



Accidental chemical poisoning: Cases recorded at Benghazi Children's Hospital (2018-2022)

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ABSTRACT

Children are more exposed to chemical poisoning incidents due to their desire to explore and love to see things they have. The aim of the study is to identify cases of chemical poisoning recorded at Benghazi Children's Hospital from January 2018 - December 2022 were used. The results showed the highest rate of drug poisoning (70.9%) in children. The lowest percentage of cannabis was (5.5%), and it included age groups under 5 years of age (64.2%), and most cases appeared in males. The highest cases of drug poisoning were recorded in the winter, followed by poisoning with phosphorus compounds in the autumn, while kerosene cases were recorded in summer season. Hospital records show that most of the poisoning cases have been treated, while 6 children died (4 kerosene and 2 drug injections). we need to educate parents about ways to deal with these substances and keep them out of the reach of children.

التسمم الكيميائي العرضي: حالات مسجلة في مستشفى الأطفال بنغازي (2018-2022)

*مريم مبارك بوسعدية و ريم الزردومي و رندة الزوي و نجمة الطوير و نجوي احميدة و صلاح عبدالدائم حمد و فاطمة بن شتوان و مروة الشطشاط و رجا محمد و ثريا الشبخي

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الكلمات المفتاحية:

القنب (الحشيش)
السم الكيميائي
تناول ادوية
الكبروسين
التسمم

الملخص

بتعرض الأطفال أكثر لحوادث التسمم الكيميائي بسبب رغبتهم في الاستكشاف وحبهم لرؤية الأشياء الموجودة حولهم. هدفت هذه الدراسة إلى تحديد الحالات التي تم إدخالها إلى مستشفى الأطفال بنغازي بسبب التسمم الكيميائي. تم استخدام في هذه الدراسة جمع السجلات الطبية للمرضى الذين راجعوا المستشفى خلال الفترة من يناير 2018 إلى ديسمبر 2022. وأظهرت نتائج هذه الدراسة أن التسمم الدوائي كان أعلى نسبة لدى الأطفال (70.9%) وأقل نسبة لعدد الحالات كانت للحشيش (5.5%). وشملت الفئات العمرية الأكثر عرضة للإصابة الأطفال دون سن 5 سنوات بنسبة (64.2%) وحالات عالية لدى الذكور. ومن خلال نتائجنا ترتفع حالات التسمم الدوائي في فصل الشتاء، تلمها التسمم بالمركبات الفوسفورية بفصل الخريف، بينما ترتفع حالات الكبروسين في فصل الصيف. ومن خلال مدة الإقامة في المستشفى، تم خروج المرضى وتبين أن غالبية حالات التسمم تم علاجها، بينما توفي 6 أطفال (4 كبروسين و 2 حقنة دوائية). وبالتالي يجب علينا توعية الآباء بطرق التعامل مع هذه المواد وإبعادها عن تناول الأطفال.

Introduction

Acute poisoning represents an emerging phenomenon, consisting of a group of toxic symptoms resulting from an organic disorder resulting from accidental or intentional exposure to chemicals present in the environment, especially at home such as plant and animal

poisons, pesticides and medicines [1-2]. These intoxications, especially the unintentional ones, are occurrences of great impact in pediatric emergency and urgency care. In some cases, the child immediately responds to the established treatment, some cases

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require intensive and prolonged care, depending on the type and quantity of the toxic substance, the conditions of exposure, and the child's vital characteristics [3-4]. Household chemical products poisonings are categorized as either unintentional or intentional [5]. Accidental poisoning is more common among children, whereas most of the intentional poisoning mainly comes from young adults (15-19 years old) [6-7]. More than 1 million cases pertaining to acute poisoning among children had been reported to the Toxic Exposure Surveillance System (TESS) of the American Association of Poison Control Centers (AAPCC). The high incidence of severe poisoning among children may be due to their tendency to taste or swallow harmful substances [8]. They are more susceptible to toxic chemicals because of immaturity of many organ to detoxify the poisons and their greater body surface that contribute to the rapid of absorption through skin [9]. Medicinal and non-medicinal substances are the most common poisoning of children. Medicinal substances included analgesics, anti-inflammatory agents, psychotropic drugs such as "antidepressants and benzodiazepines related agents". Non-medicinal agents include chemicals such as "organophosphates, insecticides, organic solvents, and household cleaning products such as bleach and caustics" were also found to be common causes of poisoning among children [10]. Nowadays, chemicals had become an important part of our daily ranging from sustaining human activities and developments, preventing diseases, and increasing agricultural productivity. Thus, the risk of getting poisoned by chemicals is increased as the chemicals have their own adverse effects on human health and environmental integrity [9-11].

