



# Evaluation of Poisoning Cases Presenting to the Pediatric Emergency Department

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## Abstract

**Aim:** Poisoning in the pediatric population often results in numerous visits to emergency services. The purpose of our study is to conduct a retrospective analysis of the demographic and epidemiological characteristics, clinical progression, laboratory findings, and prognosis of patients who presented to the pediatric emergency outpatient clinic due to poisoning.

**Material and Methods:** The clinical and laboratory features of patients who presented to our hospital's emergency department due to poisoning between March 2019 and March 2020 were retrospectively examined. Statistical analyses were carried out using IBM SPSS Statistics for Windows 22.0 software.

**Results:** The mean age of the 624 cases who presented to the pediatric emergency department due to poisoning over a one-year period was 7.9±6.2 (1.0-18.0) years, with 49.8% of them being female (n=311). It was found that the cause of poisoning in 14.6% (n=91) of the cases was a suicide attempt. Drug intoxications accounted for 54.3% (n=339) of all cases, of which 77% (n=261) involved a single drug and 23% (n=78) involved multiple drug consumption. 79.3% (n=495) of the patients, who had an admission time to hospital of 1.3±0.6 (1.0-4.0) hours, were asymptomatic upon arrival, and 71.5% (n=446) were admitted for hospitalization. 28.5% (n=178) were treated on an outpatient basis. 35.3% (n=157) of the hospitalized patients required monitoring in the intensive care unit. The mean hospital stay was determined to be 2.4±1.1 (1.0-11.0) days.

**Conclusion:** Drugs, especially analgesics, are the most frequent cause of poisoning in childhood. The most appropriate strategy for poisoning will be to enact preventive measures, increase societal awareness, and ensure that diagnosis and treatment are swiftly and effectively implemented.

**Keywords:** Poisoning, child, emergency department

## INTRODUCTION

Childhood poisoning represents a significant health concern both globally and nationally, contributing to severe mortality and morbidity, with a high incidence of emergency service admissions and hospitalizations (1). The American Poison Control Center's records indicate that over two million children seek assistance from pediatric emergency services due to poisoning annually (2). Based on 2020 data from the National Poison Information Center, roughly 47% of emergency service

visits due to poisoning involve children (3). In children, poisonings most commonly occur within the 1-5 age group and are typically accidental in nature (3). As the causes, types, and influencing factors of poisoning vary between countries, and even among different regions within the same country, it is essential for each nation to evaluate its unique poisoning profile and implement necessary precautions according to identified risks (4).

According to the Turkish Statistical Institute's 2019 reports, injuries and poisonings constituted the most

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frequent cause of death within the 1-17 age group (5). In 2014, the mortality rate attributed to this cause among children was reported at 69.4% (5). The 2020 data from the American Center for Disease Control and Prevention state that accidental injuries and deaths are the most prevalent causes (6). The aim of our study was to conduct a retrospective evaluation of the demographic and epidemiological characteristics, clinical progression, laboratory findings, and prognosis of patients who presented to the pediatric emergency outpatient clinic due to poisoning.

## MATERIAL AND METHOD

Hospital records, clinical, and epidemiological data from patients who presented to our hospital's pediatric emergency department due to poisoning between March 2019 and March 2020 were retrospectively analyzed. The study received approval from the Hitit University Faculty of Medicine Clinical Research Ethics Committee on 08/09/2020, under decision number 325.

The study excluded food poisonings other than those caused by mushrooms and plants. Patients poisoned by drugs and substances other than drugs were considered separately. Non-drug ingestions were classified into categories such as caustic/corrosive substances, inhaled gases, plants, fungi, hydrocarbons, organophosphates, insect bites, rat poison, mercury, and naphthalene. Details recorded included the cause of poisoning (accidental or intentional), the route of administration (oral, parenteral, transdermal, inhalation, rectal), the time from poisoning to arrival at the emergency department, clinical findings, treatments administered prior to and at the emergency department, and the location and duration of follow-up.

