Acute Poisoning in Children

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Abstract

Background: Childhood poisoning continues to challenge the diagnostic and treatment skills of the pediatrician. Generally, childhood poisoning can be attributed to suboptimal parental supervision and accessibility of products with poisoning potential.

Objective: To evaluate the pattern of acute poisoning in children with relation to different age groupings.

Methods: Pediatric patients hospitalized for acute poisoning at the Soroka Medical Center over a 5 year period (1994–98) were evaluated retrospectively. Special attention was given to poisoning in relation to age groupings.

Results: During the years 1994–98 a total of 1,143 children were admitted for acute poisoning to the Soroka Medical Center. The majority of cases occurred in children aged 2–5 and 14–18 years. Males under 14 had a higher frequency of poisoning, the poisoning usually being unintentional, whereas poisoning in females occurred mostly in the 14–18 age group and was intentional. Drugs were the most common agent of poisoning in infants (0–1 year), in older children (10–13 years), and in adolescents (14–18 years), while in children aged 2–5 and 6–9 years either cleaning products or drugs were the usual agents of poisoning. Most poisonings in children aged 2–13 occurred between 4 and 8 p.m., and for most adolescent patients (14–18 years old) between 4 p.m. and midnight. Poisoning in children aged 2–13 were usually due to accessible home products, and to medicinal errors such as overdose and improper drug administration.

Conclusions: This study defines the characteristic pattern of pediatric poisoning with respect to different age groups and gender. Unintentional childhood poisoning predominated in males and occurred mostly because of accessible home products and suboptimal parental supervision during critical hours of the day. Most adolescent poisoning occurred in females and was intentional. Parental education and intensified child supervision are indicated measures of prevention for unintentional poisoning.

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Childhood poisoning is a major problem for health authorities and is responsible for serious morbidity with mortality risks [1]. Toxic exposure has become one of the most common causes of acute medical illness in many countries [2], although data pertaining to the magnitude of poisoning in children in Israel are limited. This study was designed to investigate the pattern of childhood poisoning with respect to different age groups and gender, and toxic agent category.

Patients and Methods

The hospital medical records of all children admitted to the pediatric emergency ward during the years 1994 98 for acute poisoning were collected retrospectively. Children were divided into five age groups: 0–1 year, 2–5 years, 6–9 years, 10–13 years, and 14–18 years. Each group was characterized for the following variables: nature of poisoning (unintentional or intentional), instances of poisoning, type of poisoning agent, gender distribution, time of poisoning, and season of the year.

Results

The study covered a total of 1,143 cases of pediatric poisonings; 76% were self-referred and the remainder was referred by health professionals. The annual frequency of poisoning admissions to the pediatric emergency ward is about 0.9% of all pediatric admissions. Most cases (>85%) occurred in the patient's own home. Ingestion accounted for 92% of exposure routes, followed by dermal and ocular exposures. The data were collected for 1,119 patients (24 children were excluded due to incomplete data). Of the children in the study group 74.6% lived in urban areas and 25.4% resided in rural locations.

Figure 1 shows the gender and age distribution of these cases. For groups under 14 years there were more cases of poisoning among males than females (male:female ratio 2.2:1), whereas females predominated for ages 14–18 (female:male ratio 2.3:1). Most poisoning incidents occurred in children aged 2 5 years (39.41%), followed by the 14 18 age group (28.23%). Unintentional poisoning was the cause of intoxication in all children under 14 years, while 84% of the poisoning cases in the 14–18 age group were intentional The frequency of reported poisoning incidents according to age group is shown in Table 1. Drugs and cleaning agents were the most common causes of poisoning. Drugs were a more significant agent of poisoning in infants aged 0–1 years old ($\chi^2=6.4$, $P<0.011$), children 10–13 years old ($\chi^2=8.5$, $P<0.003$), and 14–18 years old ($\chi^2=180.2$, $P<0.0001$) than cleaning products (the second most common agent of

