boys than girls were poisoned at ages of more than 10 years (8.5% vs. 4.68%). The majority of all cases were due to accidental poisoning (86.8% of all poisoning), which occurred mostly in children under five years old (93%). Medications (37.41%), kerosene (23.12), opium/hashish (17.68%), agricultural pesticides (6.8%), unknown substances (5.44%), and caustic/corrosive substances (4.76%) were the most frequent poisoning

agents. The frequency distribution shows that the majority of parents of poisoned children had below grade school levels of literacy (84.6%), while only 6% of parents had collegiate literacy.
Conclusion: Most of the poisonings were due to accidental ingestions by infants and primary school age children, without any gender predilection. Medications (especially benzodiazepines), opium/hashish, and kerosene were the most commonly ingested agents. The majority of parents of poisoned patients had below grade school levels of literacy, so early awareness of poisoning and appropriate therapeutic measures taken would appear to be efficacious in reducing the incidence of acute poisoning and the mortality rate.

Keywords: Acute Poisoning, Childhood, Medications, Kerosene, Opium.

Background:

Poisons are materials capable of causing adverse effects in living beings. Chemical poisons are divided into two groups: those that come into direct human contact (foods and their additives, medications, cosmetics) and those that are not meant for human contact (household or domestic products, industrial products. agricultural pesticides, petroleum products, and non-pharmacological herbs).

Poisoning is injury or death due to a toxic substance. The extent of injury depends on the amount of the poisonous material, the extent of absorption and distribution, and the innate power of the poison. Poisonings may occur through local absorption (eyes, skin, lungs, or GI tract), systemic absorption, or through both routes.[1]

Acute poisoning is the most common pediatric emergency and cause of mortality among children in developing countries.[1, 2] Annually, thousands of children under 5 years of age are accidentally poisoned worldwide, and almost 5% of all poisonings are in this pediatrics age group.[3] Different studies show that poisoning in the pediatric population accounts for 0.23 to 3.3 percent of all poisonings.[2, 3] Seventy percent of acute poisoning occurs in the pediatric population and 90% of these poisonings are easily preventable.[4, 5] Other studies show that poisoning is the cause of 28% of emergency unit referrals.

Typically, 95 to 97% of poisonings are accidental [7], which is the most common case for children under 5 years of age (45-75%). In this age group, boys are more frequently affected.[2, 7, 8] In infants under 1 year of age, the most common cause of poisoning is medical error (74.2%).[2] Intentional poisoning is more common in those above 13 years of age, occurs more often in girls (70%) than in boys, and is mostly due to medications or domestic products.[8]

In pediatrics, poisoning is most commonly due to various medications, hydrocarbons such as kerosene, bleaching powders, agricultural pesticides, cosmetics, and insecticides.[3] In recent decades, due to increased production of washing powders and new medications, an increase in poisoning has been seen due to these products.[3, 7] According to some of the previous studies, medications were the most common cause of pediatric poisoning and among medications, benzodiazepines, anticonvulsives, and antidepressants were more the most prevalent poison causes.[2, 8] Some studies from Iran showed that after poisoning with

medications, the second cause of poisoning was ingestion of kerosene, which is more common in cold seasons (30%) [8], and contact with domestic chemicals (15 to 20% of cases).[2,8]

The occurrence of poisoning varies among different populations according to their culture, knowledge, education, and socioeconomic status.[7] Although a high prevalence of acute poisoning occurred among the pediatric population, none of the previous studies was retrospective. Therefore, none went through patients' records to include level of education, knowledge, and ages of their parents, which could be important variables affecting the prevalence of poisoning. In the present study, our aim was to determine the correlation between prevalence of acute poisoning in children with the age and level of education of the parents, in addition to the frequency and demographic data of the pediatric population referred to emergency units. This would allow us to reduce the occurrence of poisonings by educating the parents about keeping poisonous materials, especially hashish, medications, and petroleum products, out of children's reach and about not self-prescribing medications for their children.

