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Evaluation of poisoning cases admitted to the pediatric emergency clinic retrospectively

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Abstract

We aimed to analyze the demographic and epidemiologic features of the acute poisoning cases admitted to the pediatric emergency department. We evaluated 439 cases aged 18 and under applied to Ondokuz Mayıs University Medical Faculty Pediatric Emergency Department between 01/01/2019 and 01/01/2020 retrospectively. The mean age of patients was 7.5±6.39 years.242(55.1%) patients were female. Intoxications were most common in winter season (36.4%) and most seen with caustic corrosive substances. Of the poisoning agents, 35.5% (n:156) were nonpharmacologic and 57.4% (n:252) were pharmacologic agents. In poisonings with pharmacological agents, central nervous system drugs were the most common, while caustic-corrosive substances were most common in nonpharmacological poisonings. While caustic corrosive substances are in the first place in poisonings between the ages of 0-5 (47.4%), in the 5-11 age group; carbon monoxide (25%) and in the 11-18 age group; multiple drug poisonings (15%) were most common observed. Naphthalene intoxication was seen in 4.8% and alcohol was in 4.5%, higher than the literature. In our study, it was observed that alcohol use was high among young people in our region. Also, it is observed that naphthalene poisoning was in high rate. We believe that this study will guide the measures to be taken.

Keywords: adolescents, childhood, pediatric emergency, poisoning

1. Introduction

Poisoning is when a substance is taken into the body through the skin, eyes, mouth, respiratory or vascular access, causing toxic symptoms and sometimes even life-threatening (1). Poisoning is among the preventable causes of mortality and morbidity in children. Among the causes of death between the ages of 1-14, poisoning ranks first in developed countries, and comes after respiratory tract infections and gastroenteritis in developing countries such as our country (2, 3). Mortality from poisoning is four times higher in low- and middle-income countries than in high-income countries (4). The global death rate from poisonings for children younger than 20 years is 1.8 per 100 000 population (5).

While the annual frequency of intoxication caused by accident and suicide is between 0.02-0.93% in developed countries, it is known that this rate is 0.46-1.57% in Turkey (6). We decided to investigate pediatric poisonings in our area retrospectively because we thought that alcohol and naphthalene poisoning was high among the pediatric emergency admissions in our hospital and there were not enough studies about them.

Approximately two-thirds of all poisonings occur in childhood. Children under 6 years of age constitute 55% of all pediatric and adult cases and 80% of pediatric cases (7). Poisoning varies geographically according to different socio-cultural and environmental risk factors. Drugs given by parents in the first 1 year of age, drugs kept in closets at the age of 3-5, and suicidal poisoning in school age and adolescence are common (5).

In this study, we aimed to retrospectively evaluate intoxication cases brought to our hospital's pediatric emergency service.

2. Materials and Methods

Ethics committee approval for the study was received from Ondokuz Mayıs University Ethics Committee (2020/411) on 13/07/2020. This study was conducted in accordance with the International Ethics and Declaration of Helsinki.

439 patients who applied to the Pediatric Emergency Service of the Ondokuz Mayıs University Faculty of Medicine in Turkey between 01/01/2019 and 01/01/2020 and whose hospital records could be accessed were evaluated retrospectively. The cases were evaluated in terms of age, gender, month of application, cause of poisoning, application complaint, treatment applied and prognosis. Drugs causing intoxication were grouped to determine their properties.

All patients under 18 years of age and considered intoxication were included in the study. Food poisoning, snake poisoning, allergic reactions and by-drug reactions that can be considered within the scope of toxicology were not included in the study. After a thorough evaluation by the principal investigator, children with suspected intoxication without a clear etiology were also excluded from the study.

All poisoning cases were consulted with the Poison

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Information Center, and if necessary, gastric lavage was performed and / or activated charcoal was given. It was administered if the agent causing the poisoning had an antidote. The routes of exposure of the patients were oral or inhalational. According to the examination and vital signs after admission, the child was admitted to the emergency or intensive care units.

Our patients were categorized in 4 classes according to age groups as 0-2 years, 2-5 years, 5-11 years, 11-18 years.

2.1. Statistical Analysis

SPSS (Statistical Package for Social Sciences for Windows v.21.0 SPSS (Chicago, IL, USA)) program was used for statistical evaluation. Data are given as numbers and percentages.

3. Results

A total of 439 cases whose ages were between 0 and 18 years (mean 7.5±6.39 years) and whose records were available were evaluated. The ratio of poisoning cases to all emergency admissions was 1.2%. 55.1% of the patients were female patients and the male: female ratio was 0.81. According to age groups, the proportion of boys between the ages of 2-5 (41.7%) was higher, while girls were more between the ages of 11-18 (43.8%). The most common age group for poisoning was 11-18 years (Table 1).

