



# Poisoning Cases Admitted to the Pediatric Emergency Department: A Retrospective Evaluation

## Çocuk Acil Servisine Başvuran Zehirlenme Olgularının Geriye Dönük Değerlendirilmesi

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### Abstract

**Introduction:** Intoxication in childhood is an important preventable public health problem and can cause morbidity and mortality. In this study, we investigated the clinical and demographic characteristics of patients who presented to our pediatric emergency department in the last 4 years due to poisoning.

**Methods:** Records of 238 children aged 1 month to 18 years who applied to Çanakkale Onsekiz Mart University Faculty of Medicine, Pediatric Emergency Department between January 2015 and January 2019 were evaluated retrospectively. Cases were examined in terms of age, gender, time to first medical intervention after drug intake, cause of poisoning, intake method, and symptoms.

**Results:** Of the 238 patients, 45% were female. The median age was 59.34 (interquartile range: 3-215) months, and 57.15% of the patients were <5 years old, 23.1% were >12 years old, and 8.1% were accidental cases, 26.9% were poisoned following a suicide attempt. The mean time to presentation to our center was 91.2±75.6 min. Poisoning most commonly occurred in the spring months (29.83%). Among drug poisons, analgesics were the most common (23.41%); 60.51% of the cases were asymptomatic, while the most common symptoms were nausea and vomiting.

**Conclusion:** Suicidal poisoning is seen less frequently in children. The main cause of poisoning is an accidental intake of medication. In addition to the measures taken by caregivers, parents, drug manufacturers, and healthcare workers, determining the epidemiological and clinical characteristics of poisoning will contribute to the reduction of mortality and morbidity among children.

**Keywords:** Poisoning, child, emergency departments, retrospective studies

### Öz

**Giriş:** Çocukluk çağında meydana gelen zehirlenmeler morbidite ve mortaliteye neden olabilen, engellenebilir önemli bir toplum sağlığı problemidir. Araştırmamızda son dört yıl içerisinde zehirlenme nedeniyle çocuk acil servisimize başvuran hastaların klinik ve demografik özelliklerini araştırdık.

**Yöntemler:** Ocak 2015 ve Ocak 2019 tarihleri arasında zehirlenme nedeniyle Çanakkale Onsekiz Mart Üniversitesi Tıp Fakültesi, Çocuk Acil Servisi'ne başvuran 1 ay-18 yaş arası 238 çocuk hastanın dosya kayıtları geriye dönük olarak değerlendirildi. Olgular yaş, cinsiyet, ilacın alınmasından sonraki ilk tıbbi müdahaleye kadar geçen süre, zehirlenme nedeni, alım şekli ve semptom yönünden incelendi.

**Bulgular:** Zehirlenme nedeniyle çocuk acil servisine başvuran 238 olgunun %45'i kızdı. Ortalama yaş 59,34 ay (çeyrekler arası aralık: 3-215 ay) olup olguların %57,15'i beş yaşın altında, %23,1'i ise on iki yaşın üstündeydi. Olguların %68,1'i kaza sonucu, %26,9'unun özkıym amacıyla zehirlendiği görüldü. Olguların merkezimize başvuru süresi ortalama 91,2±75,6 dakika idi. Zehirlenmelerin en sık ilkbahar aylarında (%29,83) olduğu görüldü. İlaçlarla zehirlenmeler arasında en sık analjezikler (%23,41) ile zehirlenmeler saptandı. Olguların %60,51'i bulguya yönelik değildi ve bulguya yönelik olgularda en sık bulantı-kusma bulguları görülmekteydi.

**Sonuç:** Özkıym amaçlı zehirlenmeler daha az sıklıkla görülmekle birlikte çocuklarda temel zehirlenme nedeni kaza ile ilaç alımıdır. Bakım verenler, ebeveynler, ilaç üreticileri ve sağlık çalışanları tarafından alınacak önlemlere ilaveten bölgedeki zehirlenmelerin epidemiyolojik ve klinik özelliklerinin belirlenmesi mortalite ve morbiditesinin azaltılmasına büyük katkıda bulunacaktır.

