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## Evaluation of poisoning cases admitted to pediatric emergency department

Gamze Gokalp

Izmir Katip Celebi University, Faculty of Medicine, Department of Pediatric Emergency, Turkey

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### ABSTRACT

**Background:** Every year, more than one million children lose their lives due to preventable accidents. Poisoning is the most common among these accidents.

**Objective:** In this study, we investigated the demographic and clinical characteristics of poisoning cases referred to the pediatric emergency department.

**Methods:** The cases (0–18 years old) related to complaints of intoxication in the pediatric emergency department between January 1, 2017, and December 31, 2017, were examined retrospectively.

**Results:** The study included 453 patients, with 202 (46.4%) female and 233 (53.6%) male patients. The mean age of the patients was 51.12 months. The most frequent poisoning agents were 211 (46.6%) household cleaning products and 172 (38%) drugs. When the mechanism of poisoning was examined, it was determined that 377 (83.2%) cases were accidental and 47 (10.4%) cases were suicide attempts. It was observed that 286 (45.8%) items were not in original packaging and 95% of those in original packaging were not locked.

**Conclusion:** To avoid childhood poisoning that may have widespread and serious consequences, the poisonous products should be sold with locked covers and kept in places where children cannot reach them.

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### 1. Introduction

More than 1,000,000 children die worldwide every year due to preventable accidents. The major causes of death are traffic accidents, burns, drowning, and poisoning. Considering the data from all over the world, poisoning accounted for 15% [1–3]. According to the World Health Organization (WHO), in 2012, 350,000 individuals, 45,000 of whom are under 20 years of age, lost their lives due to poisoning [4]. This rate was 0.5 per 100,000 population in developed countries and 2 per 100,000 population in developing countries [5].

The number of patients who were admitted to the pediatric emergency services with poisoning was very high, and studies have shown that 85% of them are nontoxic. When causes of poisoning in childhood are questioned, chemicals such as prescription/nonprescription drugs, household cleaning products, gas oil and thinner,

toxic gases, and insecticides and pesticides are found to be the most common ones [6]. Also, the type, concentration, dose and the means of exposure of the substance, and simultaneous additional poisonings, along with child's underlying illnesses, nutritional status, socioeconomic status of the family, family size, parental education level, the amount of care given to the children by their parents, and genetic grounds of the cases, are also considered while evaluating the patients [7–9]. In addition, the time passed between the transportation of patients to a medical center and interventions performed is important for the long-term prognosis of patients.

Therefore, we conducted this study to highlight the precautions to be taken by revealing the incidence of childhood poisoning in Turkey, which is a public health problem that may lead to such serious consequences, and identifying the risk factors.

### 2. Method

This study was considered to be a retrospective observational descriptive study. Available information about all cases (between 0 day and 18 years old) with a complaint of poisoning in the

E-mail address: [drgamzegokalp@gmail.com](mailto:drgamzegokalp@gmail.com).

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pediatric emergency department of a tertiary training and research hospital between January 1, 2017, and December 31, 2017, was included in the study. The term “poisoning” refers to the exposure of the organism to an undesirable xenobiotic or undesirable dose of toxic substance. The applicants with a nonpoisoning complaint and those who lacked data were excluded from the study. The data were accessed from the automation system of the hospital. The approval was obtained from the local ethics committee. The type and dose of the substance based on the case, access to the substance use, symptoms at the time of admission, physical examination findings, laboratory data, length of hospital stay, and the taken treatment were investigated.

### 2.1. Statistical method

The data were analyzed by SPSS 20.0 statistical package program. In the descriptive statistics of the data, ratio, frequency, mean, standard deviation, median, and minimum and maximum values were calculated. The distribution of variables was measured by the Kolmogorov-Smirnov test. The cases were divided into two groups: (1) Accidentally poisoned and (2) attempted suicide. The relationship between the groups was analyzed by chi-square analysis and Fisher's exact test, when chi-square assumption was not achieved. To evaluate the risk factors, the Pearson Correlation analysis was performed, and the effect levels were evaluated using univariate and multivariate logistic regression analysis;  $P < 0.005$  was considered to be significant.