Several groups of medicinal substances that cause childhood poisoning [12-13]. These include analgesic medications, anti-inflammatory drugs, and psychotropic substances. Non-medical substances such as "organophosphates, pesticides, organic solvents, and household cleaning products have been shown to be common causes of poisoning among children" [14]. Many children under the age of 5 are poisoned by ingestion of petroleum products, such as gasoline, kerosene and paint thinners, but most recover. [10].

Many studies have been conducted on cases of acute poisoning in children. Among them is a 2003 study of children aged 0-12 years, who presented to the Children's Emergency Department Hospital, Malaysia. The study concluded that the majority of pediatric patients who developed severe sepsis were under 5 years of age [10]. In Saudi Arabia (2020) emergency department records, this study summarized the presence of 69 cases of acute poisoning in children who visited the emergency room at East Jeddah Hospital; They were all male, most of them 5 years old or younger [27]. In 2016, a retrospective study of acute poisoning in children under 5 years of age was introduced to the Alexandria Poison Center in Egypt. It turns out that accidental poisoning is the most common poisoning in young children from medications and various chemical compounds such as

kerosene are the most common household agents. [21]. At Universiti Sains Malaysia Hospital (2014), the age group most at risk was children aged 0-2 years. The fuel category (kerosene/gasoline/diesel) remains the most consumed [28].

Moreover, Organic and inorganic pollutants from municipal waste and discharges from industrial sites and hazardous waste sites contain a wide range of toxic components. [15]. Excessive exposure to organophosphorus compounds can occur prior to spraying, due to easy access by children at home and on farms [16-17]. Insecticides and pesticides are increasingly becoming the most common agents of poisoning in children [18-19]. Most medications are left in places that are easily accessible to children [20]. Other Substances may enter the body through several routes, by inhalation or ingestion, skin absorption, and eye exposure [21]. However, the capacity of a substance to produce injury is affected by many factors, including its absorption, distribution, site of activation or detoxification, excretion and site of action [22-23]. Absorption, biotransformation, enzymatic activation or detoxification, distribution, and elimination by renal [22-24] and others do not immediately pose a risk when ingested but may become dangerous when metabolized [25]. Emesis, gastric lavage, antidotes, supportive treatment, establishing an emergency airway and blood transfusions are considered first aid, especially for children [26].

Material and Methods

A descriptive analysis of research:

The study used the analytical-descriptive approach, gathering information that was then documented, saved, and ready for analysis. Cases recorded for those infected during the period 2018-2022 at Benghazi Children's Hospital were studied.

Time period for data collection: We collected and revised the data and dumped it from the first of March to the 30th of March of this year.

The data collected included: The poisonous substance, child age, address, date of admission, date of discharge.

Statistical analysis: All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 28 software package. Descriptive statistics (frequency and percentages) were determined and presented. chi-square test was used as appropriate. Statistical significance was considered at $p \leq 0.05$.

Results:

A total of 1300 chemicals poisoning cases admitted to the Hospital of Children from 2018 to 2022. We found number of cases in 2019, the highest rate was 22.4% (291 cases), and in 2020, the lowest rate was 17.3% (225 cases) then cases increased in 2022, graphically illustrated in (Fig.1).