**Anahtar Kelimeler:** Zehirlenme, çocukluk çağı, acil servis, geriye dönük inceleme

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## Introduction

Poisoning causes harmful symptoms and even death. It occurs following intake of a substance through the respiratory system, gastrointestinal system, mucous membranes, skin, and conjunctiva or parenteral methods in lethal amounts.<sup>1</sup> Poisoning can affect children's health quickly and has fatal results. In the United States, poisoning of approximately 1 million children aged <6 years has been reported annually.<sup>2-5</sup> Özcan and İkinçioğulları<sup>6</sup> reported that 60.14% of the patients who presented to the emergency room due to poisoning were children. The causes of poisoning may differ according to the patient's country and region. In our country, many studies have investigated poisoning in children from different regions.<sup>7-12</sup> Regional threats causing poisoning can be identified through research on these factors.<sup>13</sup> To reduce the morbidity and mortality rates, it is important to take necessary precautions and to plan treatment while understanding the characteristics of this region. In this study, we aimed to evaluate the demographic and clinical features of our patients who applied to the pediatric emergency department because of poisoning in the last 4 years in our region.

## Materials and Methods

Our study included 238 patients aged 1 month to 18 years who were followed up in the Çanakkale Onsekiz Mart University Faculty of Medicine Hospital's Pediatric Emergency Department between January 2015 and January 2019. Patients with food poisoning other than mushroom and plant poisoning who were transferred from our hospital to another center were excluded from our study. Ethics committee approval was received from the Çanakkale Onsekiz Mart University Ethics Committee on March 27, 2019 (no: 2011-KAEK-27/2019-1900041080).

Medical records were examined retrospectively. Age, gender, complaint, time of the event, active substance, mode of application, time of application, and time until the child entered the emergency room after the intake of the active substance were investigated. Patients were examined in four groups by age: 1-60, 60-20, 120-180, and >180 months. The analysis of the time of poisoning and time of admission to the hospital was divided into 8 h. The 8 h time slots started from 00:00. It was divided into groups to determine the properties of poisoning factors. The distribution of cases according to the season and years was examined. Whether the substance intake was an accident or a suicide attempt was examined. The poison counseling center was called for all cases. If there were treatment indications, gastric lavage and activated charcoal were applied. If available,

an antidote was administered. During the first application, urgent treatment needs were determined by examining the children.

## Statistical Analysis

IBM Statistics 20.0 statistical package was used to evaluate statistical data. The number, percentage, mean, and standard deviation were used in the presentation of descriptive data. The chi-squared test or Fisher's Exact test (in cases where the chi-squared test's assumptions could not be provided) was used for binary categorical variables in comparing demographic features. The independent-samples t-test was used to compare numerical variables. The significance level was accepted as  $p < 0.05$  in all statistical analyses.

## Results

In this study, poisoning cases constituted 0.33% ( $n=70,527$ ) of the patients who presented to the pediatric emergency department. Of the 238 patients, 45% were female. The patients' age ranged from 3 to 215 months. The average age was  $59.34 \pm 76.85$  months, and 57.1% of the patients were <5 years old and 23.1% were >12 years old. Moreover, 26 (10.9%) patients in 2015, 61 (25.6%) in 2016, 65 (27.3%) in 2017, and 86 (36.2%) in 2018 presented to our emergency department due to exposure to a poison. In addition, 71 (29.8%) patients presented in the spring, 65 (27.3%) in the summer, 38 (16%) in the autumn, and 64 (26.9%) in the winter. Of those who came to our emergency department, 40.4% ( $n=96$ ) did so between 08:00 and 16:00, 52.9% ( $n=126$ ) between 16:00 and 00:00, and 6.7% ( $n=16$ ) between 00:00 and 08:00. The average time to presentation to our emergency department was  $105.2 \pm 180.6$  min. Most of the poisoning cases occurred through digestion (93.3%) (Table 1); 68.1% of the cases were accidental poisoning and 26.9% occurred following a suicide attempt. Intoxications were more common in boys aged <5 years and girls aged >15 years. All patients aged <5 years had accidental poisoning (Table 2). No significant difference was noted when the application season was compared by age ( $p=0.252$ ), and no significant difference was found when gender was compared by application month ( $p=0.731$ ) (Figure 1). Moreover, 66.4% of poisoning cases were caused by drug intake, 15.1% by a caustic-corrosive substance, and 3.8% by carbon monoxide (Table 3). For drug poisoning, 23.4% of the agents were analgesic-antipyretic, 21.5% were combined drugs, and 3.8% were antibiotics (Table 4). Nausea and vomiting were observed in 23.9% of our patients, and lethargy was observed in 5.5%. No signs or symptoms were noted in 60.5% of the patients (Table 5).