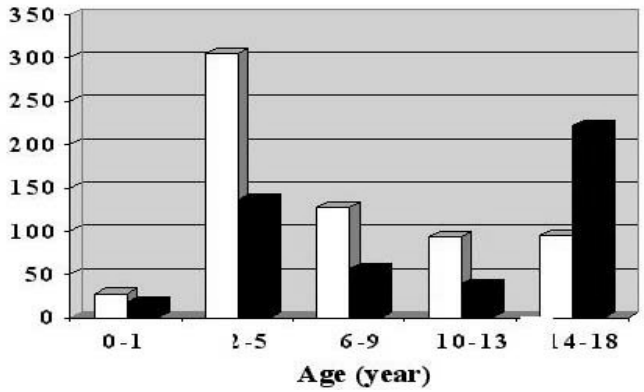

Figure 1. Age and gender distribution of 1,119 children hospitalized with poisoning. □ = male, ■ = female.

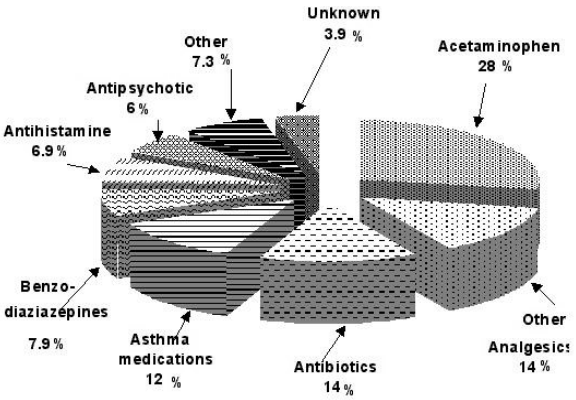

Figure 2. Frequency (%) of intoxication for various types of drugs

Table 1. Frequency (%) of reported cases of poisoning by various agents in relation to age

Poisoning agent	0–1 yr	2–5 yr	6–9 yr	10–13 yr	14–18 yr
Drugs	60.86	41.49	27.7	48.48	77.84
Cleaning products	26.08	50.11	37.50	26.51	7.91
Pesticides	–	3. 85	14.67	10.60	6.95
Petroleum products	–	3.17	12.50	11.36	0.94
Others*	13.04	1.36	7.6	3.03	6.32

* Includes plants and toxic animals.

Table 2. Distribution of cases of poisoning (%) by age and time of day

Age (yr)	8 a.m.–12 p.m.	12 p.m.–4 p.m.	4 p.m.–8 p.m.	8 p.m.–midnight	midnight –8 a.m.
0–1	82.6	10.9	6.5	–	–
2–5	20.4	19.7	57.1	2.7	–
6–9	18.5	20.1	53.8	7.6	–
10–13	7.6	15.1	74.2	3	–
14–18	7.6	10.1	37.6	40.8	3.8

poisoning for these age groups). Cleaning products were as common an agent of poisoning as drugs in children aged 2 5 years ($\chi^2=3.57, P<0.058$), and 6 9 years ($\chi^2=2.70, P<0.10$).

Table 2 shows the distribution of poisoning cases according to age and time of day. Most of the poisoning cases (82.6%) in the 0–1 age group were observed during the morning hours from 8 a.m. to 12 p.m. ($\chi^2=25.32$, $P<0.0001$), whereas the majority of cases among those aged 2–5, 6–9, and 10–13 years occurred between 4 p.m. and 8 p.m. ($P<0.0001$). In adolescent patients (14–18 years old), poisoning occurred either between 4 p.m. and 8 p.m. or between 8 p.m. and midnight, as compared to other times of the day ($P<0.0001$). A greater number of poisonings were observed to occur in spring for children aged 0–1 ($P<0.0001$), 6–9 ($P<0.005$), and 14 18 ($P<0.0004$), whereas in children aged 10–13 a significantly higher rate of poisonings occurred in winter ($\chi^2=34.12$, $P<0.0001$). For the 2 5 age group, most poisonings were observed to occur in summer and autumn, as compared to other seasons ($P<$ 0.02).