Table1. Distribution of the cases by age group and gender

	0-2 age n (%)	2-5 age n (%)	5-11 age n (%)	11-18 age n (%)	Total n (%)
Male	43 (21.8)	82 (41.7)	12 (6.1)	60 (30.4)	197 (44.9)
Female	49 (20.2)	75 (31)	12 (5)	106 (43.8)	242 (55.1)
Total	92 (21)	157 (36)	24 (5.4)	166 (37.6)	439 (100)

35.5% (n:156) of the cases were poisoned with non-pharmacological agents and 57.4% (n: 252) of them were with pharmacological agents (Table 2, 3). Central nervous system drugs were the most common (13.2%), antidepressants were the most common among pharmacological agents (7.2%), while multiple drug intoxications were in the second order (7%). Paracetamol poisoning was in third place (3.8%) grouped among analgesics (Table 2). Caustic-corrosive substances were the most common in non-pharmacological intoxications (13.2%), followed by naphthalene (4.8%) and alcohol intoxication (4.5%) (Table 3). In 31 patients (7.1%), the cause of poisoning could not be evaluated due to missing data records.

Considering the time of application according to the season (January-February-March are called winter, April-May-June are spring, July-August-September are summer, October-November-December are autumn), intoxications were seen most frequently in winter (36.4%) and with caustic corrosive substances. The autumn was in second place and poisoning with nonsteroidal anti-inflammatory drugs was the most common in this season (Table 4).

In current study, while poisoning with caustic corrosive substances was in the first place (34.7%) between the ages of 0-2, naphthalene poisoning was the second (6.52%). Caustic corrosive substances were again most common (12.7%) between the ages of 2-5, naphthalene intoxication was the second (8.2%), and paracetamol poisoning was also common in this age group (6.3%). In the 5-11 age group, poisoning with carbon monoxide (25%) and caustic corrosive (20.8%) substances was common. Multiple drugs (15%) and antidepressant (12.6%) poisonings were observed between the ages of 11-18. Alcohol intoxication was seen in 12% of this age group (Table 5).

Table 2. Pharmacological factors caused poisoning

Agent	n	(%)
Central nervous system drugs	58	(13.2)
Antidepressants	32	(7.2)
Antipsychotics	18	(4.1)
Antiparkinsonian drugs	4	(0.9)
Amitriptyline	1	(0.2)
Psychostimulants	3	(0.6)
Antiepileptics	12	(2.7)
Antihypertensives	7	(1.6)
Antibiotics	6	(1.3)
Antigribals	14	(3.1)
Analgesic-antipyretics	29	(6.6)
Ibuprofen	4	(0.9)
Paracetamol	17	(3.8)
Salicylate	8	(1.8)
Nonsteroidal anti-inflammatories	23	(5.2)
Antihistamines	5	(1.1)
Antidiabetics	3	(0.6)
Hormone-containing drugs	12	(2.7)
Cardiovascular system drugs	12	(2.7)
Vitamin-minerals	7	(1.6)
Respiratory system drugs	6	(1.3)
Gastrointestinal system drugs	10	(2.2)
Iron-containing drugs	11	(2.5)
Musculoskeletal system drugs	6	(1.3)
Myelorexanes	1	(0.2)
Colchicine	5	(1.1)
Multiple drug intake	31	(7)
Total	**252**	**(57.4)**

24.1% of the poisoning cases were caused by suicide, and 75.9% were caused by accident. Suicidal poisoning was more common in girls (79.2%) and multiple drugs were the most taken drugs, followed by antidepressant and antiepileptic drugs. Child psychiatry consultation was requested for all patients who took drugs for suicidal purposes.

A poison counseling center was called for all poisoning cases and when necessary, gastric lavage was performed and activated charcoal was given. In the follow-up of the patients,

it was determined that 97.5% were hospitalized in the emergency department and 2.5% in intensive care. There were no cases that resulted in death.