Material and Methods:

This observational, descriptive, cross sectional study with secondary data analysis had the aim of determining the frequency of acute pediatric poisoning in pediatric patients referred to Ali ebn-e Abitaleb hospital in a one year period (April 2008 – April 2009). The study population consisted of patients below 17 years of age who were referred to the emergency department with acute poisoning other than food poisoning.

We collected demographic data of individual patients and information about their parents' ages and levels of education through special forms. The information about the child's poisoning included: place and type of poisoning, season, route, duration of poisoning from the poisoning up to reaching hospital, type of primary care before reaching hospital, antidote treatment, admission and death and was entered on a special form.

Data were analyzed using SPSS software version 17 and a P value of less than 0.05 was considered significant. We used descriptive methods (mean and standard deviation) to analyze frequency. Correlation between quantitative means was determined using a Pearson and correlation between qualitative variables was determined with a chi-square test. We also used the Fisher exact test.

Results:

Patients included in the study were 147 children with complete clinical and epidemiologic information. Boys were more numerous than girls (56.4%). The mean age of all poisoned patients (mean ± SD) was 2.93 ± 3.05 years, and the age range was 0.12 to 14 years. The mean age of the boys was 2.97± 3.33 and for girls was 2.86 ± 2.69 . No significant correlation was noted between gender and poisoning.

In total, 87 percent of the children (81.7% of the boys and 90.6% of the girls) were under 5 years age. In those above 10 years of age, poisoning instances were more numerous in boys (8.5%) compared to girls (4.68%). The majority of all cases were due to accidental poisoning (86.8% of all poisonings), which occurred mostly in children under five years old (93%). A total of 12.4% were intentional and 2.4% were due to medical error. The most common route of poisoning was ingestion (96.6%) and in 3.4% (under 5) poisoning was due to inhalation of toxicants such as CO gas and hashish.

The most common causes of acute poisoning were medications (55 patients; 37.41%), kerosene (34 patients; 23.12), hashish (26 patients; 17.68%), agricultural pesticides/insecticides (10 patients; 6.8%), unknown causes (8 patients; 5.44%), and corrosives (7 patients; 4.76%). Benzodiazepines were the most common cause of poisoning due to medications (57.6%), followed by tricyclic antidepressants (35.5%) and palliative medications (10.5%). Tramadol was the cause in 10.5% and unknown medications in another 10%. One poisoning case was due to carbon monoxide (CO, 0.6%). Table 1 shows the frequency of causes of poisoning in relation to age.

In total, 96.6% of the poisonings occurred in the home, 2.7% occurred outside (in alleys, parks, etc.) and the remaining 0.7% occurred either in clinics or hospitals.

The most common season for poisoning was in the autumn (40.1% of the cases), followed by winter (23.1%), summer (19.7%), and spring (17%). No significant correlation was observed between the season and poisoning ($p>0.05$).

No hospital admission was needed for 64.6% of the patients and all of the cases were observed for six hours in an emergency room. Overall, 11.6% of the patients were admitted to the pediatric ward, and of these, 3 patients (3%) were admitted to the pediatric intensive care unit due to severe complications (respiratory distress).

In total, 55.6% of the patients did not need any intervention such as gastric lavage or antidote administration. In 26.2%, charcoal or naloxan was used and 17.2% underwent gastric lavage.

During the one year period of the study, only three patients (2% of all poisonings) died and all of these deaths were due to kerosene ingestion in children less than 5 years old. The cause was dysrhythmia in two of these children.

In the present study, 96.3% of the parents brought their children to emergency after 3 hours, while 4.6% brought them in during the following 1 to 3 days.

The mean age of the father was 33.98±9.08 years (minimum 20, maximum 70) and mother's age was 29.98±7.08 (minimum 17 and maximum 50 years). The frequency distribution showed that the majority of parents (especially the mothers) of poisoned patients had literacy below grade school level (84.6%), while only 6% of parents had collegiate literacy(table 2).