## 3. Results

The study was conducted in a pediatric emergency department in a tertiary training and research hospital, which also provided services for pediatric trauma and pediatric poisoning cases. A total of 181,254 patients between 0 day and 18 years old were admitted to the pediatric emergency department during the 1-year study period. About 1233 (0.7%) of these patients were admitted with the complaint of poisoning. Cases with lacking data that were accessed via hospital automation system were excluded from the study; hence, a total of 453 cases were studied. Of these 453 patients, 202 (46.4%) were female and 233 (53.6%) were male. The mean age of the patients was  $51.12 \pm 53.59$  months (2–204 months) (Table 1).

The examination of exposed agents revealed that 211 (46.6%) cases had poisoning with household cleaning products, 172 (38%) cases with drugs, 23 (5.1%) cases with insecticides and pesticides, 15 (3.3%) cases with inhaler toxic gases, 11 (2.4%) cases with cosmetics, and 8 (1.8%) cases with narcotics (Table 2). The most common substances revealed among home cleaning products were corrosive substances ( $n = 150$  33.1%), secondly noncorrosive detergents ( $n = 43$  9.5%), and thirdly volatile hydrocarbons ( $n = 18$  4%). After examination of the drugs exposed, it was found that

**Table 2**  
Ingested substances.

|                                             | N          | %           |
|---------------------------------------------|------------|-------------|
| <b>Substance exposed</b>                    |            |             |
| <b>Drugs*</b>                               | <b>160</b> | <b>35.4</b> |
| Drugs affecting the cardiovascular system   | 20         | 4.4         |
| Drugs affecting the CNS                     | 44         | 9.6         |
| Analgesic                                   | 41         | 9.2         |
| Drugs affecting the gastrointestinal system | 15         | 3.3         |
| Drugs affecting the respiratory system      | 8          | 1.8         |
| Drugs affecting the endocrine system        | 14         | 3.1         |
| Antibiotics                                 | 8          | 1.9         |
| Vitamins                                    | 6          | 1.3         |
| Iron supplements                            | 2          | 0.4         |
| Antineoplastics                             | 2          | 0.4         |
| <b>Detergents*</b>                          | <b>211</b> | <b>46.6</b> |
| Corrosive substances                        | 150        | 33.1        |
| Volatile hydrocarbons                       | 18         | 4.0         |
| Noncorrosive detergents                     | 43         | 9.5         |
| <b>Inhalant toxic gases*</b>                | <b>15</b>  | <b>3.3</b>  |
| <b>Alcohol and derivatives*</b>             | <b>12</b>  | <b>2.6</b>  |
| <b>Insecticides*</b>                        | <b>23</b>  | <b>5.1</b>  |
| <b>Cosmetics*</b>                           | <b>11</b>  | <b>2.4</b>  |
| <b>Narcotics*</b>                           | <b>8</b>   | <b>1.7</b>  |
| <b>Unknown*</b>                             | <b>13</b>  | <b>2.9</b>  |
| <b>Total</b>                                | <b>453</b> | <b>100</b>  |

\*:The bolds ones are the group's names show the total number and percentage of the supgroups below.

analgesics accounted for 41 (9.1%) cases, drugs that affect the central nervous system (antidepressants, antipsychotics, and sedative-hypnotic agents) accounted for 42 (9.2%) cases, and drugs that affected the cardiovascular system accounted for 20 cases (4.4%) (Table 2). When the mechanism of poisoning was examined, it was revealed that 377 (83.2%) patients had accidental poisoning and 47 (10.4%) patients attempted suicide with self-poisoning. When the exposure route was examined, it was revealed that 410 (90.5%) patients had poisoning through oral route and 19 (4.2%) patients through inhalation. Meanwhile, it was observed that 427 (94.8%) patients had poisoning for the first time. When the place of poisoning accident was questioned, it was found that 425 (93.8%) cases occurred in the house, 330 (72.8%) of these occurred in the kitchen, and 34 (7.5%) occurred in children's room. It was revealed that most poisoning cases were accidental. When it was investigated whether taken substances were in their original packages or not, it was found that 286 (45.8%) substances were not in their original package (Table 3). Moreover, it was found that 95% of the substances in original packages were without locked lids.

