Acute poisonings among children and adolescents- results of the analysis of 401 cases

Keywords
children, suicide attempt, emergency department, emergency medicine, pediatrics, poisoning, toxicology, adolescents, intoxication, poisons

Abstract

Introduction
Acute poisoning is a significant concern in modern pediatrics and emergency medicine, as it is the fifth leading cause of life-threatening injuries in children under 5 years of age. The aim of this study was to analyze and evaluate the overall patterns of acute poisoning among pediatric patients admitted to the Emergency Department of the Pediatric Hospital of the Medical University of Warsaw.

Material and methods
The study is a retrospective analysis of the medical records of children aged 0–18 years admitted to the emergency department due to acute poisoning from January 2020 to June 2021 (18 months).

Results
A total of 401 children aged from 1 month to 18 years old were included in the study. It was the patient's first poisoning in the vast majority of cases. Most cases were accidental. Acute poisoning was more common among females than males. The most common route of exposure to the poisonous substance was the oral route. The overwhelming majority of patients did not require any antidote treatment. Most children reached the hospital within 1–5 hours after taking the substance and were in generally good condition. Detergents were the most common cause of accidental poisoning, while combined pharmaceuticals and narcotics were the most common causes of intentional intoxication. No deaths were recorded.

Conclusions
Pediatricians and emergency department staff should be familiar with the management of acute poisoning and be aware of the changing patterns of intoxication depending on age and gender.

Introduction

"The dose makes the poison"—Paracelsus

Poisoning refers to an injury caused by exposure to an exogenous substance that results in illness or even death. Poisons can be ingested, injected, inhaled, or absorbed through the skin's surface [1]. Acute poisonings among pediatric patients remain a major public healthcare concern, as they are a common cause of hospitalization in pediatric departments. According to the World Health Organization, poisonings are also among the most common causes of life-threatening injuries in children and adolescents after traffic accidents, drowning, burns, and falls [2]. A retrospective study by Świderska et al. in 2018 stated that, among patients with poisoning reported by the Polish National Health Fund in the years 2009–2011, the largest group admitted were patients aged 11–18 years (30,546 cases) [3]. Fortunately, the number of fatal outcomes among children due to poisoning has declined in recent years [4, 5].

The characteristics of acute poisoning vary in each country and region and are related to the medications and substances available, as well as culture, education, and socioeconomic conditions [6]. According to the literature, acute poisonings are usually divided into two groups: accidental and intentional [7]. As children get older, this characteristic of poisoning changes in frequency—accidental intoxications decrease and intentional intoxications increase [8]. Globally, the incidental intake of therapeutic drugs and household supplies by young children is the most frequent mechanism of acute poisoning reported by poison control centers and emergency departments [9]. This kind of intoxication occurs mostly at home, occasionally leads to severe harm or a fatal outcome, and is mostly caused by carelessness of the caregivers; therefore, they are easily preventable [10]. Conversely, intentional poisonings predominate among adolescents and are mainly a form of suicidal behavior. Females are the predominant gender that chooses this method of suicide attempt [11, 12]. Adolescents often abuse pharmaceuticals, and the intake of these substances can be associated with serious medical outcomes [13].

Material and Methods

The objective of this study was to analyze and evaluate the epidemiology, clinical features, and overall pattern of acute poisoning among pediatric patients admitted to the Emergency Department of the Pediatric Teaching Clinical Hospital of the University Clinical Center of the Medical University of Warsaw (Emergency Department of the Pediatric Teaching Clinical Hospital UCC MUW). This hospital is one of the largest pediatric referral centers in Poland. We assumed that our results would be consistent with recent research and international trends, but there were differences according to regional specifics. The study was approved by the bioethical commission of the Medical University of Warsaw (consent number: AKBE/108/2021 of July 2, 2021) and hospital management.

We collected data from the Emergency Department of the Pediatric Teaching Clinical Hospital UCC MUW from January 2020 to June 2021 (inclusive). The group of interest was children (patients aged ≤ 18) admitted with one or more diagnoses from the International Classification of Diseases 10 (ICD 10) in the range of T36–T65 (regarding acute poisonings). Children were divided into age groups of 0–10 years and 11–18 years since, according to the known literature, accidental poisoning is more common in children under 11 years of age [14] [15]. Data including date of admission, age, gender, substance, dosage, route of exposure, antidote, and whether the poisoning was accidental or intentional were collected. We also obtained the following information: whether this was the child's first poisoning, time from exposure to admission, mode of reaching the hospital, general condition upon admission, interventions performed-including gastric lavage, length of hospitalization, circumstances of the incident, and whether a psychiatric consultation was performed. A total of 401 cases were included in the study. We enrolled only cases with full documentation. Cases with no indications for hospitalization or confirmation of poisoning were excluded from the study.

Statistical analysis

IBM SPSS Statistics, Version 26.0 (IBM Corp., Armonk, NY, USA) was used for statistical analysis. Statistical methods were used to describe the following: frequency tables for categorical variables, as well as range, mean, and standard deviation, which was calculated for age. Relationships between

variables were examined using the chi-square (χ^2) test. A probability value (p-value) less than 0.05 was considered statistically significant. The strength of dependence was investigated using the Phi–Yule coefficient and Cramer's V coefficient. A Cramer's V and Phi-Yule coefficient [> 0,05] is considered as weak, [>0,1] as moderate, [> 0.15] as strong, and [>0,25] as very strong [16].