**Table 1. Demographic data of the patients**

	Mean ± SD (min-max)
Average age (month)	59.34±76.85 (3-215)
Application period (min)	105.2±180.6 (10-1120)
Hospitalization time (h)	29.6±21.9 (0-120)
	<b>n (%)</b>
<b>Gender</b>	
Female	107 (45)
Male	131 (55)
<b>Age (months)</b>	
0-60	136 (57.1)
61-120	14 (5.9)
121-180	33 (13.9)
>180	55 (23.1)
<b>Application time</b>	
08:00-16:00	96 (40.4)
16:00-00:00	126 (52.9)
00:00-08:00	16 (6.7)
<b>Application season</b>	
Spring	71 (29.8)
Summer	65 (27.3)
Autumn	38 (16)
Winter	64 (26.9)
<b>Application year</b>	
2015	26 (10.9)
2016	61 (25.6)
2017	65 (27.3)
2018	86 (36.2)
<b>Route of poisoning</b>	
Digestion	222 (93.3)
Respiratory	13 (5.5)
Skin contact	3 (1.2)
Total	238 (100)

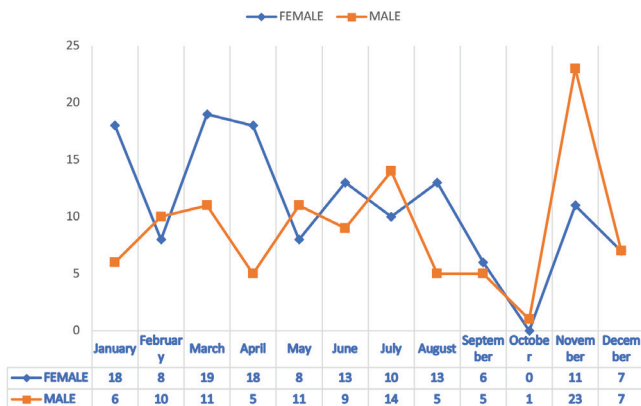
SD: Standard deviation, n: Number

## Discussion

Poisoning is a common emergency among children. Early diagnosis and treatment are important because of the high morbidity and mortality rates associated with poisoning.<sup>14</sup> Intoxications constitute 0.3-2.9% of the applications to child emergency departments in our country.<sup>15-18</sup> Yorulmaz et al.<sup>19</sup> reported that 0.74% of the patients who presented to the emergency department had poisoning, while Akgül et al.<sup>20</sup> reported 0.5%. In our study, poisoning constituted 0.33% of the patients who applied to the pediatric emergency department.

Poisoning often occurs in young children. In our study, 57.1% of the cases occurred in children aged <5 years. It is more common in boys aged 1-5 years because of increased mobility and curiosity.<sup>21</sup> In addition, careless and unknowing family members may have made medications and other toxic substances available in places accessible to children and may have failed to watch their children responsibly.<sup>22</sup> Similar to our study, this rate was expressed as 58.1% in the study of 997 cases.<sup>20</sup> In a study evaluating the data of 72 poisoning centers between 1985 and 1989, 60.8% of 3.8 million poisoning cases occurred in children aged 6 years.<sup>23</sup> Ozdemir et al.<sup>24</sup> analyzed 2.251 cases and reported that poisoning is more common in boys aged <5 and in girls aged >13 years. As regards causes of poisoning, accidental poisoning (68.1%) is the most frequent cause. Regarding distribution by gender, similar to other studies in the literature, suicidal poisoning occurred more frequently in adolescents and accidental poisoning in young children. Since suicidal poisoning cases mostly occur in adolescents, families should be more sensitive to tensions in their family and school environment.

For a successful treatment, patients should present to the emergency room as soon as possible after contact with the poison. Various studies have evaluated the duration of admission to the emergency room after poisoning. Yorulmaz et al.<sup>19</sup> reported that the patients were brought to the hospital within the first 2 h, Kahveci et al.<sup>25</sup> within 1 h, and Yılmaz et al.<sup>26</sup> within 4-6 h. In our study, patients applied to the hospital after an average of 105.2 min. Moreover, as regards the season of occurrence, we obtained close ratios but found the lowest rate of poisoning in the autumn season. Previous studies have shown that poisoning can occur in any season.<sup>10-26,27</sup> In our country, poisoning is frequently encountered in the spring and summer.<sup>22</sup> As our seasonal poisoning rates were comparable, the possible cause is that our patients were mostly poisoned by drugs (66.39%). Poisoning in children often occurs orally<sup>10</sup>, with 93.3% in our study. As poisoning in children is frequently accidental, it may be beneficial to store medicines in a locked box and to increase caregivers' awareness of this issue.