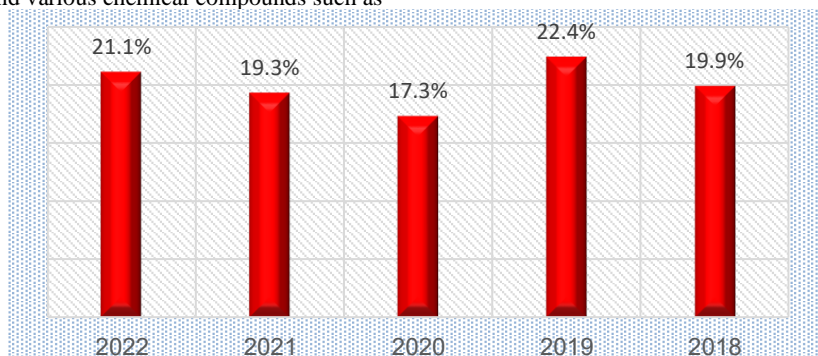


Fig. 1: Distribution of poisoning according to the years.

The highest percentage 70.9% of children suffered from poisoning due to taking medications, followed by kerosene 12.1%, then poisoning with organophosphorus compounds, and finally cannabis, 5.5% (Table 1). Records showed that the highest cases 64.2% of poisoning occurred in children in the age group (0-3 years) in (Fig.2).

Table 1: Distribution of poisoning according to type of toxin

Type of toxin	Frequency	Percent
Drug ingestion	922	70.9%
Kerosene ingestion	157	12.1%
Organophosphorus Poisoning	149	11.5%
Cannabis ingestion	72	5.5%
Total	1300	100.0%

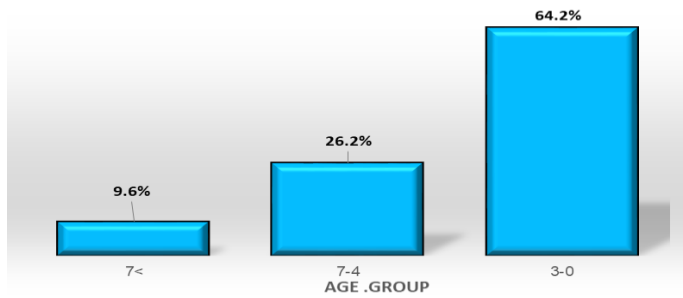


Fig. 2: Distribution of Poisoning according to age group. Males were more susceptible to poisoning, 55.7%, than females, 44.3% in (Fig.3). Our results indicated that most of the cases are from within the city 86.2% ,while the percentage of cases admitted to the hospital from outside the city was 13.8% (Fig.4).

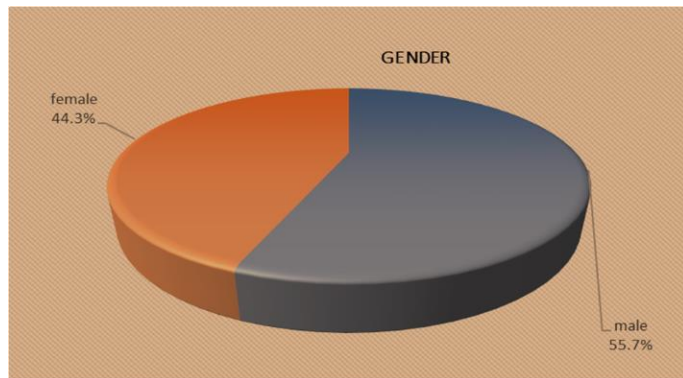


Fig3 : Distribution of cases according to gender

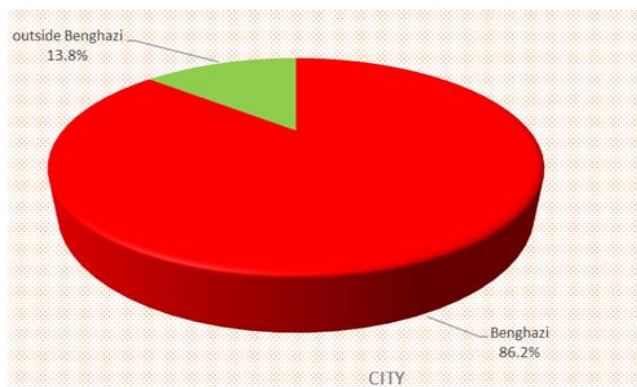


Fig.4: Distribution of cases according in/outside city.