Results

The study included 401 children: 228 females (56.9%) and 173 males (43.1%). Two hundred and seven children aged 0–10 and 194 children aged 11–18 were identified. The mean age for girls was 9.82 years (median 13 years, standard deviation 6.25, minimum 3 months, maximum 18 years). The mean age for boys was 7.01 years (median 3 years, standard deviation 6.59, minimum 1 month, maximum 18 years). There were no fatalities due to poisoning.

The most common route of exposure to the poisonous substance was the oral route (n = 376; 93.77%). The oral route was responsible for the poisoning of 216 females (94.74%) and 160 males (92.49%). Only 15 children (3.74%) developed inhalation poisoning. Intranasal and intravenous routes were other reported ways of substance intake. The route was undetermined in some cases. A statistically significant relationship was found between the age group of the children and the intake route [$\chi^2(2) = 9.077$; $p < 0.01$; Cramer's V = 0.142].

A total of 375 children (93.52%) did not require an antidote. The most frequently administered antidote was acetylcysteine (57.69% of all antidotes); it was administered to 15 children (3.74%). Other antidotes used included–flumazenil (n=4), naloxone (n=4), activated charcoal (n=2), and sodium bicarbonate ($NaHCO_3$) in one case. The activated charcoal was administered in intoxication with rat poison and carbamazepine, while $NaHCO_3$ was used in poisoning with tricyclic antidepressants-opipramol.

Among the examined children, accidental poisoning occurred most frequently (n = 238; 59.35%). A minority of cases (n = 154; 38.40%) were intentional poisoning. It was not possible to clearly establish whether the poisoning was accidental or intentional in nine patients (2.24%). The youngest patient classified as having intentional poisoning was 10 years old. From this age onward, both accidental and intentional poisonings occurred, but deliberate poisonings became significantly more dominant. There

was no significant relationship between the child's sex or age and the type of intoxication (accidental or intentional).

For the vast majority of children (n = 354; 88.28%), it was the first poisoning in their life. Only 47 patients (11.72%) had a previous history of poisoning. A significant relationship was found between the age group of the children and whether it was the child's first poisoning [$\chi^2(1) = 52.221$; $p < 0.001$; Phi–Yule = 0.361]. The percentage of first and subsequent poisoning rates in relation to age is presented in Figure 1.

Most of the children (n = 230; 57.36%) reached the hospital within 1–5 hours after taking the substance. In 105 patients (26.18%), the exact time from substance intake to arrival at the hospital could not be determined. Thirty-five patients (8.73%) reached the hospital more than 10 hours after the poisoning occurred, and 31 (7.73%) reached within the 5–10-hour window. A significant relationship was found between the age group of the children and the time from substance intake to hospital arrival [$\chi^2(2) = 21.909$; $p < 0.001$; Phi–Yule = 0.272].

The vast majority of patients traveled to the hospital independently (n = 276, 68.83%), while the emergency medical team was called for 125 children (31.17%). A significant relationship was found between the age group of the children and the type of transportation to the hospital [$\chi^2(1) = 84{,}170$; $p < 0.001$; Phi–Yule = 0.458]. Children aged 0–10 years were mostly brought to the hospital by their caregivers (89.37%; n = 185), while children aged 11–18 years (n = 103; 53.09%) were more often brought by the medical emergency team (Figure 2).

A total of 318 children (79.30%) were admitted to the hospital in good general condition, 68 (16.96%) were in medium condition, and 15 children (3.74%) were in serious condition. A significant relationship was found between the age group of the children and the condition of the patients on admission [$\chi^2(2) = 88.091$; $p < 0.001$; Cramer's V = 0.442]. It was determined that more older children tended to be in worse general health upon admission to the hospital. Detailed data are presented in Figure 3.

The indications for gastric lavage included: highly likely poisoning due to health-threatening oral ingestion of pharmaceuticals within a maximum of 2 hours of ingestion of the substance, or in the case of a very large dose (even several hundred tablets). It was possible to exceed this time beyond the 2-hour limit, although in each case the decision was made by the physician. Thirty-eight patients (9.48%) required gastric lavage, while 363 patients (90.52%) did not undergo this procedure. There was a significant relationship between the sex of the child and whether gastric lavage was performed [$\chi^2(1) = 5.633$; $p = 0.018$; Phi–Yule = 0.127]. Twenty-nine girls (12.72%) required gastric lavage, while only nine boys (5.20%) required gastric lavage. A significant relationship was found between the age group of the children and whether gastric lavage was performed [$\chi^2(1) = 15.707$; $p < 0.001$; Phi–Yule = 0.198]. Among children aged 0–10 years, eight (3.86%) required gastric lavage, while 199 (96.14%) did not require gastric lavage. Thirty patients (15.64%) in the 11–18-year-old age group required gastric lavage, while 164 (84.54%) did not require gastric lavage. The most common location for gastric lavage was an emergency department (n = 31; 81.58%), while seven (18.42%) procedures were performed in an ambulance.

The vast majority of children (89.03%) required medical interventions, such as monitoring vital functions (n = 277; 77.59%), gastroscopy (n = 58; 16.25%), or other (n = 22; 6.16%) (e.g., hydration, oxygen therapy, intubation, or hyperbaric chamber). Forty-four patients (10.97%) did not require any additional medical procedures. A significant relationship was found between the child's sex and the interventions performed [$\chi^2(2) = 11.372$; $p = 0.003$; Cramer's V = 0.180]. Girls most often required monitoring of vital functions (n = 172; 83.09%), gastroscopy (n = 22; 10.67%), or other interventions (n = 13; 6.28%). In boys, these values were 70.00% (n = 105), 24.00% (n = 36), and 6.00% (n = 9), respectively. A significant relationship was found between the age groups of the children and the interventions performed [$\chi^2(2) = 54.356$; $p < 0.001$; Cramer's V = 0.390]. In both age groups, monitoring of vital functions was the most commonly performed intervention, which included 120 children (65.93%) aged 0–10 years and 157 children (89.72%) aged 11–18 years. Children aged 0–10 years required gastroscopy much more often (n = 55; 30.22%) than children aged 11–18 years (n = 3; 1.71%).