A total of 407 (89.8%) patients were brought to the emergency department by parents. On admission to the emergency department, 76 patients (16.8%) had poisoning symptoms and 30 (6.9%) had pathological findings on physical examination (total number of cases with abnormal vital signs and pathological findings in systemic physical examination). It was found that the median period passed between poisoning and the first intervention in the emergency department was  $60 \pm 20.4$  min (2–204 min). The examination of treatments provided in the emergency department showed that 116 (25.6%) patients were treated with gastric lavage, 140 (30.9%) patients with active carbon, and 9 (2%) patients were treated with specific antidote (Table 3). Gastric lavage was performed in conscious patients, who had been exposed to an agent with serious toxicity and admitted to ED less than an hour after the poisoning. Five patients were exposed to paracetamol and N-acetyl cysteine as an antidote, and 4 patients were exposed to organic phosphorus and atropine and pralidoxime as an antidote. No patients received detoxification by extracorporeal routes. When the length of stay in the emergency department was investigated, it

**Table 1**  
Gender and age groups.

|               | N   | %    |
|---------------|-----|------|
| <b>Gender</b> |     |      |
| Female        | 202 | 46.4 |
| Male          | 233 | 53.6 |
| Total         | 453 | 100  |
| <b>Age</b>    |     |      |
| 0–12 months   | 84  | 18.5 |
| 12–36 months  | 185 | 40.8 |
| 36–72 months  | 72  | 15.9 |
| 72–144 months | 41  | 9.1  |
| >144 months   | 48  | 10.6 |
| Unknown       | 23  | 5.1  |

**Table 3**  
Characteristics of the group.

|                                                             | N   | %     |                                                                                 | N   | %    |
|-------------------------------------------------------------|-----|-------|---------------------------------------------------------------------------------|-----|------|
| <b>Cause of poisoning</b>                                   |     |       | <b>Who brought the child to emergency service?</b>                              |     |      |
| Accidentally                                                | 377 | 83.2  | Parents                                                                         | 407 | 89.8 |
| Dose error                                                  | 2   | 0.4   | Others**                                                                        | 28  | 6.1  |
| Suicide attempt                                             | 47  | 10.4  | Unknown                                                                         | 18  | 4.1  |
| Unknown                                                     | 18  | 4     | Total                                                                           | 453 | 100  |
| Others <sup>†</sup>                                         | 9   | 2     | <b>Is there any symptom associated with poisoning?</b>                          |     |      |
| Total                                                       | 453 | 100   | Yes                                                                             | 76  | 16.8 |
| <b>The way of poisoning</b>                                 |     |       | No                                                                              | 358 | 79.0 |
| Per-Oral                                                    | 410 | 90.5  | Unknown                                                                         | 19  | 4.2  |
| Inhalation                                                  | 19  | 4.2   | Total                                                                           | 453 | 100  |
| Trans dermal                                                | 2   | 0.4   | <b>Is there any findings in physical examination associated with poisoning?</b> |     |      |
| Ocular                                                      | 4   | 0.9   | Yes                                                                             | 30  | 6.9  |
| Unknown                                                     | 18  | 4     | No                                                                              | 404 | 89.2 |
| Total                                                       | 453 | 100   | Unknown                                                                         | 19  | 4.2  |
| <b>Is it the first poisoning that a child has ever had?</b> |     |       | Total                                                                           | 453 | 100  |
| Yes                                                         | 427 | 94.8  | <b>Has gastric lavage applied in ED?</b>                                        |     |      |
| No                                                          | 8   | 1.8   | Yes                                                                             | 116 | 25.6 |
| Unknown                                                     | 18  | 4     | No                                                                              | 318 | 70.2 |
| Total                                                       | 453 | 100   | Unknown                                                                         | 19  | 4.2  |
| <b>Where is the poisoning?</b>                              |     |       | Total                                                                           | 453 | 100  |
| At home                                                     | 421 | 92.9  | <b>Has active carbon applied in ED?</b>                                         |     |      |
| In the kitchen                                              | 330 | 72.8  | Yes                                                                             | 140 | 30.9 |
| In the bedroom of parents                                   | 5   | 1.1   | No                                                                              | 294 | 64.9 |
| In the bedroom of children                                  | 34  | 7.5   | Unknown                                                                         | 19  | 4.2  |
| In the living room                                          | 26  | 5.7   | Total                                                                           | 453 | 100  |
| In the garden                                               | 14  | 3.1   | <b>Has any antidote applied in ED?</b>                                          |     |      |
| In the bathroom                                             | 16  | 3.5   | Yes                                                                             | 9   | 2.0  |
| In the school                                               | 3   | 0.7   | No                                                                              | 425 | 93.8 |
| In a restaurant                                             | 3   | 0.7   | Unknown                                                                         | 19  | 4.2  |
| Others*                                                     | 8   | 1.8   | Total                                                                           | 453 | 100  |
| Unknown                                                     | 18  | 4     | <b>What happened to the patient?</b>                                            |     |      |
| Total                                                       | 453 | 100   | In ED <6 hours                                                                  | 106 | 23.4 |
| <b>Is the product in the original container?</b>            |     |       | In ED 6–24 h.                                                                   | 129 | 28.5 |
| Yes                                                         | 131 | 24.12 | >24 hours in PW                                                                 | 191 | 42.2 |
| No                                                          | 286 | 45.81 | PICU                                                                            | 7   | 1.5  |
| Unknown                                                     | 36  | 30.07 | Unknown                                                                         | 20  | 4.4  |
| Total                                                       | 453 | 100   | Total                                                                           | 453 | 100  |