**Figure 1.** Distribution of poisoning by gender and month

**Table 2. Demographic data of poisoning cases by age (years)**

	<5 years n (%)	5-10 years n (%)	10-15 years n (%)	>15 years n (%)	Total n (%)	p
<b>Gender</b>						
Female	65 (49.6)	4 (3.1)	26 (19.9)	36 (27.4)	131 (55)	0.012
Male	71 (66.4)	10 (9.3)	7 (6.5)	19 (17.8)	107 (45)	
<b>Cause of poisoning</b>						
Accident	136 (84)	12 (7.4)	6 (3.7)	8 (4.9)	162 (68.1)	0.000
Suicide	0	2 (3.1)	21 (32.8)	41 (64.1)	64 (26.9)	
Intoxicating	0	0	6 (50)	6 (50)	12 (5)	
<b>Application season</b>						
Spring	37 (52.1)	7 (9.9)	10 (14.1)	17 (23.9)	71 (29.8)	0.252
Summer	45 (69.2)	2 (3.1)	4 (6.1)	14 (21.6)	65 (27.3)	
Autumn	19 (50)	3 (7.9)	6 (15.8)	10 (26.3)	38 (16)	
Winter	35 (54.7)	2 (3.1)	13 (20.3)	14 (21.9)	64 (26.9)	

n: Number

**Table 4. Classification of poisoning drugs**

	n (%)
<b>Analgesic-antipyretic</b>	<b>37 (23.4)</b>
<b>Combined drug use</b>	<b>34 (21.5)</b>
Analgesic-antibiotic	6 (3.8)
Analgesic-antidepressant	5 (3.2)
Analgesic-vitamins	4 (2.6)
Analgesic-antibiotic-vitamins	2 (1.3)
Antidepressant-antihistamines	1 (0.6)
Analgesic-antihistamines	1 (0.6)
Antidepressant-antihypertensive-antacid	1 (0.6)
Vitamin-anti-asthma	1 (0.6)
Antiarrhythmic-antiepileptic-antidepressant	1 (0.6)
Antiarrhythmic-anticoagulant	1 (0.6)
Analgesic-spasmolytic	1 (0.6)
Analgesic-antidiabetic	1 (0.6)
Analgesic-antiemetic	1 (0.6)
Antacid-antihistamine	1 (0.6)
Analgesic-antacid	1 (0.6)
Analgesic-hormone	1 (0.6)
Analgesic-antihypertensive	1 (0.6)
Antiasthma-antihistamine-antacid	1 (0.6)
Antihypertensive-antidepressant-antihistamine	1 (0.6)
Analgesic-antidepressant-vitamin-antidiabetic	1 (0.6)
Antacid-antipsychotic-antidepressant	1 (0.6)
Vitamin	10 (6.3)
Antipsychotics	10 (6.3)
Antidepressant	9 (5.7)
Antihypertensive	6 (3.8)
Antibiotic	6 (3.8)
Antiasthma	6 (3.8)
Antacid	6 (3.8)
Unknown	5 (3.2)
Antihistamines	4 (2.5)
Antiarrhythmic	3 (1.9)
Antiepileptic	3 (1.9)
Hormone	3 (1.9)
Antithrombolytic	3 (1.9)
Sildenafil	2 (1.3)
Colchicine	2 (1.3)
Other (antitussive, spasmolytic, mydriatic eye drops, antidiabetic, and antituberculosis)	9 (5.7)
<b>Total</b>	<b>158 (100)</b>