Other medical procedures were performed in seven children aged 0–10 years (3.85%) and 15 children aged 11–18 years (8.57%).

For 335 patients (83.54%), it was possible to identify the causes/circumstances of the event, which included caregiver inattention, suicide attempt, history of mental disorders in the child, parental mistake, and others. A significant relationship was found between the age group of the children and whether there were any causes or circumstances of the event [$\chi^2(1) = 45.643$; $p < 0.001$; Phi–Yule = 0.337]. Among children aged 0–10 years, 198 (96.65%) had causes/circumstances of the event, while among children aged 11–18 years, the causes/circumstances of the event were identified in 137 (70.62%) patients. A significant relationship was found between the child's sex and the presence of specific causes/circumstances of poisoning [$\chi^2(4) = 37.252$; $p < 0.001$; Cramer's V = 0.329]. A significant relationship was also found between the age group of children and the specific causes/circumstances of the event [$\chi^2(4) = 348.230$; $p < 0.001$; Cramer's V = 0.920]. Detailed data on the frequency of causes or circumstances of the event are presented in Figures 4 and 5.

Of all the patients, 135 (33.67%) required a psychiatric consultation. The indication for psychiatric consultation was predominantly a suicide attempt in the form of intoxication. A significant relationship was found between the child's sex and whether a psychiatric consultation was performed [$\chi^2(1) = 33.784$; $p < 0.001$; Phi–Yule = 0.290]. It is also important to note that a significant relationship was found between the age group of the children and whether a psychiatric consultation was conducted [$\chi^2(1) = 204.867$; $p < 0.001$; Phi–Yule = 0.715]. Statistically significant data are presented in Figure 6.

Over 100 different substances were reported in the study as the cause of acute poisoning. More than one substance was involved in 58 cases (14.46%). The most common cause of accidental poisoning was detergents (n = 73; 30.67%). The most common substances causing accidental poisoning were: in the group of detergents- washing capsules (n=34), liquid cleaners (n=12), toilet rim block (n=11); among pharmaceuticals- over-the-counter painkillers (Acetaminophen (n=11), Ibuprofen (n=8)), psychiatric medicines (n=9); in the group of household supplies- rat poison (n=6), decalcifier (n=4). The plants most frequently causing poisoning included the following species- *Convallaria Majalis* (n=4), *Taxus* (n=4),

and *Belladonna* (n=2). Combined pharmaceuticals and narcotics were responsible for most intentional poisonings (n = 34; 21.79%). Detailed data on the frequency of substances causing the poisonings are presented in Tables I and II.

Discussion

Despite childproof packaging, advances in healthcare, and increasing awareness about acute poisoning among the general public, acute intoxications remain a challenging problem in modern pediatrics and emergency medicine. The incidence of deliberate suicide-related poisonings has been increasing in recent years [12],12]. The coronavirus disease 2019 (COVID-19) pandemic has disrupted the lives of people around the world, affecting the mental health of minors [17], which may additionally contribute to the increase in intentional poisoning incidents.

Analysis of the data collected in the period from January 2020 to June 2021 demonstrated a predominance of females among reported cases of acute poisonings (n = 228; 56.9%). These findings are consistent with another Polish study [18]. This appears to be related to the tendency of females to choose this method for suicidal purposes [11],[19]. The reason for that may be the fact that poisoning is associated with relatively low lethality compared with other methods of suicide. Women in mental health crises want to attract public attention to their problems rather than act to take their own lives [11, 20].On the other hand, some studies have shown the opposite trend, with a male predominance [10, 21]. There are differences in the patterns of poisoning between men and women. Alcohol abuse and high suicidal intent of acute poisoning are significantly more common in males [22, 23]. Alcohol is responsible for the majority of fatal poisonings among men, and pharmaceuticals among women [23]. Additionally, men are more likely to take drugs recreationally and therefore the toxicity associated with such behavior is more frequent in them [24] [25].

In comparison to a study by Pac-Kożuchowska et al., who reported that 2.59% of children had a previous history of acute poisoning [8], we observed significantly more such cases (11.72%).

In the present study, the majority of poisoning incidents were classified as unintentional (n = 238; 59.35%), which is similar to other research findings [8, 14, 15]. Conversely, a study by Kierus et al.

reported a significant predominance of intentional poisonings (68.85%) [26]. The incidence of unintentional poisoning usually decreases as the age of the child increases; there is a corresponding inverse pattern with deliberate poisonings. These results are consistent with other reports [8, 14] and highlight the increase in the number of suicide attempts and experimentation with narcotics and alcohol among older children [19]. The youngest patient reported with intentional poisoning was only 10 years old, and the case was classified as suicidal behavior. There is insufficient research on suicidal behaviors among very young children. Additionally, serious family conflict issues and poor parental supervision seem to contribute to suicidality among children as young as 10 [27].

