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ORIGINAL ARTICLE

Poisoning Cases Among Children Under 18 Years in Arak: Causes, Contributing Factors, and Statistics

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Abstract

***Background*:** Childhood poisoning poses serious health risks and complications. Numerous studies have highlighted differing rates of pediatric poisoning. This study investigates the prevalence, causes, and contributing factors of poisoning among children during the period from 2022 to 2024.
***Methods*:** This cross-sectional study involved 483 children aged 1–18 years diagnosed with poisoning in Amir Kabir Hospital in Arak between March 2022 and March 2024. Data were retrospectively gathered from patient medical records during the specified period. Information on demographic details, seasonality, type of exposure (intentional or accidental), and general categories of poisoning agents was collected and analyzed using SPSS version 26.
***Results*:** The mean age was 7.78 ± 5.75 years. Girls were significantly older than boys (8.79 ± 5.82 vs. 6.62 ± 5.45 years; P = 0.0001). Poisoning peaked in winter (30.6%). Mean hospital stay was 1.72 ± 1.06 days. Pharmaceutical poisoning was the most common cause (43.1%). Neurological symptoms were the most frequent presentation (49.9%). Accidental poisoning accounted for 76.4% of cases, with significant gender differences (accidental: 51.8% in boys; intentional: 71.1% in girls; P < 0.01).
***Conclusion*:** Pharmaceutical agents represented the leading cause of pediatric poisoning in this study. These findings underscore the importance of enhancing medication safety measures, enforcing stricter controls on drug accessibility, and implementing targeted prevention strategies, particularly for younger children and adolescents.

Keywords: Child, Poisoning, Pediatrics, Epidemiology, Toxicology

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INTRODUCTION

Poisoning is a leading cause of hospital emergency room visits in numerous countries. Annually, 7% of emergency room patients experience poisoning from exposure to various substances, with many progressing to severe conditions like brain death due to the seriousness of the complications [1]. Pediatric poisoning is a frequent global emergency that happens when harmful substances are ingested, inhaled, injected, or absorbed through the skin in dangerous amounts [2].

Poisoning is most prevalent among children aged 1 to 5. In their first year, it is primarily caused by medications given by parents. For children aged 2 to 3, household cleaning products are the main source. Between ages 3 and 5, poisoning often results from medications stored in cupboards or left unsecured. Among school-age children and teenagers, the primary cause of poisoning is the use of medications in suicide attempts [3]. Various studies report that the prevalence of poisoning in children ranges from 3% to 6.7%. Over half of these cases involve children under the age of six, with more than 90% occurring in the home-incidents that are largely preventable [4].

The pattern of significant acute poisoning risks differs by age, country, and even city. Within the same region, the causes and demographics of childhood poisoning can evolve over time. This poses a constant challenge for emergency physicians. Regular monitoring is essential to identify trends in specific factors and variables linked to childhood poisoning. Such surveillance aids in developing prevention strategies and enables emergency physicians to effectively recognize and manage poisonings based on age and timing [3, 5]. The poisoning rate for boys in the WHO African Region is 5 per 100,000 people, whereas for girls in high-

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income countries in the Eastern Mediterranean and Western Pacific regions, it is 0.1 per 100,000 people [6].

A range of substances can lead to poisoning in children, primarily household chemicals like detergents and bleach, industrial pesticides, narcotics, and herbal compounds. Research indicates that medications, including benzodiazepines and tramadol, are the most frequent toxic agents. Treating poisoning in children involves cardiorespiratory support, preventing absorption, toxin removal using laxatives (such as sorbitol), and administering antidotes [7].

Considering the widespread prevalence, substantial costs, and high mortality rates linked to poisonings, determining their causes is crucial for improving patient care and enhancing prevention measures. Since the types of poisonings vary by region and over time, regular reassessment within each area is indispensable. Accordingly, we conducted this study to gather epidemiological data on pediatric poisoning in Arak city, with the goal of reducing potential risks and improving treatment outcomes.

METHODS

A cross-sectional retrospective study was carried out on children aged 1 to 18 years who were admitted with poisoning diagnoses to Amir Kabir Hospital in Arak between March 2022 and March 2024. After receiving approval from the Ethics Committee of Arak University of Medical Sciences (Ethics ID: IR.ARAKMU.REC.1403.010), the medical records of eligible patients were reviewed.