ED:Emergency Department. PICU: Pediatric Intensive Care Unit.PW: Pediatric Ward  
<sup>†</sup>: attract attention, wonder, good taste

\*: Play garden, in a vehicle (bus, car and plane), in the garage, in the bussiness \*\*: Grand parents, teachers, baby sitters.

was revealed that 106 (23.4%) cases were observed for shorter than 6 h, 129 cases (28.5%) for 6–24 h, and 191 cases (42.2%) were observed for longer than 24 h in pediatric wards. Seven (1.5%) cases required pediatric intensive care support (Table 3). None of the cases resulted in exitus. The mean observation time of patients who were under observation for more than 24 h was determined to be 50 ± 26 h (max. 168 h), and the median observation time of patients who needed intensive care and whose observation time varied between 2 and 50 days was determined to be 2 days.

It was detected that as age decreased, the observation length is prolonged ( $p = .04$ ), the rate of being symptomatic is increased ( $p = .008$ ), and the number of pathological findings is increased on physical examination ( $p = .11$ ). There was no significant correlation between the place of poisoning accident, symptomatic status of patients at the time of admission, abnormal findings of physical examination, and the packaging of the taken substance. However, there was a positive and moderate correlation between the symptomatic status of the patients and abnormal findings of physical examination ( $p < .001$ ,  $r = 0.5$ ).

According to the logistic regression model, it was found that the

probability that a patient will be under observation for longer than 24 h is increased 3.99 times by taking a prepartate containing iron, 1.18 times by taking a sedative-hypnotic agent, 5.97 times by being symptomatic during admission, 3.8 times by the presence of a laboratory abnormality, and 6.4 times by the administration of activated carbon (Table 4).

When we examined the cases by dividing them into two groups – accidentally poisoned (group 1) and attempted suicide with self-poisoning (group 2) – it was found that the number of female patients and mean age of patients were significantly higher in group 2 ( $p = .001$ ;  $p < .001$ ). It was found that patients of group 2 were more symptomatic and had a longer length of observation period ( $p = .002$ ,  $p < .001$ ). Moreover, it was found that patients of group 2 had mainly poisoning with drugs ( $p = .001$ ). Patients of group 1 had poisoning in the house, mainly in the kitchen ( $p < .001$ ) (Table 5).