The majority of patients reached the hospital on their own (n = 276; 68.83%). This study showed that young children were transported independently more often than older children. This may be due to the fact that the younger patients were in better condition, so fewer incidents required an ambulance. Similar results were observed by Soave et al. [14]. In the predominant number of cases, the patients were admitted in good general condition (n = 318; 79.30%). Other researchers have come to similar conclusions [15, 26, 28], reporting that the majority of children presented with minimal or no effects of exposure. However, it should be mentioned that we relied on the healthcare providers' assessments in our study. There is no single unified scale for assessing the severity of the condition; therefore, the results may be debatable and inconclusive. A significant relationship was found between the age group of the children and their condition upon admission. Patients in the older age group tended to be in worse general condition upon admission. The reason for this was the changing pattern of poisoning, which was characterized by a predominance of intentional suicide-related poisoning using pharmaceuticals or narcotics among older children [11, 13].

The use of gastric lavage seems controversial. It has been claimed that this procedure should not be used routinely but considered only in particular cases [29]. Therefore, it may be surprising that gastric lavage was performed in almost 10% of the cases in our study. In comparison, this procedure was performed in only 2.8% [28] and 2.3% [14] in other studies. A minority of children required the administration of a particular antidote. The most commonly provided antidote was acetylcysteine (n = 15; 3.74%), which is recommended for patients with acetaminophen-induced liver toxicity [30]. This is expected,

considering that over-the-counter painkillers are the leading intentionally taken substances [13]. In our study, the total number of cases caused by acetaminophen poisoning was 31. In half of the cases, acetylcysteine was administered. In the remaining cases, acetaminophen was ingested in a non-toxic dose or gastric lavage removed most of the tablet mass during the initial phase of poisoning.

Suicide attempts and a history of mental illness were the predominant circumstances of poisoning among children aged 11–18, especially in females. These findings are consistent with the well-established knowledge that adolescent females are more likely than males to have suicidal thoughts and attempts [31] and are at higher risk of depression [32]. A Polish study reported that the most common cause of suicide-related poisoning was family problems [12]. Soave et al. claimed that in adolescents over 12 years of age, the risk factors for deliberate poisoning were female gender, psychiatric diseases, and complex family dynamics [14].

One limitation of this research is that the study group consisted of patients admitted to a single emergency department and the retrospective nature of the study. Another limitation of this study was the possible overestimation of the results concerning the assessment of the patient's general condition. Because of the retrospective character of the study, the general condition was based on the medical records and the evaluation of physicians. Unfortunately we could not use an objective assessment tool. The authors hope to extend the field of study in future prospective research.

Conclusions

Accidental poisonings dominate among younger children, while suicide attempts and experimentation with drugs, narcotics, and alcohol are becoming significant problems among teenagers. Pediatricians and emergency department staff should be familiar with the management of acute poisonings and be aware of the changing patterns of intoxication according to age and gender. Greater attention should be paid to expanding efforts to instruct and educate parents and caregivers on the principles of poisoning prevention, the proper dosages of medications, and secure storage conditions, especially of detergents and pharmaceuticals, as they are the leading causes of acute intoxication. It is vital to prevent suicide

attempts because older children and adolescents are much more likely to be hospitalized in serious condition due to poisoning.

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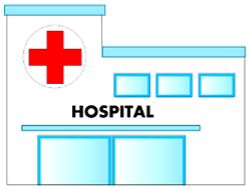

Emergency Department of UCC MUW (Warsaw)
January 2020 - June 2021

Medical records
Patients with a diagnose in the range of T36–T65 (ICD 10)

Children diagnosed with acute poisoning
n=401

Analysis

CONCLUSIONS:
1. The majority of cases were accidental.
2. Acute poisoning was more common among females than males.
3. Detergents were the most common cause of accidental poisoning, while combined pharmaceuticals and narcotics were the most common causes of intentional intoxication.
4. Most children reached the hospital within 1–5 hours after taking the substance and were in generally good condition.
5. No case of death was recorded.

Table I. Types, numbers, and percentages of substances causing accidental poisonings.

Substances	**n**	**%**
Detergents	73	30.67
Pharmaceuticals	76	31.93
Household supplies	34	14.29
Plants	16	6.72
Ethanol/Narcotics/ Nicotine	14	5.88
Carbon monoxide	11	4.62
Mushrooms	8	3.36
Others	6	2.52

Table II. Types, numbers, and percentages of substances causing intentional poisonings.

Substances	**n**	**%**
Combined pharmaceuticals + narcotics	34	22.08
Ethanol	30	19.48
Ethanol Including:		
- Ethanol (alone)	16	10.40
- Ethanol + other substances	14	9.08
Over-the-counter painkillers	27	17.53
- Acetaminophen	17	11.04
- Ibuprofen	7	4.54
- Acetaminophen + Ibuprofen	3	1.95
Benzodiazepines	13	8.44
Selective serotonin reuptake inhibitors	13	8.44
Quetiapine	8	5.19
Narcotics	8	5.19
Other psychiatric pharmaceuticals	5	3.25
Opiates	5	3.25
Other pharmaceuticals	5	3.25
Carbamazepine	4	2.60
Detergents	2	1.30

Table III. Characteristics of 401 patients with acute poisoning by age and gender (Fisher's exact test was used when the expected value was less than 5).