Figure 2 shows that the most common drugs contributing to poisoning incidents included acetaminophen (28%), antibiotics (14%), other analgesics (14%), and asthma medications (12%). Acetaminophen was the dominant agent of intentional poisoning in adolescents, whereas asthma medications and other analgesics accounted for unintentional poisoning among young children.

Only in 327 cases (for the 0–13 age group) were data regarding the circumstances of unintentional poisoning reported in the medical history. In 246 cases (75.2%) accessible home products or drugs with poisoning potential were unintentionally taken. In 52 (15.9%) cases there was an error in dosage of a medication, leading to overdose, and in 29 (8.8%) cases an incorrect drug was given by a member of the child's family. None of the patients aged 14–18 years, who belonged to the group of intentional poisoning, was aware of the toxicity and potentially lethal effect of the material ingested. Fifty-two children were admitted to the pediatric intensive care unit, most of them with pesticide intoxication and scorpion bite. The only fatality in the study period was reported for a 4-week-old infant who died from potassium permanganate intoxication and secondary bacterial infection.

Discussion

Acute poisoning in children is a major problem for health authorities worldwide and is responsible for serious morbidity with mortality risks [1,3]. In 1981, the Israel Poison Information Center was consulted on 5,992 cases of poisoning, of which more than 50% were children below the age of 6 [4]. In the 1997 Annual Report of the American Association of Poison Control Centers, children younger than 6 years of age were involved in 52.5% of human exposure cases [5]. The AAPCC reported that in this age

AAPCC = american Association of Poison Control Centers

group, cosmetics and cleaning agents were the substances most frequently involved in pediatric poisoning [5].

The results of our study suggest that acute poisoning is mostly unintentional in young children, while intentional in adolescents, and that the rate of poisonings for children under 14 years is higher for males than females, whereas it is higher for females in the 14 18 age group. These statistics are consistent with other studies. In a study of acute poisoning in Teheran, Abdollahi et al. [2] observed that 54.4% of poisoning cases in children under 12 years of age occurred in boys. Petridou et al. [6] found that in children under 4 years of age poisoning was 50% higher among boys than girls, but was reversed in older children with the figures for females rising. In their study in the Sofia region, Milev and Mikhov [7] reported that the number of suicide attempts by poisoning in children under the age of 14 was ten times higher among girls than boys. However, other authors have found a clear increase in suicide rates for male as compared to female adolescents for the same age group [8,9].

Our findings indicate that the majority of poisoning cases occurred in the 2–5 and 14–18 year ranges, and suggest age and gender patterns for both groups. The peak rate of poisoning in children aged 2–5 appears to be due to the interaction of increased activity and the lack of proper parental supervision, which increases vulnerability. In contrast, adolescent intentional poisoning (most suicide attempts) is the major cause of poisonings for the 14–18 age group.

The data also indicate that most cases of poisoning in the age range 2 18 years occurred between 4 and 8 p.m. These are high risk hours for young children who are usually awake and very active and might be left unsupervised by their parents. We also noted with interest that suicide attempts in adolescents occurred mainly in the spring.

In our study, medicinal products were the main agents of unintentional childhood poisoning and intentional adolescent poisoning, which is consistent with other studies [2,7,10 13]. Household cleaning products were also common agents of poisonings, but were a less common mode of intentional poisoning for the adolescent patients. It is interesting that these adolescent patients were not aware of the potential toxicity of the ingested medicinal compounds.

To conclude, unintentional childhood poisoning would appear to be due mainly to accessible home products, suboptimal supervision, and errors in drug administration. "Chemical" child abuse must be considered in the case of unintentional poisoning and in certain cases of intentional adolescent poisoning. In view of some of these data, it seems that greater parental supervision and education can reduce pediatric poisoning.

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The man who makes no mistakes does not usually make anything.

Edward Phelps,
British speech made at Mansion House 1899