Statistical analyses were conducted using IBM SPSS Statistics for Windows 22.0 software. Pearson's chi-square test or Fisher's exact test were employed to compare qualitative variables when the expected frequency was less than five cells. The Shapiro-Wilk test was utilized to determine whether numerical variables followed a normal distribution, and the t-test was applied to independent groups to compare normally distributed variables across two groups. The Mann Whitney U test was employed to compare non-normally distributed variables across two groups. The relationship between normally distributed variables was assessed using the Pearson correlation coefficient, while the Spearman's rank correlation coefficient was used to examine the relationship between non-normally distributed variables. A p-value less than 0.05 was deemed statistically significant.

## RESULTS

Over a one-year period, the pediatric emergency service received 165,506 visits, with 624 (or 3.4%) attributed to poisonings. The mean age of these poisoning patients was 7.9±6.2 years, ranging from 1 to 18 years. Gender distribution was nearly equal, with females accounting for 49.8% (n=311) and males 50.2% (n=313). Poisoning

as a result of a suicide attempt constituted 14.6% (n=91) of cases. The mean age of those attempting suicide was 15.3±1.3 years (range: 12-17 years), with females comprising 71.1% (n=64) of this subgroup. From the moment of hospital admission, averaging 1.3±0.6 hours (range: 1-4 hours) post-poisoning, 71.5% (n=446) of patients were hospitalized, while 28.5% (n=178) were treated as outpatients. Of those hospitalized, 35.3% (n=157) required intensive care, with an average hospital stay of 2.4±1.1 days (range: 1-11 days).

When grouped by age, males dominated cases under 12 years, while females were more frequent among those 12 years and older (Table 1). The mean age of those poisoned with corrosive substances (n=83) was 3.2±3.7 years (range: 1-17 years), with males accounting for 57.8% (n=48).

**Table 1 : Gender distribution of the cases according to age groups**

Gender	Age group		
	<6 years old (n=327) (%) (n)	6-11 years (n=51) (%) (n)	>12 years (n=238) (%) (n)
Female	41.9% (n=137)	39.2% (n=20)	62.6% (n=149)
Male	58.1% (n=190)	60.8% (n=31)	37.4% (n=89)

Table 2 outlines the causative factors of poisoning in our patients. Drugs were the most common cause (54.3%, n=339), followed by ingestion of corrosive substances (13.3%, n=83) (Table 2). Table 3 details the specific drugs involved in poisoning cases. Of those with drug-related poisoning, 77% (n=261) had ingested a single drug, and 23% (n=78) had taken multiple drugs. The mean age of single-drug ingestions was 6.5±5.9 years (range: 0-17 years), while those who took multiple drugs averaged 12.7±5.4 years (range: 1-17 years). Females attempting suicide represented 55.1% (n=43) of multiple-drug ingestions, with 16.9% (n=44) of single-drug ingestions resulting from suicide attempts. Despite no significant difference in terms of gender distribution, season, admission time and duration, hospitalization, location and duration, and treatment approach between patients poisoned by a single drug versus multiple drugs (p>0.05), their mean ages were statistically different (p=0.001).

The mean age of the 261 cases of poisoning due to suicide attempts was 15.2±1.6 years. The causative agent was drugs in 99.2% (n=259) of cases and insecticide-agricultural medicine in 0.8% (n=2).

Most admissions occurred during winter (27.2%, n=173) and spring (27.2%, n=170) months, with 24.2% (n=151) in summer and 20.8% (n=130) in autumn. Admissions were most common (48%, n=301) between 16:00-23:59, with the least occurring between 00:00-08:00 (18%, n=113). The peak referral time was immediately after ingestion was discovered. Upon presentation, 79.5% (n=495) of patients exhibited no symptoms, whereas 8.3% (n=52) reported nausea and vomiting, and 2.4% (n=15) experienced

drowsiness. Other complaints included dizziness, weakness, loss of consciousness, bodily convulsions, numbness, palpitations, inability to walk, shortness of breath, lip swelling, and body rash.

