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Original Article

Acute Drug Poisoning among Children Attending a Pediatric Emergency Department in Tishreen University Hospital

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Abstract *- Background: Poisoning poses a significant challenge to public health, ranking among the foremost contributors to worldwide mortality, morbidity, and healthcare costs. Objective: This study aims to assess the incidence of pharmacological poisoning in pediatric patients, along with the eventual outcomes observed. Materials and Methods: A one-year cross-sectional descriptive-analytical investigation was carried out from January 2022 to December 2022 at Tishreen University Hospital located in Lattakia, Syria. The study included all children attending emergency departments that care for children with a history of acute poisoning by drugs. Results: 228 children were analyzed, with 105 (46.1%) diagnosed with acute drug poisoning. The mean age was 3.24±2.1 years, and the most common age group was 1-4 years (81.9%). Males accounted for 49.5% of the sample, and females 50.5%. Respiratory drugs were the most frequently involved (21%), followed by psychotropic drugs (17.1%) and cardiovascular drugs (10.5%). Most cases (93.3%) were unintentional, with 39% occurring in the morning. Gastrointestinal ingestion was common (95.2%), with half during the winter and minimal parental intervention (90.5%). Circulatory and neurological symptoms were prevalent on admission (13.3% and 11.4%, respectively). Conclusion: There is an important prevalence of unintentional poisoning in the targeted health center, so taking prevention strategies for poisoning is considered crucial to improving the final outcome.*

Keywords *- Children, Pharmacological, Poisoning, Prevalence, Syria.*

1. Introduction

Poisoning is defined as an injury that results from exposure to harmful exogenous substances that can damage the human body [1, 2, 3]. Acute pharmacological poisoning is a clinical condition that occurs due to exposure to one overdose of a drug or multiple doses in less than 24 hours [4,5, 6]. There is potential for poison exposure during all stages of a child's life, and most cases that occur in children younger than ten years are unintentional. In contrast, suicide attempts were observed more frequently in older children and adolescents [7, 8, 9, 10]. Many risk factors may contribute to the risk of poisoning, and exploration of the surrounding environment places children at risk of poisoning, especially those younger than three years [11].

In addition, children are at greater risk of acute poisoning that results from medication errors [12, 13]. Poisoning is considered an important problem that is associated with significant mortality in low- and middle-income countries compared to high-income groups. An annual incidence is estimated to be approximately 1 million worldwide and might be considerably higher due to underreporting of all cases [14, 15]. According to the CDC childhood injury report, the prevalence of poisoning is 38% in children younger than 6 years and 8% in adulthood [16]. Poisoning is the 4th leading cause of preventable injury-related death after motor vehicle traffic, drowning, and asphyxia. It is a predictable and preventable event like other injuries, so primary prevention by taking all of the activities to prevent poisoning from occurring is considered crucial [17, 18].

This study aims to assess the prevalence of pharmacological poisoning in children relative to other forms of poisoning. Secondly, to identify the most frequently implicated drugs responsible for such poisonings, and thirdly, to elucidate the clinical trajectory and ultimate outcomes experienced by the affected patients.

Accordingly, the study aimed to provide comprehensive insights into the epidemiology, etiology, and prognosis of pharmacological poisonings in pediatric populations, thereby contributing to the enhancement of preventive strategies and therapeutic interventions in this critical healthcare domain.

2. Materials and Methods

2.1. Study Design

A descriptive-observational and cross-sectional study was conducted after receiving approval from the local research ethics committee. The study focused on children attending the emergency department at Tishreen University Hospital throughout the period of January 2022 to December 2022. The research aimed to investigate cases of acute poisoning among these children.

2.2. Subjects

The study included children with a definitive history of acute poisoning. Data collection involved obtaining a complete history from the families of these children, encompassing variables such as age, sex, the time interval between exposure and hospital attendance, types of medication involved, methods of exposure, season of poisoning, and any interventions administered by the family prior to hospital arrival. Upon arrival at the hospital, a review of systems and physical examination was performed, followed by the initiation of appropriate emergency interventions.

2.3. Data Collection

Data collection involved the demographic characteristics of the study population and the characteristics of poisoning types. Demographic data included age, sex, and age group distribution, while poisoning type characteristics comprised the route of poisoning, the season of exposure, time of exposure, and etiology of poisoning. Data collection was conducted over the specified one-year period.