Data	Age		p-value	Gender		p-value
	0–10 years 207 (51.6%)	11–18 years 194 (48.4%)		Female 228 (56.9%)	Male 173 (43.1%)	
Route of intake						
Oral	200 (96.6%)	176 (90.7%)	**p < 0.010**	216 (94.7%)	160 (92.5%)	p = 0.529
Inhalation	6 (2.9%)	9 (4.6%)		8 (3.5%)	7 (4.0%)	
Others	1 (0.5%)	9 (4.6%)		4 (1.8%)	6 (3.5%)	
Was it the child's first poisoning?						
Yes	206 (99.5%)	148 (76.3%)	**p < 0.001**	200 (87.7%)	154 (89.0%)	p = 0.689
No	1 (0.5%)	46 (23.7%)		28 (12.3%)	19 (11.0%)	
Time from taking the substance to reaching the hospital						
1–5 h	154 (86.5%)	76 (64.4%)	**p < 0.001**	139 (75.6%)	91 (81.3%)	p = 0.288
5–10 h	14 (7.9%)	17 (14.4%)		19 (10.3%)	12 (10.7%)	
> 10 h	10 (5.6%)	25 (21.2%)		26 (14.1%)	9 (8.0%)	
Way of getting to the hospital						

Independently	185 (89.4%)	91 (46.9%)	**p < 0.001**	156 (68.4%)	120 (69.4%)	p = 0.840
Emergency medical team	22 (10.6%)	103 (53.1%)		72 (31.6%)	53 (30.6%)	
Condition of the patient on admission						
Good	200 (96.6%)	118 (60.8%)	**p < 0.001**	177 (77.6%)	141 (81.5%)	p = 0.279
Medium	6 (2.9%)	62 (32.0%)		44 (19.3%)	24 (13.9%	
Serious	1 (0.5%)	14 (7.2%)		7 (3.1%)	8 (4.6%)	
Was gastric lavage performed?						
Yes	8 (3.9%)	30 (15.5%)	**p < 0.001**	29 (13.0%)	9 (5.0%)	**p = 0.018**
No	199 (96.1%)	164 (84.5%)		199 (87.0%)	164 (95.0%)	
Other interventions performed in the emergency department						
Monitoring of vital functions	120 (65.9%)	157 89.7%)	**p < 0.001**	172 (83.1%)	105 (70.0%)	**p = 0.003**
Gastroscopy	55 (30.2%)	3 (1.7%)		22 (10.6%)	36 (24.0%)	
Others	7 (3.9%)	15 (8.6%)		13 (6.3%)	9 (6.0%)	
Were there specific causes/circumstances of the poisoning?						
Yes	198 (95.7%)	137 (70.6%)	**p < 0.001**	193 (84.6%)	142 (82.1%)	**p < 0.001**
No	9 (4.3%)	57 (29.4%)		35 (15.4%)	31 (17.9%)	

Specific causes/circumstances of the poisoning						
Caregiver inattention	178 (89.9%)	1 (0.7%)	**p < 0.001**	82 (42.5%)	97 (68.3%)	**p < 0.001**
Suicide attempt	7 (3.5%)	88 (64.2%)		74 (38.3%)	21 (14.8%)	
History of mental disorders	1 (0.5%)	32 (23.4%)		26 (13.5%)	7 (4.9%)	
Parental mistake	8 (4.0%)	1 (0.7%)		4 (2.1%)	5 (3.5%)	
Others	4 (2.0%)	15 (11.0%)		7 (3.6%)	12 (8.5%)	
Was a psychiatric consultation conducted?						
Yes	2 (1.0%)	133 (68.6%)	**p < 0.001**	104 (45.6%)	31 (17.9%)	**p < 0.001**
No	205 (99.0%)	61 (31.4%)		124 (54.4%)	142 (82.1%)	

