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# Pattern of Childhood Poisoning and Intoxication in AL Salam Hospital Sadah -Yemen

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**ABSTRACT**

***Background and objectives***: The poisoning among children is a pediatric emergency and a worldwide problem that vary in different part of the world. The study aims to investigate the clinical profile and outcome of childhood poisoning and intoxication in Yemen.

***Patients and methods:*** All patients admitted to pediatrics wards in A-Salam Hospital -Sadah governorate for ingestion of poisons over period from January 2010 to December 2011 were included in this retrospective descriptive study. The targeted group was age between 6 months and 14 years of age. The data was collected from medical records retrospectively and was analyzed with SPSS 12.0 software.

***The results:*** Total number of cases was 660 patients. They were 368 (55.8%) females and 292 (44.2%) males with female to male ratio of 1.26:1 with age ranging from 6 months to 14 years.
Of these, 476 patients (72.1%) were <5 years old. Pharmaceutic agents were identified in 502 patients (76.1%) with preponderance of psychotropics as the most frequently ingested drugs (33.9%) followed by tricyclic antidepressants (27.1%). Non-pharmaceutic agents were identified in 158 patients (23.9%), 54.4% of which were pesticides. The majority of all cases were accidental poisonings (90%) mainly by pharmaceutics that occurred mostly in children <5 years old (72.1%). Then come self-inflicted intoxications (8.2%) which demonstrated the highest ratio in children >10 years old (6.7%).

***Conclusion:*** Intoxications are serious health problem especially among children <5 years old. Preventive measures such as implementation of the use of child-proof drug prescription bottles and efforts towards public education and keeping drugs and

poisons away from the reach of children may reduce the risks.
***Keywords:*** Childhood, Intoxication, *Poisoning, Pediatric emergency units.*

## INTRODUCTION

The poisoning among children is a pediatric emergency and a worldwide problem that vary in different part of the world [1]. Accidental poisoning among children has been studied by other similar studies [2-5].The causes and types of poisoning vary in different parts of the world depending upon the factors such as demography, socioeconomic status, education, local belief and customs [1].

More than two million human poisoning exposures are reported annually in Unites states, 50% of which occur in children 5 years of age or younger. Almost all exposures are unintentional [6]. According to World Health Organization, more than three million poisonings occur in developing countries, particularly among agricultural workers [7,8].

Childhood poisoning is one of the most common reasons for presentation at hospital emergency departments in Australia [9].The pattern of poisoning depends upon the availability of poisonous substance, occupation, religious and cultural influences [7]. Acute poisoning in children is common and in many cases it is preventable [10,11]. While the rate of childhood poisoning has been declined dramatically since before the 1980s, there has been little change in the rate of presentation to hospital emergency department [2, 12]. Intoxication that necessitates hospitalization remains an important source of morbidity in children [13,14].

The very nature of a young child predisposes the child to explore the surrounding environment. The exact documented data of poisoning in Yemen is not available. This retrospective study was undertaken to describe the epidemiological features of pediatric patients hospitalized for intoxication and to determine the incidence of hospitalization, the principal agents of poisoning, hospital length of stay and outcome.

## PATIENTS AND METHODS

All children admitted to pediatric ward in Al-Salam Hospital at Sadah governorate for ingestion of poisons or envenomation over period from January 2010 to December 2011, were included in this retrospective descriptive study. The selected age group was between 6 months and 14 years of age. Those cases younger than 6 months or older than 14 years old or those cases who had no signs of life on presentation, or who had food poisoning, or who were discharged home from emergency department after short period of observation or patient without an identified cause were excluded from the study.

The data was obtained from medical record department of Al-Salam Hospital. The hospital covers all areas of specialty from maternity to elderly age groups. The emergency unit accommodates 23 beds some of which are general ICU, trauma room, hydration room, and general observation room. The pediatric ER in Al-Sala Hospital is considered to be as a referral unit, which provides 24 hours services, receiving all medical pediatric emergencies. In addition, patients who need medical supervision and intervention i.e. injection, IV fluid ...etc.