**Table 2. Poisoning factors**

Poisoning factors	n	%
Drug	339	54.3
Corrosive-caustic substance	83	13.3
Alcohol	42	6.7
Food	42	6.7
Carbon monoxide	37	5.9
Mushroom	25	4.0
Hydrocarbon	23	3.7
Insecticide-agricultural pesticide	13	2.1
Rat poison	12	1.9
Herb	5	.8
Other chemicals	2	.3
Mercury	one	.2
<b>TOTAL</b>	<b>624</b>	<b>100.0</b>

**Table 3: Drugs causing poisoning**

Active ingredient	n	%
Paracetamol	43	12.6
Diclofenac potassium	20	5.8
Ibuprofen	16	4.7
Risperidone	8	2.4
Methylphenidate hydrochloride	7	2.1
Metformin	6	1.8
Dexketoprofen	6	1.8
Sertraline	6	1.8
Valproic acid	5	1.5
Acetylsalicylic acid	5	1.5
Amoxicillin+clavulanate	5	1.5
Other	212	62.5
<b>TOTAL</b>	<b>339</b>	<b>%</b>

In terms of treatment, common interventions for poisoned patients included clinical monitoring, gastric lavage and administration of activated charcoal, and hydration and oxygen administration. The most frequent treatment was clinical monitoring and administration of activated charcoal-lavage (28.2%, n=176), followed by hydration therapy (25.6%, n=160). No antidotes were administered, and there were no recorded fatalities.

## DISCUSSION

Poisoning, one of the primary reasons for pediatric emergency services visits, is predominantly observed in younger age groups (7). Although the mean age in our study was 7.9±6.2 years, it's significant to note that 52.4% of our cases were children under the age of 6 years. Similar findings are noted in the literature, such as a Spanish study of 2157 poisoning cases, where 67% of the patients were children younger than four years of age (8). The study conducted by Akgül et al. reported that 58.1% of the cases involved males younger than five years old, with poisonings becoming more prevalent in females above the age of 12 (9). Similarly, in a study conducted by Özdemir et al., it was found that poisoning was more common in males younger than five years old and females older than thirteen years (10). Andıran et al. reported higher rates of poisoning in males under the age of ten and females over the age of ten (11). Consistent with these studies, our data revealed that poisoning was more common in males under 12 years of age and in females over 12 years of age. Accidental poisoning in younger children and suicidal poisoning in adolescence are common, suggesting a bimodal distribution (9).

Factors influencing poisoning differ according to geography, seasons, socio-cultural characteristics, and age group (12). In our study, the most common cause of poisoning was drug intake, followed by ingestion of corrosive substances. In line with our study, a Spanish study found that 48% of poisoning cases in the emergency department resulted from drug intake (13). Poisoning typically occurs with orally taken drugs and cleaning products easily accessible to children (8,10). In our study, the most common drugs causing poisoning were analgesics (23.1%, n=79), with paracetamol (12.6%, n=43) being the most common among them. Similar to our findings, the study by Akgül et al. reported analgesics as the leading cause of poisoning (26.9%). When evaluating the drugs ingested, the most common poisonings were attributed to nonsteroidal anti-inflammatory agents (12.3%) and paracetamol group drugs (11.3%) (9). In our study, non-steroidal anti-inflammatory agents (5.8%, n=20) were the second most common cause after paracetamol (12.6%, n=43). In a national study, it was found that 75% of poisonings reported to the National Poison Center in 2003 were drug-related, with analgesics being the most common followed by antidepressants (14). An English study reported that 60% of intoxications in children aged 14 years and younger were due to drugs, a third of which were analgesics. This widespread use of over-the-counter analgesic-anti-inflammatory drugs suggests they are easily accessible and therefore more often identified as a poisoning agent.

In the study conducted by Ozdemir et al., 44.3% of cases were poisoned with corrosive substances, with non-drug agents more commonly implicated between the ages of 1-5 (10). In our study, the rate of poisoning with corrosive substances (13.3%) was found to be lower than in the

mentioned study, and the mean age (3.2 years) was similar. Poisoning is more frequent due to children's higher activity levels at play age and the consumption of cleaning products as food.

Numerous studies in rural areas of our country have determined that poisonings are most common in the spring and summer. In contrast, a study in Sakarya reported poisonings being most common in autumn, while a study by Biçer et al. in Istanbul reported most incidences in December, and the study of Türkmenoğlu et al. found winter to be the most common time (16-18). Türkmenoğlu suggested the lower incidence of poisoning in Istanbul during the summer months was due to fewer encounters with toxic animals and pesticides in city life, and a decrease in emergency visits as families leave the city for vacation (18). According to our study results, poisoning cases are seen more frequently in the spring and winter months. This aligns with the findings from studies in our country, which suggest an increase in exposure to toxic substances from pesticides, home dyeing and cleaning activities in the spring, and a higher occurrence of carbon monoxide poisoning in the winter months (16).