In the current study, according to data from inside the hospital, 76.54% of the cases recovered and were discharged. 15.38% left the hospital at their own risk, while 6.77% escaped from the hospital and 0.69% refused to enter the department for treatment (Table.2). Records indicate that male children have the highest rates of poisoning with all types of toxic substances (6.6%-14.2%), exception of drug poisoning 75.7%, which was higher in females in (Fig.5).

Table.2: Distribution of cases by hospitalization and discharge

Type of Hospital Discharge	Frequency	Percent
Discharged	995	76.54%
Self-discharge	200	15.38%
Escape	88	6.77%
Death	6	0.46%
Admission rejection	9	0.69%
Transferred	2	0.15%
Total	1300	100.0%

Our data showed that the rate of drug poisoning reached 81.4% and increased in the winter, while in the summer the cases of kerosene poisoning increased by 22%, and the cases of poisoning with organophosphorus increased by 13.6% in the autumn (Fig.6). Since the highest rate of poisoning was for children in the 0-3 age group

among all age groups in our study, we found the highest rate of drug poisoning for this age group at 74.5% during the year 2020, followed by kerosene poisoning at 23.7% during the year 2018, and last for cannabis poisoning 20.5 % during the year 2022) Table.3).

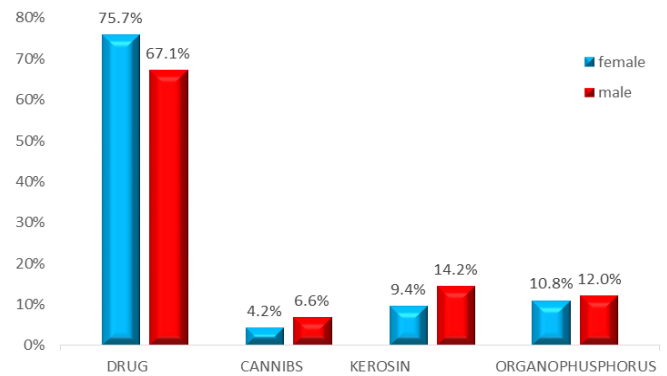


Figure 5: Percentages of chemical-substances according to the gender

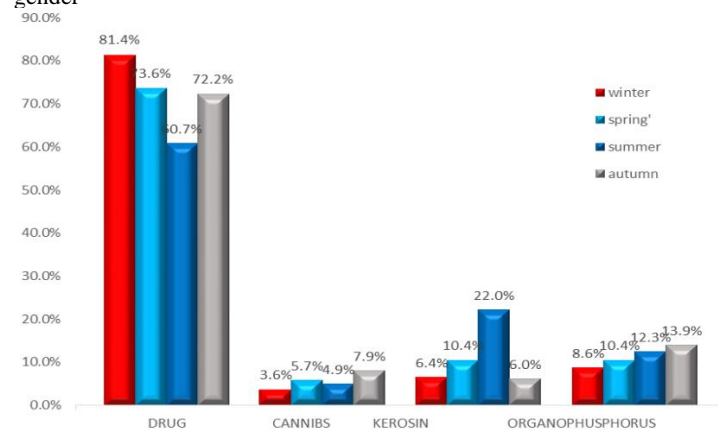


Figure 6: Percentages of toxic substances according to the seasons

Table 3: Distribution of toxic substances according to the age group 0-3 over the years 2018 to 2022

AGE (0-3Y)	2018		2019		2022
	N	%	N	%	
TYPE TOXIN					N
KEROSIN INGESTION	36	23.7%	27	13.5%	11
CANNIBS INGESTION	1	0.7%	3	1.5%	4
ORGANOPHUSPHORUS	26	17.1%	25	12.5%	20
DRUG INGESTION	89	58.6%	145	72.5%	102
TOTAL	152	100%	200	100%	137