The areas covered by these services include Sadah and Amran governorates. In addition, we excluded all the newborns and all intoxications with an adverse reaction to avoid cases where the intoxication was either iatrogenic or had occurred during hospitalization. The classification of agents as pharmaceutics and non-pharmaceutics was done according to the ICD-10 (International Classification of Diseases, 10th Revision). Patients' data such as demographics, the circumstances of ingestion (the mode and the place of ingestion, time lapsed until seeking medical care), the agents ingested, and the hospital data (duration of observation in the emergency room and time of hospitalization, the necessity of Pediatric Intensive Care/patient needs intensive care follow up , outcome) were recorded and analyzed. Intoxications were also further grouped into three types as accidental, self-inflicted and therapeutic error. Statistical calculations were performed using the SPSS 12.0 program. Besides standard descriptive calculations (frequencies, mean and standard deviation), the chi-square test was performed for evaluation of qualitative data. Statistical significance level was established as $p<0.05$.

## RESULTS

Total number of 660 children was admitted to department of pediatrics in Al-Salam Hospital at Sadah city for ingestion of poisonings. They were 368 (55.8%) females and 292 (44.2%) males with a female/male ratio (F/M) of 1.26:1 (Table 1). The mean age was 4.57±3.52 years (range: 6 months-14 years). Four hundred and seventy six children constituting 72.1% of all the patients were <5 years old, 110 (16.7%) were 5-10 years old and 74 (11.2%) were >10 years. Of the <5-year-olds, 56 (8.5%) children were <12 months (Table 2).

**Table (1):** Frequency and distribution of children poisoning to gender

| | Group | n= | % |
|---|---|---|---|
| Gender | Male | 292 | 44.2 |
| | Female | 368 | 55.8 |
| Age (y) | 1-5 | 476 | 72.1 |
| | 5.1-10 | 110 | 16.7 |
| | >10 | 74 | 11.2 |
| Total | | 660 | 100 |

**Table (2):** Relation of children-age to type and mode of poisoning

| Age (y) | Accidental n=594 (90%) | | Self-inflicted n=54 (8.2%) | | Therapeutic error n=12 (1.8%) | |
|---|---|---|---|---|---|---|
| | Pharmaceutic | Non pharmaceutic | Pharmaceutic | Non pharmaceutic | Pharmaceutic | Non Pharmaceutic |
| <1 | 32 | 24 | 0 | 0 | 0 | 0 |
| 1-5 | 324 | 92 | 0 | 0 | 4 | |
| 5.1-10 | 62 | 30 | 8 | 2 | 8 | 0 |
| >10 | 20 | 10 | 44 | 0 | 0 | 0 |
| Total | 438 | 156 | 52 | 2 | 12 | 0 |

Among all the intoxication cases admitted to our department, the highest number were in the group aged <5 years (p=0.0001). Among the children aged 0-5 years, no gender predominance was found (F/M=1); however, among the children in the age groups of 5- 10 years and >10 years, there was a female predominance, with F/M ratios of 2.2 (76/34) and 2.7 (54/20), respectively. Pharmaceutic agents were identified in 76.1% (502/660) of the intoxications (Table 3).

Psychotropic agents were the most commonly ingested drugs (33.9%), among these, the tricyclic antidepressants accounted for the highest percentage (27.1%). The second most common cause of intoxication with pharmaceutic agents was multidrug ingestion (14.3%) followed by analgesic agents (9.6%), among which acetaminophen was the most common (4 %). The remaining causes of pharmaceutic agent intoxications are presented in (Table3). Non- pharmaceutic agents were identified in 158 (23.9%) patients. Among this group, pesticides comprised (54.4%), followed by snake bites (27.8%) and scorpion (7.6%) poisonings. The majority of all cases were due to accidental poisonings (90%), mostly seen in children <5 years old (72.1%, n=476), caused by pharmaceutic agents, followed by self-inflicted intoxications (8.2%), which had the highest ratio in children >10 years old (6.7%, n=44). Among all the poisonings, 12 (1.8%) were due to therapeutic error, mostly in those aged 1-10 years (Table 2).