Table 3. Non-pharmacological factors caused poisoning

Agent	n	(%)
Mushrooms	11	(2.5)
Pesticide-insecticides	9	(2)
Carbon monoxide	13	(3)
Caustic-corrosive substances	58	(13.2)
Mercury	4	(0.9)
Alcohol	20	(4.5)
Opiate	5	(1.1)
Detergents	1	(0.2)
Antiseptics	1	(0.2)
Hydrocarbons	32	(7.3)
Naphthalene	21	(4.8)
Thinner	8	(1.8)
Other	3	(0.6)
Plants	2	(0.4)
Total	**156**	**(35.5)**

Table 4. Distribution of poisoning cases according to the seasons and the most common factors

Season	Most common factor	Total number of patients / most common factor n (%)
Winter	Caustic corrosive substance	160/21 (36.4%)
Spring	Caustic corrosive substance	96/13 (21.8%)
Summer	Caustic corrosive substance	84/16 (19.1%)
Autumn	Nonsteroidal anti-inflammatories	99/11 (22.5%)

Table 5. The most common causes of poisoning by age

Age	The most common factor	Number of Cases / Total number of patients (n) (%)
0-2 years	Caustic corrosive substance	32/92 (34.7%)
2-5 years	Caustic corrosive substance	20/157 (12.7%)
5-11 years	Carbon monoxide	6/24 (25%)
11-18 years	Multiple drug intake	25/166 (15%)

4. Discussion

The purpose of the study was to evaluate poisoning cases in our rural area and calling attention to common poisoning agents.

In acute poisonings, which constitute a significant part of emergency admissions, early diagnosis and treatment are of great importance because of the high mortality and morbidity rates when intervened late (8).

Poisoning in the first year of life is usually caused by parental mistakes. Intoxications between the ages of 1-5 are caused by unconscious and careless parents leaving the drugs or other toxic substances in the reach of children and not following their children closely enough or keeping them in containers that do not belong to them. The children aged 12-19 are mostly caused using drugs or substances for suicide purposes (1).

In our study, the average age of the patients was 7.5 years. Poisoning in children under six years of age constitutes approximately 80% of childhood poisonings (7). The reason for this those children at this age are very active, inquisitive, curious about learning and try to recognize every item they find by putting them in their mouths (9). In the multicenter study conducted by Dayasiri et al. (10) on 1621 children, 80% of the children were under five years old. In the study of Berta et al., (11) 72.9% of the children were under four years old. In another multicenter study conducted on 2154 children, 67% of children were younger than four years (12). In current study, it was found that 57% of the cases were under 5 years old. In our study, the smallest case was a 22-day-old baby and the mother accidentally prepared and drunk formula with water containing descaler and intoxication occurred. Another youngest patient was a one-month-old baby, and he was poisoned by his older brother because he took a motility-reducing drug containing diphenoxylate and atropine sulfate.

Gender factor is important in intoxication cases. Most studies have shown that the cause of poisoning is mostly accidents and that poisoning cases in children are most common in boys between the ages of 1-5, and in adolescents when drugs taken for suicide are more common in girls (12). In our study, the male/female ratio was found to be 0.8. When grouped by age, the ratio of boys/girls for 0-5 years old was one, after the age of 11 this ratio was found to be 0.6. In the study of Berta et al. (11) 55% were male and Dayasiri et al. (10) the ratio of males was 60%.

When all our cases were evaluated, it was seen that the poisoning occurred because of an accident in 75.9% of the cases and suicide in 24.1% of the cases. In literature it is reported that 85% of poisonings were accidental, 10.6% therapeutic error, 2.3% suicide attempt and 1.5% recreational (11). In current study suicidal poisoning in adolescent girls was found to be frequent, consistent with the literature (n=84) (male/female ratio 0.27) (13). It made up 79.2% of the total suicide cases (n=106) and it was mostly by their own antidepressant drugs or by multiple drug poisoning. The high rate of suicide in girls may be related to their early maturity, emotional behavior, pressure, and intense psychological conflicts during adolescence.

The most common factors that increase the possibility of poisoning in our country are small children are often left at home alone, with a sibling or friend, and medicines and cleaning agents are kept within easy reach of children. In addition, the low level of education and unconsciousness of the families is another reason for this. It is thought that

increasing the level of education, packaging the medicines and cleaning materials in protected packages, and keeping the cleaning materials in their own packaging will significantly reduce poisoning.

We observed that poisonings were most common in winter and then autumn months compared to other seasons. Like our study, Biçer et al. (14) showed that, poisoning was most common in winter and autumn months, while Kösecik et al. (15) found most frequently seen in spring and summer. In another study, no seasonal differences were found in poisoning cases (16).

In our study, while poisoning with caustic corrosive substances was the most common (34.7%) between the ages of 0-2, naphthalene poisoning was the second (6.52%). Caustic corrosive substances were again most common (12.7%) between the ages of 2-5, naphthalene poisoning was the second place (8.2%), and paracetamol poisoning was also common in this age group (6.3%). Among the children in the 5-11 age group, the most common poisonings were carbon monoxide (25%) and then caustic corrosive (20.8%) substances. In the age group of 11-18 years, the most common intoxications with multiple drugs (15%) and intoxications with antidepressants (12.6%) were observed. Alcohol intoxications occurred in 12% of this age group and 4.5% of all intoxications, and this rate was higher than the literature. In a study conducted by Biçer et al. (14) from Istanbul, the rate of alcohol intoxication was found to be 1.14%, and in a study conducted in Konya, it was found to be 1.4% (17). In our study, drug poisoning rate was 3% of 11-18 age group children and 1.1% among all children. In a study conducted by Yazar et al. (18) from Konya, this rate was 2.8%.