Table 1: The frequency of causes of poisoning in relation to age

Age	Medications	Kerosene	Hashish	Pesticides	Unknown	Corrosives	Cristal	Alcohol	Carbon monoxide	total
0-4	46(36.3%)	30(23.6%)	25(19.7%)	9(7.1%)	4(3.1%)	6(4.7%)	2(1.6%)	2(0.8%)	1(0.8%)	172
5-9	4(33.2%)	3(25%)	1(8.3%)	1(8.3%)	2(16.7%)	1(8.7%")	0	0	0	12
10-14	5(71.5%)	1(14.3%)	0	0	1(14.3%)	0	0	0	0	7
total	55(37.41%)	34(23.12%)	26(17.68%)	10(6.8%)	8(5.44%)	7(4.76%)	4w(2.72%)	2(1.37%)	1(0.6%)	147

Table 2: Level of education of the parents in the study

Education	Mother	Father	Total
Illiterate	48	37	85
Elementary	35	38	73
Guidance	8	10	18
High school	27	28	45
College	7	13	20

Discussion:

In the previous studies, the mean ages of the poisoned patients were 5.5-5.96 years.[2, 3] In our study, the mean age was 2.93 ± 3.05 years, which is lower than in the previous studies. The most prevalent (63.3%-80%) age group for poisoning events was children under 5 years of age, which is the same as seen in previous studies (2,3,6,9-11). A high prevalence of poisoning has been reported in the 2 to 6 year age group (3,12-14) and one study reported the highest prevalence in children under 2 years of age.[5] In our study, the most common age group was children under 5 years age, which accounted for 87% of our studied population. The high prevalence in this age group can be due to concomitant initiating of walking, sense of curiosity, and checking everything by placing objects in their mouths and noses.[3, 15]

Examination of patient gender, as previously reported, indicated that poisoning was more common in boys than in girls (52.3%-66.4%).[2, 3, 5, 12, 13, 16] The ratio of acute poisoning in boys compared to girls was 1.5.[11, 12] This can be due to boys being more active and more curious than girls.[2, 15] We saw the same results in our study (56.4% were cases of poisoning in boys). It is worth mentioning that even poisoning in children above 10 years of age was more common in boys (8.5%) compared to girls (4.68%). Only one study, conducted in Turkey on children 10 years of age, showed more poisoning in girls (79%).[2]

Previous reports have shown that the most common route of poisoning is accidental (59.9-95%) especially in those under 5 years of age [2, 5, 13, 14, 17] and 5% are intentional, especially in those above 10 to 12 years of age.[2, 5] In one study, the rate of intentional poisoning was as high as 20.2%.[13] In our study, 86.2% of poisonings were accidental and 12.4% were intentional. In similar studies, 75-96.8% of the cases of poisoning were due to ingestion of poisonous material.[2, 3, 13, 14] In our study, ingestion was the cause in 96.6% of the cases.

In our study, the most common causes of poisoning were medications, kerosene, hashish, pesticides and insecticides, unknown sources, and corrosives. In most of the studies in Iran, the cause was medications or hydrocarbons.[2, 3, 5, 6, 8, 9, 14, 16, 17] According to previous reports, the most common causes of acute pediatric poisonings were medications (42-60%), kerosene (19.28-31.2%), food poisoning (10.9%), and organophosphorus pesticides (7%).(2,3,5,8,9,14,16). In our study, there was one case of CO poisoning (0.6%), which was a lower incidence than some previous reports (2.2%–9.4%).[2,5] One study from Kermanshah, Iran reported a CO poisoning rate of 0.5%.[17]

Hashish was the cause of poisoning in 17.68% of the patients, which is different from a report from Tehran, Iran that indicated a rate of 3.65%, but which is close to the result of a study from Babul, Iran where the rate was 21.4%.(5, 14) One of the reasons for the high number of poisonings by hashish is that we share a common border with Afghanistan and Pakistan and these materials are easily

available. For this reason, we need to educate parents about not using drugs and also to keep drugs out of their children's reach.

In a similar report from India, kerosene was the most common cause of acute pediatric poisoning, while medication was the cause only in 7.3% of the cases.[12] This may reflect socioeconomic differences in the different geographies, as most people in India use hydrocarbons as fuel and use lower amounts of pharmaceutical medications, turning instead to herbal remedies. In another report from New Delhi in 2002, unlike the previous reports, the most common poisoning cause was washing or bleaching materials (47.03%), followed by medications (21.8%).[13] In our region and in some other areas in Iran where hydrocarbons are still the primary fuel consumed, hydrocarbons are still the most common cause of poisoning after medications. The most common reason for ingestion of hydrocarbons, especially kerosene, is that it is colorless, like water. Poisoning due to kerosene can be avoided by adding non-harmful colorants to kerosene.