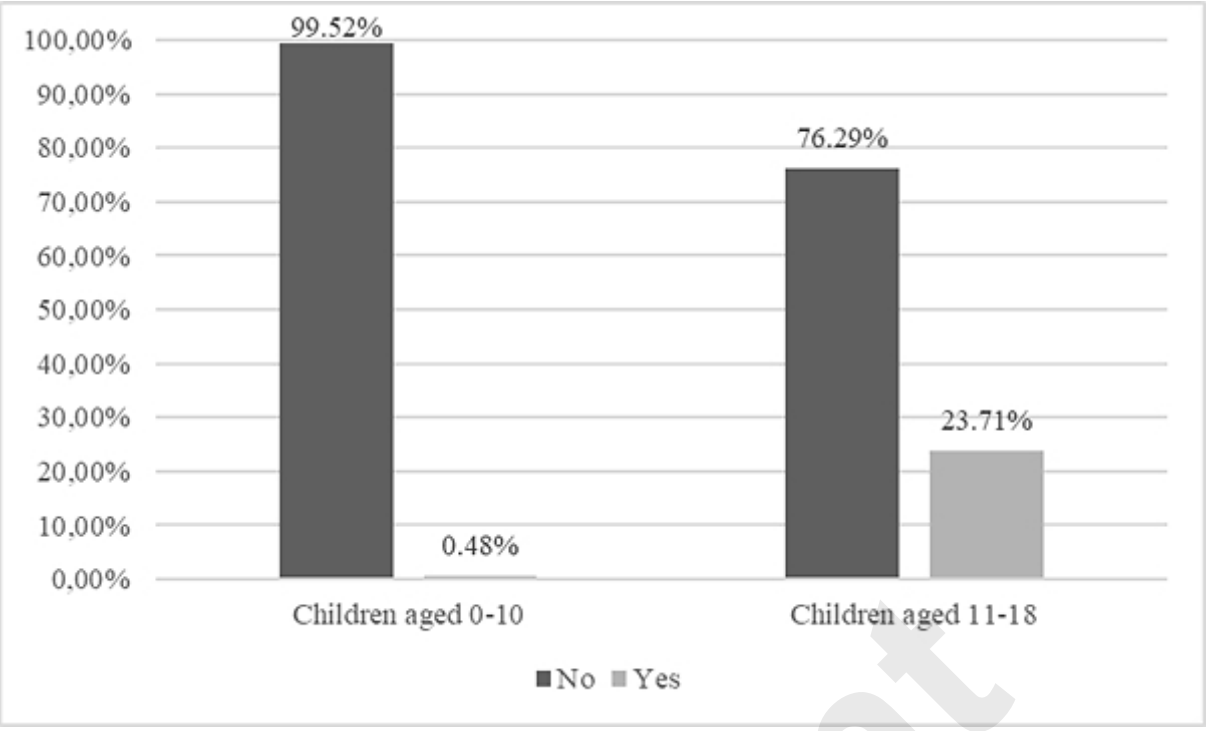

Figure 1. Relationship between age and whether the child had a prior history of poisoning.

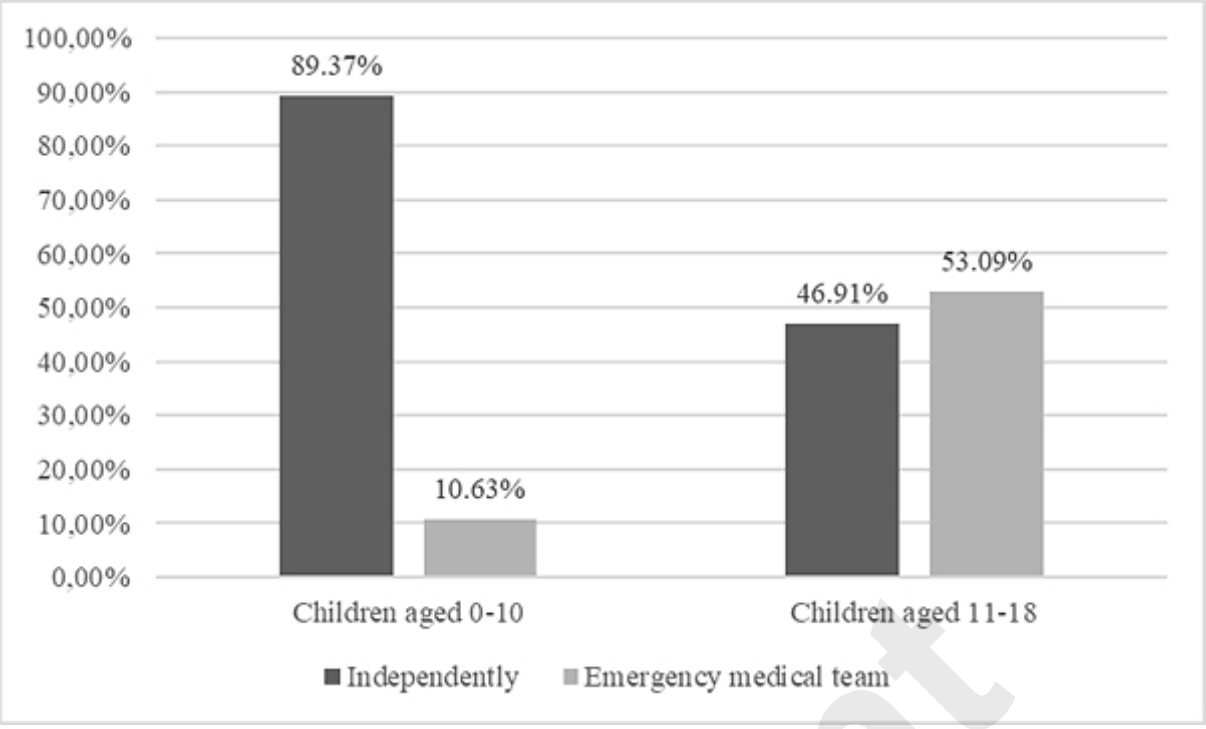

Figure 2. Relationship between age and mode of transport to the hospital.