In current study, the high rate of poisoning with naphthalene was remarkable and was higher than the literature (4.8%). In the study of Biçer et al. (14) naphthalene intoxication rate was found to be 1.5%.

57.4% (n:252) of the cases were poisoned with non-pharmacological agents and 35.5% (n:156) were poisoned with pharmacological agents. Biçer et al. (14) and Çam et al. (19) found drugs in the first place among the intoxication agents (44.9%). In the study of Berta et al. (11) non-pharmacological agents (59%) were the most common, and household cleaning products were the most common among them, while pharmacological agents constituted 41% of poisonings. Among the pharmacological agents, analgesics (20.8%) were the most common, followed by psychotropics (18.2%) and cardiovascular drugs (12.6%). Dayasiri et al. (10) reported that, the most common poison was kerosene oil, followed by paracetamol. In the study of Mintegi et al. (12) conducted from Spain, 54.7% of the cases (the most used drug paracetamol) included local products in 28.9%, alcohol in 5.9%, carbon monoxide in 4.5% and illegal drugs in 1.5%.

Among the non-pharmacological intoxication agents, caustic-corrosive substances (13.2%) took the first place, followed by naphthalene (4.8%) and alcohol intoxication (4.5%), respectively. The rate of mushroom poisoning was 2.5%. In a similar study conducted in our region, the rate of naphthalene poisoning was 6.09% and the rate of mushroom poisoning was close to our study (3.65%) (20). Naphthalene poisoning is rare in children due to its pungent odour, taste, insolubility in water, and poor absorption from the gastrointestinal tract. The small size and coloration of naphthalenes may attract the attention of children and cause accidental ingestion. It results from intravascular hemolysis. Supportive therapy includes transfusion of packed red blood cells, if needed, monitoring of fluid and electrolyte balance, and administration of alkalis (21).

Central nervous system drugs were the most common cause of intoxication with drugs and among these, antidepressants (7.2%) followed by multiple drug intake (7%) and analgesic-antipyretic (6.6%). Çam et al. (19) and Ağın et al. (22) reported that central nervous system (44.6%, 45% respectively) and analgesic-antipyretic drugs (15.7%, 26.3% respectively) were the leading agents. In the study of Biçer et al., (14) analgesics took the first place (22.3%) and the second was antidepressants (16.9%). In the study of Boran et al. (23) central nervous system drugs took first place among drugs (41.2%), while analgesics (20.2%) were the second.

The first treatment in poisoning is the emergency patient approach protocol (ABCD). In addition, giving specific antidotes for the poisoning agent, changing its metabolism, or increasing its excretion from the body, preventing its absorption, and treating the symptoms are other treatment methods (18). It is of great importance to apply to a health institution as soon as possible when poisoning is exposed or when this situation is noticed. Early initiation of the treatment process is directly proportional to the reduction in mortality and morbidity. Applications such as gastric lavage and drinking activated charcoal are highly effective in the first hour. In our study, most of the patients were referred and gastric lavage and activated charcoal application were performed before they arrived. The mortality rate of intoxication cases ranges from 0.1% to 3.9% (24). While there were some patients presenting with colchicine intoxication, which is known to have high mortality, none of our patients died, 11 patients were followed up in intensive care. The average follow-up period of all cases was 1 day.

One of the limitations of our study is the use of secondary data based on patient treatment forms, which prevents us from controlling the quality of information recorded in medical records. So, we could not determine the time between the time of poisoning and the emergency application.

In conclusion, significant progress has been made in the treatment of poisoning, but the most valid method is preventive measures. For this, these are recommended; family education, keeping drugs or toxic substances out of the reach of children and not putting them in bottles that do not belong to them, producing boxes and lids that cannot be opened by children, placing warning labels on drugs, increasing the number of poisoning centers and increasing the number of health personnel trained on poisonings.

In current study, it was observed that alcohol use was at a high level among the youth in our region. In addition, it is seen that naphthalene poisoning is higher than the literature. Alcohol use among adolescents is alarming. We believe that this study will guide the measures to be taken.

Conflict of interest

None.

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Ethics committee approval for the study was received from Ondokuz Mayıs University Ethics Committee (2020/411) on 13/07/2020.

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