The detailed characteristics of 8 patients who needed intensive care follow-up are given in the table. Two of them were admitted to the emergency care unit due to poisoning with narcotic substance and received general supportive care until normalization of consciousness that was abnormal due to a low GCS. Four of them were admitted to the emergency department after taking organic phosphate insecticides by oral route; after their general condition was normalized by providing supportive treatments and administering active carbon, atropine, and pralidoxime, they were discharged from the hospital. Meanwhile, one patient was poisoned due to the inhalation of butane gas for pleasure. The gas passed to the ventricular fibrillation and caused cardiac arrest; hence, resuscitation was provided. After postresuscitation period of the 50-day follow-up in the intensive care unit, the patient was discharged from the hospital with severe neurological sequelae (Table 6). This patient was completely normal initially, but later became dependent on mechanical ventilator with tracheostomy and turned into a vegetative form.

#### 4. Discussion

The aim of this study was to investigate the demographic and clinical characteristics of patients admitted to the emergency department due to poisoning. The examination of the literature showed that there were similar conducted studies. This subject has been examined often because it is undoubtedly a serious problem in terms of community health. Especially in case of accidental poisonings, the small age is considered to be a risk factor. When the distribution of poisoning cases in the literature was examined based on the gender and age, it was observed that male children were more exposed to accidental poisonings at younger ages, whereas a higher rate of intentional poisonings was observed in girls of puberty age [10–12]. For example, per Ahmed et al.'s study based on the examination of the prevalence of poisoning in Qatar, 44.42% of patients were younger than 5 years and 54.2% were male. Similarly, according to the study by Mansorini et al., 71.4% of patients in Iran were younger than 5 years and 57.1% were male. On the other hand, Hassan et al.'s study found that 83% of patients in Egypt were younger than 6 years old and 56.3% were male patients [10–12]. However, in some other studies conducted in Ethiopia and Nigeria, although the mean age of about 65.5 months was not so large, a higher rate of poisonings was observed in female patients (51.6%) [10–15]. In our study, the mean age was 51 months, and 53.6% of patients were male.

An important factor affecting the clinical course of the cases is determining the poisoning agents. According to the study of McGregor et al., in which the national poison counseling data of the USA were examined in children below 6 years of age, 13.4% were exposed to cosmetic products, 10% to cleaning products, and 7.9% to

**Table 4**

Logistic regression modeling of factors affecting long-term 24-h monitoring of events in emergency service.

|                                           | n   | B      | Sig. | OR   | %95 CI.    |
|-------------------------------------------|-----|--------|------|------|------------|
| Abnormal physical examination             | 23  | −1,54  | 0,08 | 0,21 | 0,04–1,21  |
| Abnormal symptoms                         | 59  | 1,79   | 0,01 | 5,97 | 2,15–16,63 |
| Abnormal laboratory results               | 252 | 1,33   | 0,00 | 3,80 | 2,09–6,89  |
| Gastrointestinal lavage                   | 113 | 18,48  | 0,99 | 1,06 | 1,21–33,7  |
| Active coal                               | 135 | 1,86   | 0,01 | 6,79 | 1,26–33,7  |
| Drugs containing iron                     | 2   | 2,56   | 0,02 | 3,99 | 1,35–5,75  |
| Drugs containing sedative-hypnotic agents | 12  | 3,78   | 0,03 | 1,18 | 2,8–6,97   |
| Constant                                  |     | −20,37 |      |      |            |

**Table 5**

The relationship between the two groups; intoxication by suicidal attempt and accidentally.