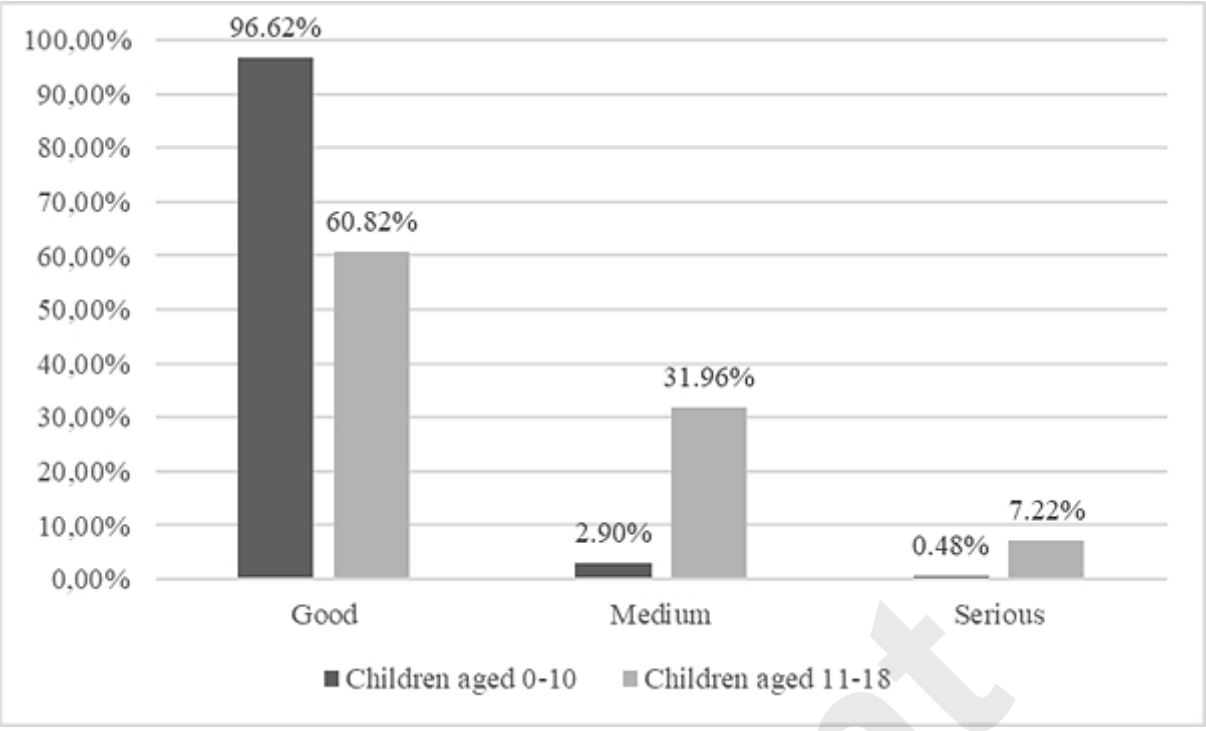

Figure 3. Relationship between age and general condition of the patient upon admission to the hospital.

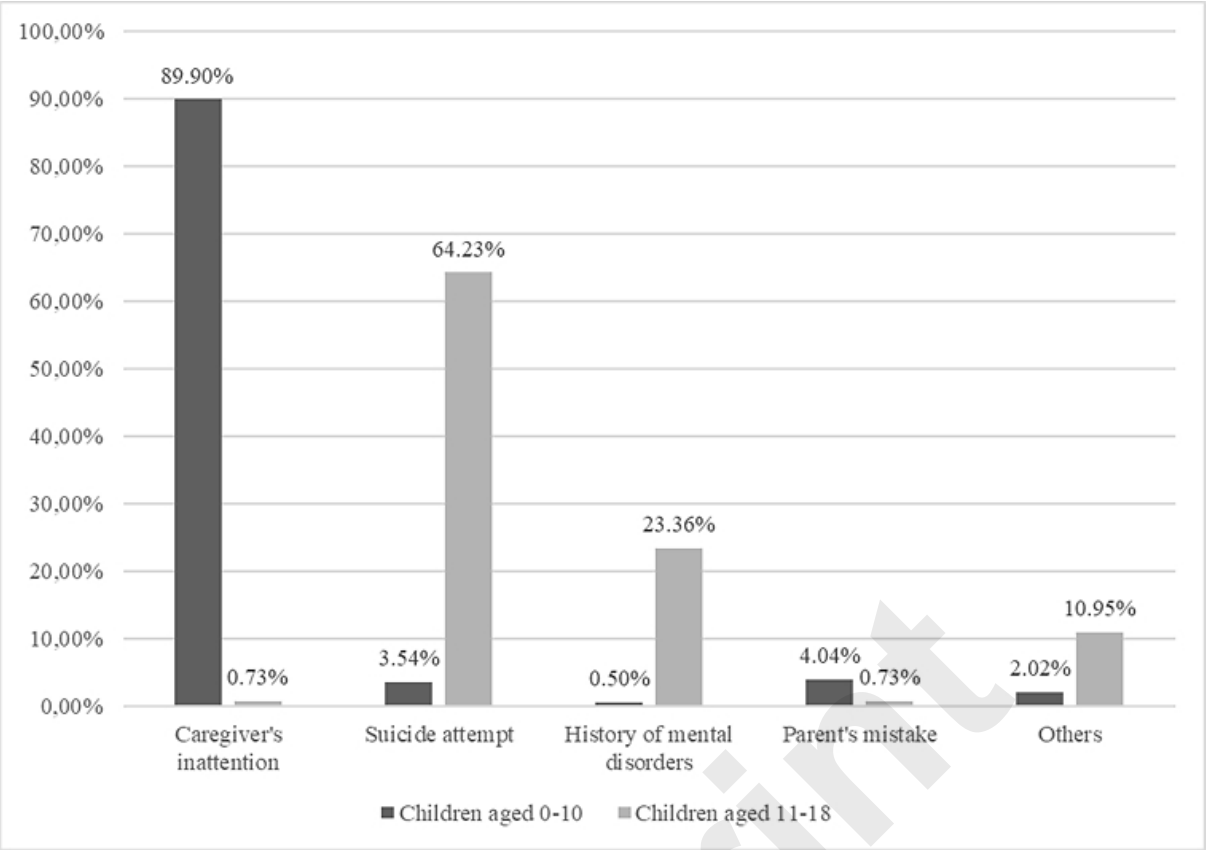

Figure 4. Relationship between age and causes or circumstances of the poisoning.