Examining the admission times of patients to the emergency department in eight-hour intervals, we found the highest admission rate (48%) between 16:00 and 23:59. Studies have reported that cases of poisoning tend to visit pediatric emergency services more frequently during evening hours (18). A study in Çukurova observed the most frequent visits in the morning (19). Türkmenoğlu's study found the most common admission hours to be between 18.00 and 23.59. This is likely because families are occupied during dinner hours and may not supervise their children as closely.

In our study, the most common reason for admission was discovery of drug intake. Most of the cases (79.5%) were asymptomatic, with less frequent development of nausea, vomiting, and drowsiness. However, when comparing the admission time and age distribution of the cases, it was found that the younger the age, the shorter the time taken to reach the hospital. In a study by Akıcı et al. in Istanbul comparing children younger than six years old and older, it was observed that the group with younger children sought help earlier. This is likely because families monitor their young children more closely and notice changes sooner (20, 21).

In our study, 14.6% of all cases involved a suicide attempt. Studies report that suicide attempts increase during adolescence, with most cases involving drug-induced poisoning, more commonly in females (6). The mean age (15.3 years) and gender distribution (71% female) of cases poisoned due to suicide in our study aligned with the literature.

Most poisoning cases are asymptomatic and require only supportive treatment. In instances of toxic dose drug intake within the first hour, gastric lavage should be performed, followed by administration of activated charcoal. The

most common treatment in our study was observation and administration of activated charcoal-lavage. Antidote treatment is not always possible depending on the active substance in poisonings, and despite all interventions, some patients still die. While child poisoning mortality was 4.9% between 1975 and 1984 at Hacettepe University, the increase in early admission and improved intensive care facilities in recent years have significantly reduced mortality (10). Even et al. reported that 8% of poisoning cases were treated in the pediatric intensive care unit, with only one fatality (22). Young reported a 0.7% mortality rate, and Özdemir reported 0.9% (10,23). Kondolot et al. reported no fatalities (24). In our study, no fatalities were observed among patients treated for poisoning. We believe the lack of mortality in our cases is due to easy access to transportation and early admission, as well as advanced treatment options and intensive care facilities.

## CONCLUSION

In conclusion, childhood poisonings have an important place in emergency applications and poisonings with drugs, especially analgesics still take the first place, and the frequency of suicide attempts in the adolescent age group is striking. In order to prevent childhood poisoning, it is necessary to raise awareness of families, schools and the society, and especially the preference of non-opening lids for the packaging of drugs will be beneficial in preventing accidental poisoning in young children. The most correct approach in poisoning will be to take preventive measures and raise awareness of the society, and to ensure that diagnosis and treatment are implemented quickly and effectively.

## LIMITATIONS

The study is retrospective and single-center. Patients with missing data could not be evaluated.

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**Conflict of Interest:** The authors have no conflicts of interest to declare.

**Ethical approval:** The study received approval from the Hitit University Faculty of Medicine Clinical Research Ethics Committee on 08/09/2020, under decision number 325.

## REFERENCES

1. Özcan T, Tosun A, İnan G, et al. Hastanemize başvuran zehirlenme olgularının değerlendirilmesi. Adnan Menderes Üniversitesi Tıp Fakültesi Dergisi. 2002;3:5-8.
2. Gummin DD, Mowry JB, Beuhler MC, et al. 2020 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 38th Annual Report. Clinical Toxicol (Phila). ;59:1282-501.
3. Ulusal zehir danışma merkezi (UZEM) raporları 2014-2020 yılları yayınlandı. <https://tatd.org.tr/toksikoloji/2021/10/21/ulusal-zehir-danisma-merkezi>"<https://tatd.org.tr/>