Data collection was conducted using a structured checklist created by the research team, which captured demographic details, type and intent of poisoning, season of exposure, clinical symptoms, and hospitalization outcomes. Given the retrospective design of the study, comprehensive information regarding specific pharmaceutical agents was not consistently available; thus, pharmaceutical poisoning was categorized as a single general group. All accessible records within the study timeframe were included.

RESULTS

A total of 483 children with poisoning were included in this study. Among them, 259 were girls (53.6%) and 224 were boys (46.4%). The average age of the children was 7.78 ± 5.75 years, with an average hospital stay of 1.72 ± 1.06 days. The average age of the boys was 6.62 ± 5.45 years, while that of the girls was 8.79 ± 5.82 years, with the girls being significantly older (P = 0.0001). Poisoning cases were more common in boys than girls within the 1-3 and 4-12 age groups. Conversely, in the 13-18 age group, girls experienced poisoning cases more frequently than boys (Figure 1).

The majority of poisonings were unintentional (76.4%), though a notable correlation with age and gender was identified. Accidental poisonings were more frequent in the 1-3 years (96%) and 4-12 years (89%) age groups, while intentional poisonings were more common in the 13-18 years age group (57%). Accidental poisonings are more frequent among boys (51.8%), while intentional poisonings are more prevalent among girls (71.1%) (Table1). Poisoning in children occurs most frequently in winter, accounting for 30.6%, while the lowest frequency is in spring at 21.9%. The incidence of poisoning in children is 24.2% in summer and 23.2% in autumn.

Table 2 outlines the causes of poisoning in children, categorized by gender and age group. Poisoning from pharmaceuticals and detergents is more common in girls, accounting for 65.9% and 54.2% of cases, respectively. In contrast, boys have a higher frequency of poisoning from other causes, including 75% of pesticide-related cases, 66.7% of hydrocarbon-related cases, 51.4% of narcotic-related cases, 53.8% of carbon monoxide-related cases, and 59.2% of cases involving other causes. The lowest average age associated with detergent poisoning was 3.16, while the highest average age associated with poisoning from other causes was 9.95 years.

Poisoning incidents showed seasonal variations: the highest rates for drugs, narcotics, and carbon monoxide poisoning occurred in winter (32.2%, 28.4%, and 59%, respectively). Pesticide poisoning peaked during summer and autumn (both 35%), while detergent poisoning was most common in autumn and winter (33.3% each). Hydrocarbon poisoning reached its highest rates in spring and autumn (33.3% each), and poisoning from other causes was most frequent in summer (38%) (Table 3). Neurological symptoms were the most common in poisonings, occurring at a frequency of 49.9%, while urinary symptoms were the least common, with a frequency of 0.8% (Figure 2).

DISCUSSION

Poisoning among children is a significant global public health issue and remains a leading cause of emergency department visits, especially in low- and middle-income nations. Pediatric toxicology surveillance systems worldwide consistently reveal notable morbidity linked to both accidental and intentional poisonings, underscoring the importance of region-specific epidemiological data to guide effective prevention efforts [8, 9]. Recent international studies show that patterns of pediatric poisoning vary greatly based on factors such as age, socioeconomic status, household behaviors, and access to medications.

Recent studies conducted across multiple centers and internationally have shown that pharmaceutical substances and household chemicals are the leading causes of pediatric poisoning in various environments. A comprehensive multicenter study from southwestern China, which analyzed 1,755 cases of pediatric poisoning, identified pharmaceuticals as the primary cause, with distinct