Discussion

Our study showed that the higher number of cases in 2019 may be due to the onset of the spread of Corona disease and the increased use of drugs and chemicals. The data presented in this study showed that the most common cases in children were due to taking medications, followed by kerosene, and this is consistent with a study conducted in 2014-2016 in the city of Misrata, where the highest rate of poisoning was due to taking medications, 70.9% [16]. In another study, it was found that kerosene is the most common cause of child poisoning in northeastern Nigeria and that children aged 0 to 2 years are the age group most at risk [29]. In the present study the highest percentage of poisoning cases in children in the age group (0-3) years and this is due to the fact that children at this age are trying to explore the surrounding environment without taking precautions. A study conducted in the Kingdom of Saudi Arabia in 2020, also found that the age group [30] (0-5) years was most at risk, and most of them were male. This study is similar to the one conducted in the city of Misrata 2014-2016 [16] and the Kingdom of Saudi Arabia in 2020. In both studies, the number of cases among males was greater than

among females [30]. It may be due to the children discovering and swallowing objects, especially boys at this age. In Singapore study the gender distribution was about equal, with a slight male predominance [31]. Also in our study data, most hospitalized are from within the city, with smaller numbers from outside Benghazi. Some neighboring areas and villages may not have a reception point, so there must be specialized centers or clinics nearby for such Lack of records

Further, in a study conducted in 2007, only half of the poisoning cases required treatment, and most of the poisoning cases were mild and the clinical outcomes were good [29] this is consistent with our study's distribution of cases according to recovery. Most of the cases were provided with first aid, treated, recovered, and were leaved from the hospital naturally. A very small percentage died as a result of poisoning, and some of them escaped without treatment, and some of them refused to enter the department. Current data also showed that male children have the highest rates of poisoning with all types of toxic substances, exception of drug poisoning which was higher in females. Current data also showed that male children have the highest rates of poisoning with all types of toxic substances, with the exception of drug poisoning, which was higher among females. This is consistent with the Misrata study, kerosene poisoning cases are highest among males [16]. In a previous study conducted in the city of Ankara, the rate of poisoning in males was chemical and drug poisoning [32]. It may be due to frequent trips and outings in nature and the spread of insects, which makes children vulnerable to these toxic substances. This explains that drug poisoning increases in the winter and cases of kerosene in the summer, and cases of organophosphorus poisoning increase in the autumn. our study coincided with study conducted in Northeastern Nigeria where Kerosene is the commonest cause of poisoning in children aged 0 - 2 years, who are the most vulnerable age group. The highest frequency of admission coincides with the period of the hot and dry months of March to June [33] as we obtained, the highest rate of drug poisoning was for children in the 0-3 age group among all age groups in our study, and this may be due to the spread of Corona disease in 2018, the disruption of schools and kindergartens, and exposure to poisoning at this early age.

Conclusion

Accidental poisoning occurs most often in the age group 1-5 years although less than one per cent of poisoning in children is serious. More than 94% of fatal poisonings occur in low- and middle-income countries. We concluded that most cases were poisoned with drugs, followed by kerosene, then organophosphates, and finally cannabis. It was found that the number of cases within the city of Benghazi is greater than the cases coming from outside the city. The results showed that cannabis has the fewest reported cases of all years. And number of cases of drug poisoning increases in winter, while in autumn of cases of poisoning with phosphorous compounds increases, and finally kerosene increases in summer.

Recommendations

There are several specific and general suggestions related to practice, policy and future research:

1. Hospitals must create a database of poisoning cases entering emergency departments.
2. Study the impact of education on the prevalence and incidence of childhood poisoning is needed.
3. Trained doctors, pharmacists and nurses in clinical toxicology are needed to develop hospital poison teams.
4. Clinical toxicology should be directed toward the further development of hospitals and basic science.

Limitations

The current study has some limitation related to lack of sufficient data in the records such as:

1. Data about the symptoms that appeared on the case.
2. Chemical exposure data.
3. Data on the treatment provided to the case upon arrival at the hospital

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