|                                   | Accidentally (Group1) | %    | Suicide attempt (Group 2) | %    | X <sup>2</sup> | P     |
|-----------------------------------|-----------------------|------|---------------------------|------|----------------|-------|
| <b>Gender</b>                     |                       |      |                           |      |                |       |
| Female                            | 165                   | 42.5 | 37                        | 78.7 | 12.21          | .001  |
| Male                              | 233                   | 57.5 | 10                        | 21.3 |                |       |
| Total                             | 388                   | 100  | 47                        | 100  |                |       |
| <b>Age</b>                        |                       |      |                           |      |                |       |
| 0–12 months                       | 84                    | 21.9 | 0                         |      | 263.29         | <.001 |
| 12–36 months                      | 183                   | 47.8 | 0                         |      |                |       |
| 36–72 months                      | 70                    | 18.3 | 0                         |      |                |       |
| 72–144 months                     | 36                    | 9.4  | 5                         | 10.6 |                |       |
| >144 months                       | 10                    | 2.6  | 42                        | 89.4 |                |       |
| Total                             | 383                   |      |                           |      |                |       |
| <b>Ingested substance</b>         |                       |      |                           |      |                |       |
| Drugs                             | 113                   | 29.1 | 45                        | 95.7 | 77.59          | .001  |
| Others*                           | 275                   | 70.9 | 2                         | 4.3  |                |       |
| Total                             | 388                   | 100  | 47                        | 100  |                |       |
| <b>Is it the first poisoning?</b> |                       |      |                           |      |                |       |
| Yes                               | 382                   | 98.5 | 45                        | 95.7 | 1.70           | .210  |
| No                                | 6                     | 1.5  | 2                         | 4.3  |                |       |
| Total                             | 388                   |      |                           |      |                |       |
| <b>Is patient symptomatic?</b>    |                       |      |                           |      |                |       |
| Yes                               | 75                    | 19.4 | 1                         | 2.1  | 7.48           | .002  |
| No                                | 312                   | 80.6 | 46                        | 97.9 |                |       |
| Total                             | 387                   |      |                           |      |                |       |
| <b>Observation time</b>           |                       |      |                           |      |                |       |
| >6 h observation                  | 106                   | 27.5 | 280                       | 72.5 | 15.6           | <.001 |
| <6 h observation                  | 0                     | 0    | 47                        | 100  |                |       |
| Total                             | 106                   |      | 327                       |      |                |       |
| <b>Which room?</b>                |                       |      |                           |      |                |       |
| Kitchen                           | 306                   | 81.0 | 24                        | 51.1 | 65.84          | <.001 |
| Others**                          | 72                    | 19.0 | 23                        | 49.9 |                |       |

\*: Substances mentioned in Table 2.

\*\*: Places mentioned in Table 3.

**Table 6**

Patients observed in pediatric intensive care unit.

| Gender | Age (month) | Exposured xenobiotic              | The way of poisoning | Duration in PICU | Treatment                          | Reason          | Result           |
|--------|-------------|-----------------------------------|----------------------|------------------|------------------------------------|-----------------|------------------|
| Male   | 156         | Narcotics (synthetic cannabinoid) | PO                   | 2                | Active carbon                      | Sedation        | Normal           |
| Male   | 180         | Narcotics (volatile hydrocarbon)  | Inhalation           | 4                |                                    |                 | Normal           |
| Male   | 24          | OPI                               | PO                   | 3                | Active carbon. Atropin. Pam        | Accident        | Normal           |
| Female | 36          | OPI                               | PO                   | 2                | Active carbon. Atropin. Pam        | Accident        | Normal           |
| Female | 24          | OPI                               | PO                   | 2                | Active carbon. Atropin. Pam        | Accident        | Normal           |
| Female | 60          | OPI                               | PO                   | 2                | Active carbon. Atropin. Pam        | Accident        | Normal           |
| Female | 168         | Paracetamol                       | PO                   | 4                | Gastric lavage. Active carbon. Nac | Suicide attempt | Normal           |
| Male   | 163         | Butane gas                        | Inhalation           | 50               | Supportive                         | Sedation        | Severe sequeled* |

OPI: Organic phosphorous insecticide.

PICU: Pediatric intensive care unit. PO: Per oral. PAM: Pralidoxime. NAC: *N-acetyl cysteine*.