2.4. Statistical Analysis

The data was analyzed utilizing IBM SPSS version 20, employing fundamental descriptive statistics to summarize the information. This encompassed averages, Standard Deviations (SD), medians, frequencies, and percentages. Through this examination, valuable insights were gained regarding the core traits, diversity, and spread of demographic attributes and types of poisoning among the subjects under investigation.

3. Results

A total of 228 cases of acute poisoning were attended by the pediatric emergency department during a period of one year. Patients were divided according to the types of poisoning as follows: pharmacologic in 105 cases (46.1%) and non-drug poisoning in 123 cases (53.9%). The baseline characteristics of patients in the pharmacologic group were as shown in Table 1. 52 (49.5%) of the study participants were males, and 53 (50.5%) were females. Ages ranged from 1 to 14 years (mean 3.24±2.1 years), and age group 1-4 years represented the most frequent group (81.9%), followed by 5–9 (15.2%), and 10–14 years (2.9%). Respiratory, psychotropic, and cardiovascular drugs were the most common medications involved in poisoning incidents, at an average of 21%, 17.1%, and 10.5%, respectively. Other drugs included were analgesics (9.5%), hormonals (8.6%), vitamins (6.6%), antihistamines (5.7%), gastrointestinals (5.7%), iron (3.8%), anti-cholinergics (0.9%), lidocaine (0.9%), and other pharmaceuticals (9.5%).

Table 1. Demographic characteristics of the study population

Variables	Results
Age (years)	3.24±2.1 (1-14)
Age group (no. & %)	
1-4	86 (81.9%)
5-9	16 (15.2%)
10-14	3 (2.9%)
Sex (no. & %)	
Male	52 (49.5%)
Female	53 (50.5%)
List of poisoning medications	
Respiratory	22 (21%)
Psychotropic	18 (17.1%)
Cardiovascular	11 (10.5%)
Analgesics	10 (9.5%)
Hormonal	9 (8.6%)
Vitamins	7 (6.6%)
Antihistamine	6 (5.7%)
Gastrointestinal	6 (5.7%)
Iron	4 (3.8%)
Anti-cholinergic	1 (0.9%)
Lidocaine	1 (0.9%)
Others	10 (9.5%)

As shown in Table 2, ingestion represented the main route of entry (95.2%), followed by intravenous injection (2.9%) and intramuscular (1.9%). Approximately half of the cases occurred in winter (52 cases), followed by summer (21 cases), fall (19 cases), and spring (13 cases). The highest rate of exposure was seen in the morning period (39%), followed by noon (31.4%), evening (25.7%), and afternoon (3.8%). The majority of poisonings in children were unintentional (93.3%), followed by therapeutic errors (4.8%) and suicidal attempts (1.9%).

Emesis induction was performed in 10 cases (9.5%) at home without undertaking any intervention for the remaining cases (90.5%). In most cases, the interval between taking the drug and arriving at the hospital was one hour. Poisoning affected many parts of the body, and symptoms related to the circulatory system represented the most frequent features (13.3%), followed by neurological (11.4%), gastrointestinal (4.8%), and respiratory (3.8%)

symptoms, with the presence of combined symptoms in 6 cases (5.7%). According to the treatment methods that were applied to patients, gastric lavage was performed in 78 cases (74.3%), 60 patients (57.1%) had activated charcoal, and 11 cases (10.5%) received an antidote. The need for hospitalization was recorded in 32 cases (30.5%), as shown in Table 3.

Table 2. Characteristics of poisoning types of the study population

Variables	Results
Route of poisoning	
Ingestion 6	100 (95.2%)
Venous	3 (2.9%)
Intramuscular	2 (1.9%)
Season of exposure	
Winter	52 (49.5%)
Summer	21 (20%)
Fall	19 (18.1%)
Spring	13 (12.4%)
Time of exposure	
Morning	41 (39%)
Noon	33 (31.4%)
Afternoon	4 (3.8%)
Evening	27 (25.7%)
Etiology of poisoning	
Unintentional	98 (93.3%)
Therapeutic errors	5 (4.8%)
Suicidal exposure	2 (1.9%)

Table 3. Clinical features and management of the study population on arrival at the hospital.