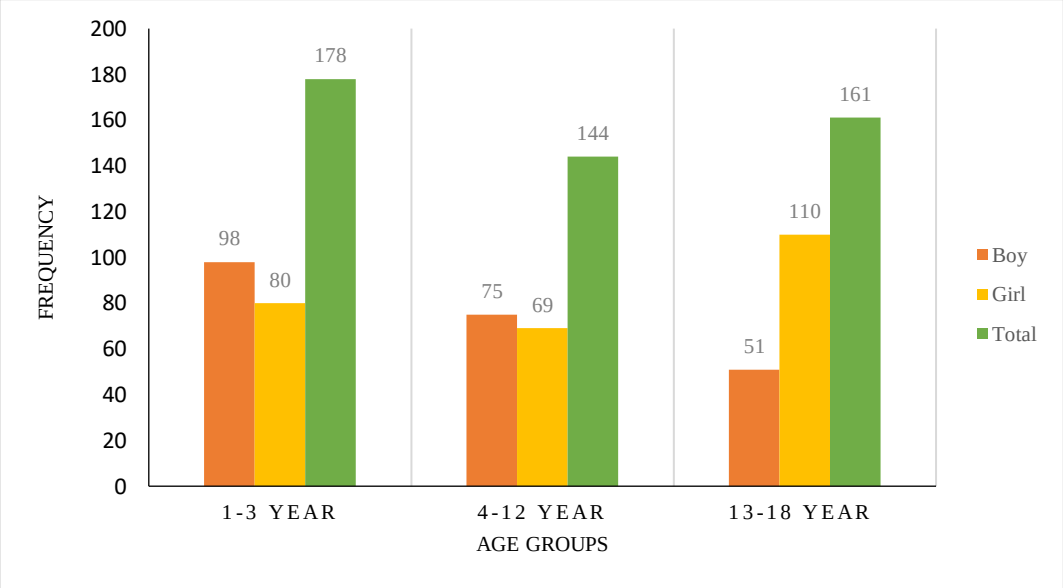

Figure 1. Incidence of poisoning in children under 18 years by gender and age groups

Table 1. Incidence of intentional and accidental poisoning in children under 18 years by gender and age groups

Type of exposure	1-3 year N (%)	4-12 year N (%)	13-18 year N (%)	Boy N (%)	Girl N (%)
Accidental	172 (% 96)	131 (% 89)	69 (% 43)	191 (% 51.8)	178 (% 48.2)
Intentional	6 (% 4)	16 (% 11)	92 (% 57)	33 (% 28.9)	81 (% 71.1)

Table 2. The correlation between age, gender, and the causes of poisoning in children

Causes of poisoning	Average of age Mean (SD)	P-value	Boy Mean (SD)	Girl Mean (SD)	P-value
Pharmaceuticals	8.77 (5.83)	0.0001	71 (34.1)	137 (65.9)	0.0001
Narcotics	6.66 (5.64)		56 (51.4)	53 (48.6)	
Carbon monoxide	6.51 (4.49)		21 (53.8)	18 (46.2)	
Pesticides	6.10 (5.99)		15 (75)	5 (25)	
Detergents	3.16 (3.23)		11 (45.8)	13 (54.2)	
Hydrocarbons	4.33 (4.41)		8 (66.7)	4 (33.3)	
Other	9.95 (5.47)		42 (59.2)	29 (40.8)	

variations based on age and seasonality [10]. Likewise, a European narrative review highlighted that medication-related poisonings are most prevalent among younger children, while intentional poisonings are more common in

Table 3. The relationship between Season and the cause of poisoning in children

Season	Pharmaceuticals Mean (SD)	Narcotics Mean (SD)	Carbon Monoxide Mean (SD)	Pesticides Mean (SD)	Detergents Mean (SD)	Hydrocarbons Mean (SD)	Other Mean (SD)	P Value
Spring	44 (21.2)	28 (25.7)	10 (25.6)	6 (30)	3 (12.5)	4 (33.3)	11 (15.5)	
Summer	53 (25.5)	24 (22)	0	7 (35)	5 (20.8)	1 (8.3)	27 (38)	
Autumn	44 (21.2)	26 (23.9)	6 (15.4)	7 (35)	8 (33.3)	4 (33.3)	17 (23.9)	0.0001
Winter	67 (32.2)	31 (28.4)	23 (59)	0	8 (33.3)	3 (25)	16 (22.5)	
Total	208 (100)	109 (100)	39 (100)	20 (100)	24 (100)	12 (100)	71 (100)	