\*: This case was completely normal previously, but became dependent on the mechanical ventilator with tracheostomy and turned into a vegetative form.

analgesics [16]. In Ahmet et al.'s prevalence study, in Qatar, 72.6% of patients were exposed to drugs, 14.9% to household cleaning products, and 3% to insecticides [10]. According to Lam et al.'s study conducted in Australia on drug exposure, 29% of patients were exposed to analgesics and 23.4% to psychotropic agents [17].

Similarly, Hassan et al.'s study conducted in Egypt reported that 28.6% of cases were exposed to insecticides, 17% to cleaning products, and 22.6% were exposed to drugs [12]. Similarly, in our study, 47.6% of patients were exposed to household cleaning products, 36.5% to drugs, 5.3% to insecticides and pesticides, 3.3% to inhaler

toxic gases, 2.5% to cosmetic products, and 1.8% of patients were exposed to narcotics.

When exposed drug groups were examined, it was found that exposure to analgesics was the most common, followed by drugs affecting the cardiovascular system. In another study, it was found that 34.5% of cases were due to exposure to drugs that affect the neurological system, 18.4% of cases were due to analgesics, and drugs affecting cardiovascular system accounted for 8% of cases [10,14]. According to our study, drugs affecting the neurological system accounted for 42% of cases, analgesics accounted for 41% of cases, and drugs affecting the cardiovascular system accounted for 12.5% of cases.

The extent of damage caused by the toxic substances varies based on the means of exposure. For example, Per oral intake of elemental mercury has less toxic effects, whereas inhalation of the same amount of mercury can lead to serious toxicity [18]. Thus, on examining the routes of taken substances into the body, it was observed that the rate of per oral route intake (88.6%, 72%, 77%) was high [11,12,19]. Similarly, in our study, it was found that xenobiotics were administered orally in 90.5% of cases.

It is important to determine the time passed between poison intake and patient's admission to the emergency department. In a related study, Ahmed et al. stated that the duration between poison intake and patient's admission to the emergency department was less than an hour in 54.2% of patients [10]. In another study conducted in a university hospital in Bolu (Turkey), it was reported that the rate of admission within an hour was 29.2%, and the median time to reach the hospital was  $45.0 \pm 17.3$  min [20]. Similarly, in our study, the mean value was found to be 60 min. The duration depends on the location of the hospital and the transportation conditions of the area as well. When the place of the poisoning was examined, many studies have shown that most childhood intoxications in Turkey occur at home (according to the study by Hassan et al., childhood intoxications at home accounted for 91% of the cases, whereas Lin et al.'s study reported 89.7% of cases) [12,14]. Similarly, our study reported a rate of 92.6%. In one study, living room accounted for 28.2% of poisoning cases and kitchen accounted for 15.5% of cases. On the other hand, another study revealed that 50% of poisoning cases occurred in the living room and 42% in the kitchen [10,11]. Similarly, according to our study, kitchen accounted for 72.8% of poisoning cases. This is because, in Turkey, medicines stored in the kitchen are likely to be implicated in childhood poisoning as many children are curious to explore in and around the home, and they inadvertently consume the medicines kept in the kitchen.

Many studies have reported that child-resistant packaging and safe storage of toxic substances in a secure location that is out of reach of children can help prevent unintentional childhood poisoning, which is a common and dangerous public health problem [21–23]. For example, according to a study conducted in Brazil, it has been found that protective caps reduce the risk of poisoning by 16 times [23]. With the adoption of such measures in the UK, the rate of childhood poisoning, which was 151 per 100,000 population in 1968, was reduced to 23 per 100,000 population in 2000 [9]. It was found in our study that 45% of products were not in their original packages and 95% of them did not have a locked cap.

Whether the poisoning is accidental or suicidal is also important. If the poisoning is an act of suicide, it is necessary to evaluate the case of poisoning from the point of psychiatry besides clinical correction. Several studies were conducted within the same age group to investigate and examine the cause of poisoning. In one study, it was found that 77.5% of the cases were accidental and 15.5% of the cases were suicidal. In another study, 83.5% of the cases were accidental and 38.5% of the cases were suicidal [13,14,24]. Similarly, our study reported that 83% of the cases were poisoned

accidentally and 10% of the cases were suicide attempt.