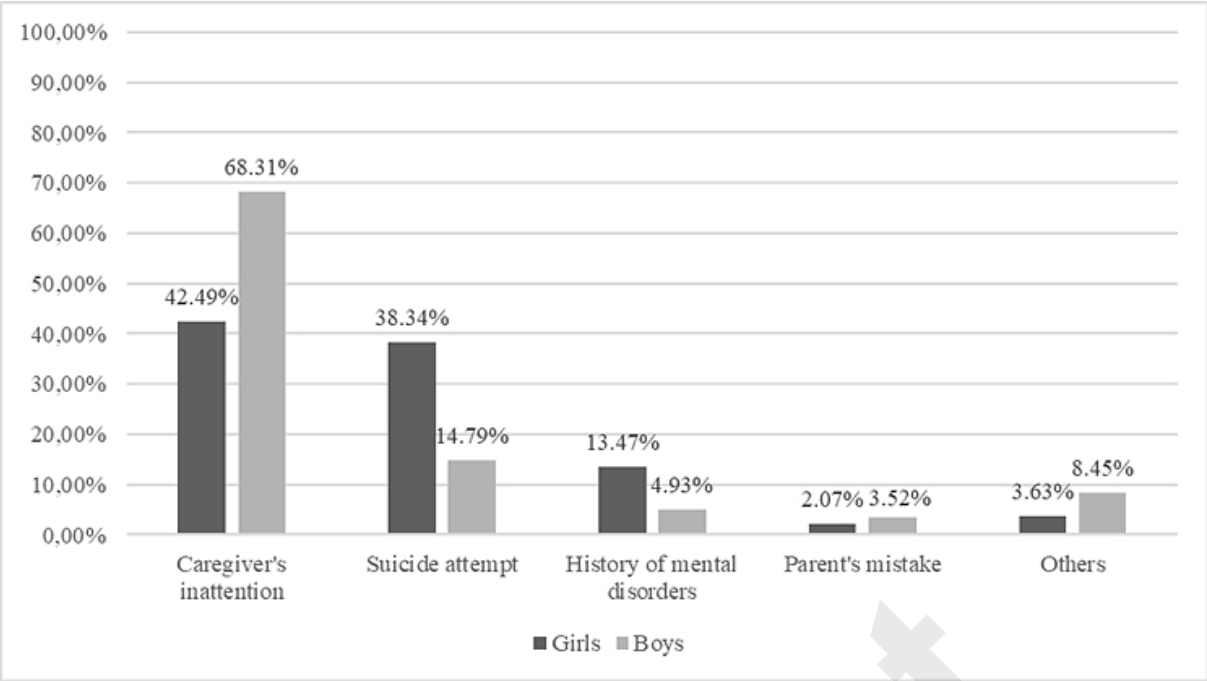

Figure 5. Relationship between sex and causes or circumstances of the poisoning.

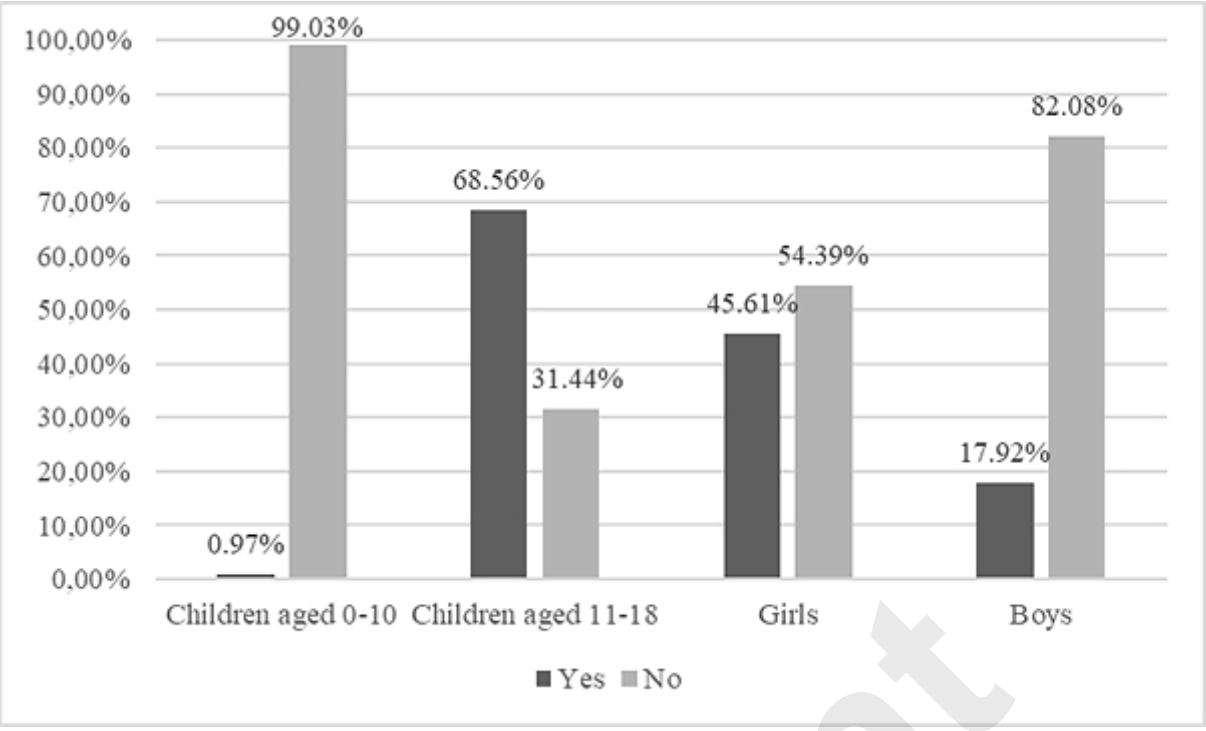

Figure 6. Relationship between age, sex, and whether a psychiatric consultation was performed.