**Table 3. Classification of poisoning agents**

	n (%)
Medicine	158 (66.4)
Caustic-corrosive	36 (15.1)
Alcohol	13 (5.5)
Insecticidal and herbicidal	13 (5.5)
Carbon monoxide	9 (3.8)
Drugs	6 (2.5)
Organophosphates	2 (0.8)
Naphthalene	1 (0.4)
<b>Total</b>	<b>238 (100)</b>

n: Number

**Table 5. Symptoms caused by poisoning**

	n (%)
Asymptomatic	144 (60.5)
Nausea-vomiting	57 (23.9)
Lethargy	13 (5.5)
Abdominal pain	5 (2.1)
Erythema	5 (2.1)
Dizziness	4 (1.7)
Headache	3 (1.3)
Palpitation	3 (1.3)
Hallucinations	2 (0.8)
Others	2 (0.8)
<b>Total</b>	<b>238 (100)</b>

n: Number

Khudair et al.<sup>28</sup> identified chemical agents as the most common etiological factor (61.6%), while Liu et al.<sup>29</sup> found medicinal poisoning to occur most frequently. In our country, drug poisonings took the first place in etiology.<sup>17-30</sup> Yılmaz et al.<sup>26</sup> found that organophosphate poisoning was the most common cause. In our study, the most common cause of poisoning was drug poisoning (66.4%), and we

obtained results similar to those of the literature on the topic. While medicinal poisoning usually takes first place in research, the frequency of other causes may change. A study reported that the most common drugs, which are the largest source of poisoning reported to the National Poison Center, are analgesics, and of these, the most common are antidepressants.<sup>31</sup> Intoxications can occur with simple and/or combined medications. In a study conducted in 2002, Karcioğlu et al.<sup>32</sup> stated that 53.6% of drug poisoning occurred by a single drug and 46.4% by combined drug. Other studies have stated that anti-inflammatory, antidepressant, and antibiotic drugs are among the most common causes of poisoning.<sup>17-33</sup> In our study, analgesic-antipyretic drugs are the most common factors in drug-induced poisonings (23.4%). Öner et al.<sup>17</sup> reported that 22.9% of poisoned patients suffered from nausea and vomiting, and compared with literature, 19.4% experienced unrest and arrhythmia. In some studies, most cases were asymptomatic.<sup>34,35</sup> In another study, nausea and abdominal pain were detected in 28.6% and 20.4% of the patients, respectively.<sup>36</sup> In our study, 60.5% of poisoning cases were asymptomatic. The most common symptom was nausea and vomiting (23.9%).

The frequency of alcohol and drug use in adolescents increases because of curiosity, school, and problems with friends and family.<sup>37</sup> In our country, the frequency of trying alcohol during adolescence was 10-66%<sup>38</sup>. According to Güzel et al.<sup>39</sup> alcohol poisoning made up 2.3% of the total poisoning cases. In our study, 5.5% of the presentations with poisoning were caused by alcohol poisoning. To prevent these numbers from increasing further, adolescents should be screened for alcohol and substance use to investigate the risk factors and strengthen protective factors.<sup>40</sup>

### Study Limitations

This is a cross-sectional study that retrospectively examined childhood poisoning. Since our study was planned retrospectively, the larger the patient data available, the more they were evaluated. Since the exact dose of the drugs could not be determined, the safe and toxic doses could not be evaluated. In some cases, treatment records made before entering the hospital could not be accessed. In symptomatic cases, symptoms could not be distinguished from their current data. As research strength, our study is one of the pioneering studies in which children who had poisoning are evaluated in the South Marmara Region.

### Conclusion

Intoxications are a preventable cause of morbidity in the pediatric age group. In our study, children aged <5 years

usually had accidental poisoning. Poisoning was related to suicidal intentions in the adolescent age group. Medicines are the most common poisoning agents. Our study will contribute to the awareness of the epidemiological and clinical features of poisoning according to age groups and will contribute to the reduction of poisoning cases through correct diagnosis and provision of treatment. In addition, recognizing poisoning cases in our region will contribute to reducing youths' morbidity and mortality rates by examining the patient profiles of the hospitals serving in this region and identifying the deficiencies in their treatment plans.

### Ethics

**Ethics Committee Approval:** Ethics committee approval was received from the Çanakkale Onsekiz Mart University Ethics Committee on March 27, 2019 (no: 2011-KAEK-27/2019-1900041080).

**Informed Consent:** Medical records were examined retrospectively.

**Peer-review:** Externally peer-reviewed.

### Authorship Contributions

Surgical and Medical Practices: Y.G., F.B., H.A., Concept: F.B., H.A., Design: F.B., H.A., Data Collection or Processing: Y.G., F.B., Analysis or Interpretation: H.A., Literature Search: Y.G., F.B., Writing: Y.G., F.B., H.A.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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