Among poisonings due to medications, the most common cause reported has been anxiolytic drugs.[3] Another study indicated that the most common causes were anticonvulsives drugs, thyroid hormones, benzodiazepines, and palliative drugs.[13] One study in Tehran found that the most common medications involved in poisonings were benzodiazepines, antidepressants, and anticonvulsives.[5] In another study in Babul, benzodiazepines (17.1%) were the most common cause of acute poisoning due to medications, followed by nonsteroidal anti-inflammatory drugs (NSAIDs), oral contraceptive pills (OCPs), metoclopramid, anticonvulsives, and antihistamines.[14] In our study, benzodiazepines were the most common cause of acute poisoning due to medications (57.6%). In one study in Turkey, palliative drugs (23.7%) or a mixture of multiple medications (21.6%) were the most common causes of medication poisoning.[3] In previous reports, tricyclic antidepressants were the causes in only 2.9-9.6% of poisoning cases, while in our study they were the most common cause next to benzodiazepines (35.5%).

According to one study, in the 0-4 year age group, the most common cause of poisoning was bleaching powders (53.29%) and kerosene (43.52%). In the 5 to 9 year age group, the most common cause was bleaching powder (54.54%) and food (36.36%).[3] In our study, in all age groups, medications and kerosene were the most common causes. No correlation was found between age and type of poison ingested.

In our study, 96.6% of poisonings occurred at home, 2.7% outside the home (i.e., in alley, parks, etc.), and 0.7% in clinics or hospitals. In other reports, 89% to 93.3% of poisonings happened at home.[3, 17] The most common season in which poisoning occurred was autumn in our study (40.1%), while in Babul and Kermanshah this was summer (33.7 to 34.6%).[14, 17] In another study in Turkey, spring was the most common season for poisoning incidents (32.7%) [3]

The mortality due to acute poisoning in our series was 3 cases (2% of all cases),

which was more than the rate reported in two similar studies (0.4% to 0.98%).[2, 5] It is worth mentioning that the actual number of deaths in both reports was the same as in our study (3 patients). A report from Kermanshah city indicated 4 deaths (2.4%), which all were due to acute complications of kerosene ingestion, as in our report.[17]

Our results showed that for 69.3% of the cases, the childen were brought to a hospital within 3 hours, which was more than reported in a similar study (50.9%).[3] In relation to care given to patients, 86.5% of cases in one study were managed as outpatients and 13.5% were admitted due to severe complications.[5] Different studies show that most pediatric poisonings do not need specific measures.[3] In another study, 65.1% of the patients were discharged with only minor primary care measures.[17] In our study, the need for intervention was higher compared to other reports at (43.4%). Charcoal/ naloxane was administered in 26.2% of our patients and 17.2% of the patients underwent gastric lavage. In one study, the need for gastric lavage in severe poisoning cases was 48.7 %.[3]

Our results showed that most of the parents, and especially the mothers, had low levels of education (elementary school only) (66.4% of mothers and 59.52% of fathers). Only 5.6% of mothers and 10.31% of fathers had college education. According to our results, a relationship exists between the parents' level of education and the occurrence of pediatric poisoning. Since the level of education in this study was lower in the mothers and since mothers are those who take primary care of children at home, they should be educated regarding care and prevention of lethal injuries to their children at home.

Conclusion:

Most of the poisonings in children were due to accidental ingestions in infancy and at the primary school ages, without any gender predilection. Medications (especially benzodiazepines), opium/hashish, and kerosene were the most commonly ingested poisoning agents. The majority of parents of poisoned patients had below grade school levels of literacy, indicating that training in early awareness of poisoning and appropriate therapeutic measures would be efficacious in reducing the incidence of acute poisoning and mortality rate. We also need additional prospective studies for more careful evaluation of the causes of acute pediatric poisoning.

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