To retrospectively determine the severity of cases, factors such as the duration of the follow-up and the need for monitoring in the intensive care can be considered. When the observation periods of the cases in a study by Ahmed et al. were examined, it was found that the observation period of 35% of the cases was indicated to be shorter than 6 h and the observation period of 67% of them was indicated to be shorter than 24 h [10]. In a study by Hassan et al., it has been indicated that 86% of the cases were discharged from the emergency service and 10.3% were transferred to the pediatric intensive care. On the other hand, in a study by Haghghat et al., it was observed that 5.8% of the cases needed pediatric intensive care [12,24]. Similarly, according to our study, 27.8% of the cases had shorter than 6 h of observation period, 56.3% of the cases had shorter than 24 h, 42.2% accounted for longer than 24 h, and 1.5% received pediatric intensive care support. This is because the general conditions of the cases in our study group were better and the pediatric emergency service conditions were more developed.

Similar to the rates observed in the study by Ahmed et al., (80.50%), it was found that the vast majority of the cases in our study (94.8%) had their first poisoning incident in their lives [10].

It is obvious that the cases of relatively more severe poisoning will be symptomatic from the moment of admission. Therefore, when the status of being symptomatic at the time of admission to the emergency service was examined, it was found that half of the cases were asymptomatic in the study by Bacha et al. and only 16% were symptomatic in the study by Lin et al. [13,14]. In our study, only 16.8% of the cases had symptoms related to poisoning when they were admitted to the emergency service, which may indicate that the poisoning cases were not too severe.

On examining poison-specific treatments, it was observed that different decontamination methods were used. For example, according to the study by Ahmed et al., activated carbon was administered at a rate of 64.2%, whereas per study by Bacha et al., it was administered at a rate of 23%. In a study by Lin et al., it was found that gastric lavage was performed at a rate of 44.8% [10,13,14]. In addition, in our study, it was found that the administration of activated carbon prolonged the length of stay in hospital. This is because activated carbon was not administered in nontoxic intoxication cases, whereas repeated doses of activated carbon were administered in some serious intoxication cases. When examined based on antidote, it was observed that Lin et al. administered an antidote at a rate of 11%; 90% of the cases were lorazepam intoxication, and flumazenil was administered as an antidote. In a study conducted by Bacha et al. in Ethiopia, the rate of antidote administration was 8% [13,14]. In their study published in 2015, it was found that they used atropine as an antidote for organic phosphate poisoning, antacid for corrosive substance intake at a rate of 53.3%, and N-acetyl cysteine for paracetamol poisoning at a rate of 0.6% [13]. In our study, of the total cases, 25.6% underwent gastric lavage, 30.9% received activated carbon, and 2% received specific antidote. Of these 9 cases, 5 were paracetamol intoxication cases and N-acetyl cysteine was administered as an antidote, 4 was organic phosphate poisoning and atropine and pralidoxime were administered as antidotes.

Similar to our study, the study by Lin et al. examined both suicide group and accidentally poisoned group. It was found that the mean age of the suicide group was significantly greater, and the rate of poisoning among the accidentally poisoned group was higher among male children [14].

Limitations of our study are that it is a retrospective study and the long-term results of the cases are unknown. However, we think that it will contribute to the literature in terms of reflecting the current situation in our region. Based on this, we are of the opinion that informative and educative publications about the need for

storing toxic products in lockable compartments that are out of reach of children and selling hazardous products in protected packages will reduce undesirable consequences.

In conclusion, accidental poisoning is high among male children in the small age group, and female children in the advanced age group are susceptible to suicide attempt. Contact with corrosive and noncorrosive cleaning agents at home is the most common cause of poisoning, especially among the small age group. Small age, symptomatic state at the time of admission, detection of pathological findings on physical examination, laboratory parameters, poisoning agents such as iron-containing products and sedative-hypnotic agents, and administration of activated carbon prolong the observation period.

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