- toxicology/2021/10/21/ulusal-zehir-danisma-merkezi access date 20.06.2022.
4. Uziel Y, Adler A, Aharonowitz G, et al. Unintentional childhood poisoning in the Sharon area in Israel: a prospective 5-year study. *Pediatr Emerg Care*. 2005;21:248-51.
  5. İstatistiklerle çocuk. <https://data.tuik.gov.tr/Bulten/Index?p=Istatistiklerle-Cocuk-2020-37228> access date: 20.06.2022.
  6. National Vital Statistics System-Mortality Data via CDC. <https://wonder.cdc.gov/controller/saved/D76/D266F092> access date: 20.06.2022
  7. Yorulmaz A, Akbulut H, Yahya İ, et al. Retrospective evaluation of patients admitted to the pediatric emergency department with intoxication. *Turkish Journal of Pediatric Emergency and Intensive Care Medicine*. 2017;4:96-103.
  8. Mintegi S, Fernandez A, Alutiza J, et al. Emergency visits for childhood poisoning: a 2-year prospective multicenter survey in Spain. *Pediatr Emerg Care*. 2006;22:334-8.
  9. Akgül F, Er A, Çelik F, et al. Retrospective study of childhood poisonings. *J Pediatr Emerg Intensive Care Med*. 2016;3:91-6.
  10. Ozdemir R, Bayrakci B, Tekşam O, et al. Thirty- three-year experience on childhood poisoning. *Turk J Pediatr*. 2012;54:251-9.
  11. Andiran N, Sarikayalar F. Pattern of acute poisonings in childhood in Ankara: what has changed in twenty years? *Turk J Pediatr*. 2004;46:147-52.
  12. Soyucen E, Aktan Y, Saral A, et al. Sakarya bölgesinde çocukluk çağı zehirlenmelerinin geriye dönük değerlendirilmesi. *Çocuk Sağlığı ve Hastalıkları Dergisi*. 2006;49:301-6.
  13. PJ Caballero Valles, S Dorado Pombo, A Diaz Brasero A, et al. Epidemiologic survey of acute poisoning in the South area of the Community of Madrid: the VEIA 2004 study. *An Med Interna*. 2008;25:262-8.
  14. Duyan Çamurdan A. Preventive cautions in childhood poisoning. *Türkiye Klinikleri Pediatrik Bilimler*. 2006;2:87-91.
  15. Jepsen F, Ryan M. Poisoning in children. *Current Paediatrics*. 2005;15:563-8.
  16. Akbay-Öntürk Y, Uçar B. Eskişehir bölgesinde çocukluk çağı zehirlenmelerinin retrospektif değerlendirilmesi. *Çocuk Sağlığı ve Hastalıkları Dergisi*. 2003;46:103-13.
  17. Biçer S, Sezer S, Çetindağ F, et al. Evaluation of acute intoxications in pediatric emergency clinic in 2005 Marmara Medical Journal. 2007;20:12-20.
  18. Türkmenoğlu Y, Akşahin B, Sartaş Ü, et al. Update glance on childhood intoxication. *Okmeydanı Medical Journal*. 2015;31:82-91.
  19. Yılmaz HL, Derme T, Yıldıztaş D, Alhan E. Evaluation of childhood intoxication cases in Çukurova region. *Nobel Medicus*. 2009;5:35-44.
  20. Akıcı N, Bayoğlu D, Gürbüz T, et al. Investigation of Poisonings in Children aged six and under and in children older than six years. *Marmara Pharm J*. 2013;17:35-41.
  21. Özdemir D, Yiş U, Kalkan Ş, et al. Akut çocukluk çağı zehirlenmeleri. *Eurasian Emerg Med*. 2003;1:36-8.
  22. Even KM, Armsby CC, Batema ST. Poisoning requiring admission to the pediatric intensive care unit: a 5-year review. *Clin Toxicol (Phila)*. 2014;52:519-24.
  23. Genç G, Saraç A, Ertan Ü. Çocuk hastanesi acil servisine başvuran zehirlenme olgularının değerlendirilmesi. *Nobel Med*. 2007;3:18-22
  24. Kondolot M, Akyıldız B, Görözen F, et al. Çocuk acil servisine getirilen zehirlenme olgularının değerlendirilmesi. *Çocuk Sağlığı Ve Hast Derg*. 2009;52:68-74.