Variables	Results
Clinical manifestations	
Circulatory	14 (13.3%)
Neurological	12 (11.4%)
Gastrointestinal	5 (4.8%)
Respiratory	4 (3.8%)
Combined	6 (5.7%)
Emergency interventions	
Gastric lavage	78 (74.3%)
Activated charcoal	60 (57.1%)
Antidote	11 (10.5%)
Need for hospitalization	.
Present	32 (30.5%)
Absent	73 (69.5%)

4. Discussion

This is a cross-sectional descriptive-analytic study of all children with a proven history of acute poisoning who attended the pediatric emergency department during one year, of which 46.1% were acute pharmacologic. The current study showed the following main findings: patients were of a wide range of ages, and 50.5% of them were female. Those findings agree with Berta et al. [19], Yura et al. [20], Sultan et al. [21], Tharwat et al. [22], and Sabiha et al. [23]. On the other hand, Abd Elhaleem et al. [24] demonstrated that poisoning was more frequent in males, which might be explained by gross motor activity in males and tendencies to exploration of the surrounding environment. Peak poisoning frequency occurs in the age group 1-4 years, and this is in agreement with Sultan et al. [21], Tharwat et al. [22], and Sabiha et al. [23]. The interval between exposure to drugs and attending the hospital was one hour for the majority of patients in the current study, whereas the interval was 4.7 hours in the study of Tharwat et al. [22] and 3 hours in Sultan et al. [21]. Respiratory drugs represented the most frequent group of drugs that lead to poisoning, followed by psychotropic and cardiovascular drugs. In contrast to the current study, non-opioid analgesics represented the most frequent etiology of pharmacologic poisoning in the studies of Sultan et al. [21], Tharwat et al. [22], Berta et al. [19], and Abd Elhaleem et al. [24]. The gastrointestinal system was the most common route of entry for the factor, followed by intravenous and intramuscular injection, and this finding is in agreement with Sultan et al. [21], Tharwat et al. [22], and Sabiha et al. [23]. Poisoning occurred more frequently in the winter, and a lower incidence occurred in the spring.

This might be related to the high prevalence of respiratory diseases and the need for bronchodilator drugs, which constitute the highest percentage of cases that lead to poisoning. Abd Elhaleem et al. [24] found that peak poisoning frequency occurred in the fall (37.8%), and lower occurrence was in the winter (18.9%). These findings might be explained by the cultural and social status of the studied country and the ability to buy drugs without a prescription. No intervention was undertaken by parents in the majority of cases, with induction of emesis in limited cases, and this is in agreement with the study of Berta et al. [19]. Children were symptomatic in 39% of the cases; cardiovascular and neurological symptoms represented the highest rate, followed by combined symptoms and gastrointestinal and respiratory symptoms. In contrast to the current study, Sabiha et al. [23] showed that the majority of the cases were symptomatic, and gastrointestinal symptoms represented the most common features. The need for hospital stays was recorded in 30.5% of the cases, of which 3.8% were in intensive care units. Low-acuity hospital admissions might be related to the shorter interval between poisoning and presenting to the hospital with an emergency intervention. Finally, many emergency procedures were performed for patients, such as gastric lavage, the administration of activated charcoal, and antidotes. Abd Elhaleem et al. [24] demonstrated that gastric lavage was performed in 64.4% and administration of antidote in 18.9%.

5. Conclusion

In conclusion, the study underscores the crucial significance of prioritizing prevention strategies to mitigate the incidence of poisoning among children. Education emerges as a paramount tool, particularly for pediatric healthcare providers, to raise awareness among parents and caregivers about potential hazards and safe practices.

Timely consultation with a doctor upon suspicion of poisoning is imperative, underscoring the need for swift action in managing such cases. Additionally, emphasizing product engineering to develop safer forms of potentially harmful substances can further contribute to reducing the risk of poisoning incidents among children.

Ethical Consideration

All parents of the children involved provided comprehensive and informed consent for their participation. Prior to the commencement of the study, discussions were held with the parents to ensure they fully understood the nature and purpose of the research. This transparent communication enabled them to make informed decisions regarding their children's involvement in the study. By obtaining explicit consent from the parents, the study upheld principles of autonomy, respect, and beneficence, ensuring that the rights and well-being of the participants were prioritized throughout the research process.

Availability of Data and Materials

The majority of the data utilized in this study was sourced from the article itself, while any additional data required was obtained through communication with the corresponding author.

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