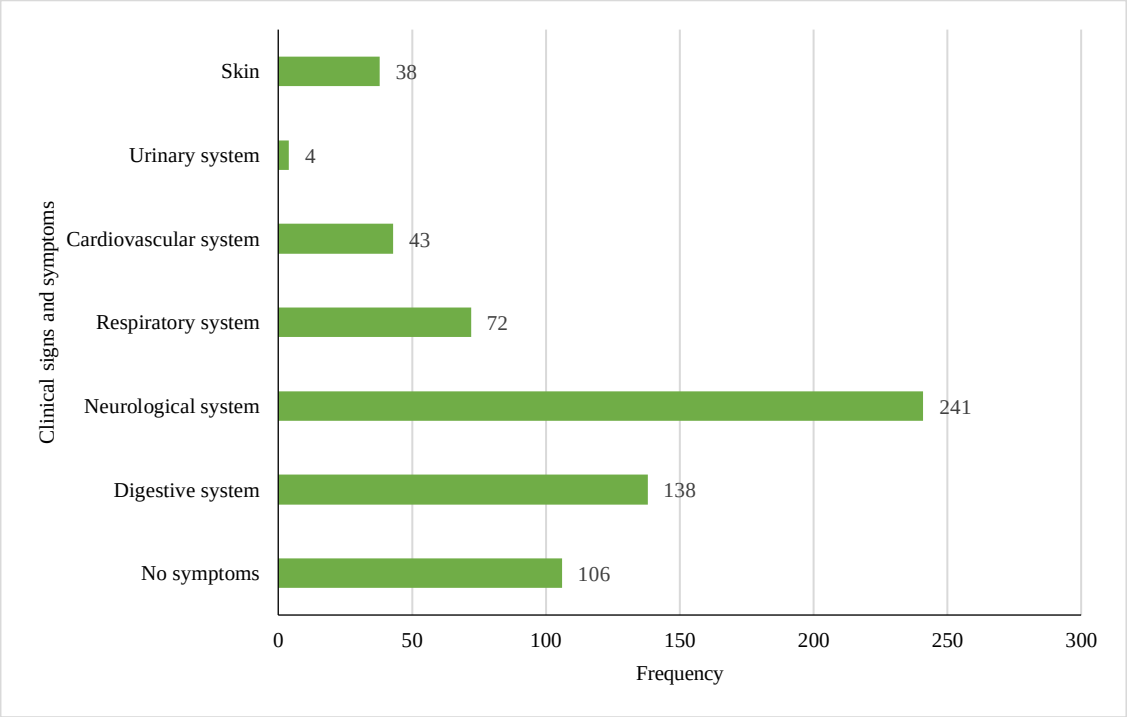

Figure 2. Prevalence of clinical signs and symptoms in poisoned children under 18 years of age

adolescents, often linked to psychosocial stressors and behavioral factors [5].

The results of this study align with international findings, particularly highlighting the prevalence of pharmaceutical poisoning and the significant rate of accidental exposures among younger age groups. These trends can be understood through a developmental–ecological lens. Younger children are especially at risk due to their exploratory behaviors, limited understanding of risks, and the unsafe storage of medications at home. On the other hand, poisoning incidents among adolescents are more often driven by behavioral, psychological, and socioeconomic factors, such as emotional distress, peer pressure, and easier access to medications.

Various international studies, both multicenter and single-center, have highlighted similar epidemiological trends in pediatric poisonings, showing that pharmaceuticals are the most frequent agents, with accidental cases prevailing among younger children and intentional cases being more common among adolescents [11, 12]. US poison exposure trends reveal age-related variations and highlight the significant role of pharmaceuticals as exposure agents [13]. Data from Italy highlights the significance of pediatric poison control registries in analyzing exposure trends and intentional incidents among adolescents [14].

The epidemiological trends identified in this study align with previous single-center reports from Iran; however, this research offers updated insights from a less-studied region, enhancing the understanding of pediatric poisoning in comparable contexts. The results emphasize the critical need for medication safety, family-focused education, and age-specific preventive public health measures.

This study has certain limitations. Firstly, being conducted at a single referral center may restrict the applicability of the findings to broader populations. Secondly, the retrospective design depends on the precision and completeness of medical records, which could lead to potential gaps or inaccuracies in documentation. Moreover, many records lacked detailed information on specific pharmaceutical agents, socioeconomic factors, and psychological aspects.

CONCLUSION

Pharmaceutical poisoning emerged as the leading cause of pediatric poisoning in this study; however, the absence of detailed drug-specific data restricts further categorization. The results highlight the critical need for preventive measures, including secure medication storage, public awareness campaigns, and enhanced regulatory control. These findings can guide emergency medical practices and regional public health strategies to mitigate childhood poisoning incidents.

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