In those <12 months, all the poisonings were accidental (8.5 % , n = (56 ) and in those aged 1-5 years, accidental poisonings (416/420; 99%) and in those >10 years self-inflected intoxications (44/74; 59.5%) carried the highest ratios, as expected (Table 2).

Tricyclic antidepressants (TCAD) and multidrug were more common in self-inflicted intoxications compared with unintentional intoxications. All of the intoxications with non-pharmaceutic agents were accidental (Table 3). Intoxication with a single agent was found in 594 (90%) patients, whereas ingestion of more than one agent was reported in 66 (10%) cases. The most common route of poisoning was oral, in 634 (96.1%), followed by inhaler in 22 (3.3%) and ophthalmic in 4 (0.6%) patients.

Indoor poisoning was determined in 634 (96.1%) cases and outdoor poisoning in 22 (3.3%). Common clinical features of poisoning are presented in (Table-4). Vomiting was the most common clinical feature followed by, increased salivation, seizure and altered pupil size. Coma was present in 18.0% cases and 6.6% cases had respiratory failure.

The seasonal distribution pattern was as follows: 142 (21.5%) cases were admitted during spring , 134 (20.3%) during autumn,168 (25.5%) during winter, and 216 (32.7%) during summer. This shows that, children with intoxication were seen more in summer and winter compared to other season. The mean duration of time from ingestion to admission to the Pediatric Emergency Unit (PEU) was 3.72±5.56 hours (range: 0-48 hours). The mean duration of observation in the PEU was 1.18±0.63 hours. Of the patients, 206(31.2%) received intervention by others before admission to the PEU, while 454 (68.8%) patients did not.

Among the cases who received intervention before admission, 190 (92.2%) were treated at the basic health units/dispensaries medical center, whereas 16 (7.8%) received the first intervention at home. Among the 660 hospitalized patients, 228 (34.5%) were symptomatic, and the remaining 432(65.5%) were admitted to pediatric unit with only drug ingestion history without any symptoms. The results of the physical examination were found to be normal in 584 (88.5%) patients, whereas in 76 (11.5%) patients, abnormal physical findings were observed and recorded. After hospitalization, only 64 (9.7%) of the patients received

**Table (3):** Children poisoning distribution to their mode intake

| | | Accidental poisoning | Self-inflicted poisoning | Therapeutic error | Total n (%) | (%)of all pt **n = (660)** |
|---|---|---|---|---|---|---|
| Pharmaceutics: | | | | | 48 (9.6) | (7.2) |
| | Paracetamol | 20 | 0 | 0 | 20(4) | (3) |
| Analgesics | A.A.S | 16 | 2 | 0 | 18(3.6) | (2.7) |
| | NSAI other | 10 | 0 | 0 | 10(2) | (1.5) |
| Sedative-hypnotic, antiparkinsonians | | 34 | 0 | 4 | 38(7.5) | (5.8) |
| Psychotropic drugs | | | | | 170 (33.9) | (25.7) |
| tricyclic and tetracyclic antidepressants | | 116 | 18 | 2 | 136(27.1) | (20.6) |
| Other antidepressants | | 2 | 0 | 0 | 2(0,4) | (0.3) |
| neuroleptics and others | | 28 | 2 | 2 | 32(6.4) | (4.8) |
| Autonomic nervous system drugs | | 12 | 4 | 0 | 16(3.2) | (2.4) |
| Systemic and hematologic drugs | | 28 | 4 | 0 | 32(6.3) | (4.8) |
| Cardiovascular drugs | | 30 | 0 | 0 | 30(6) | (4.5) |
| Gastrointestinal drugs | | 8 | 0 | 0 | 8(1.6) | (1.2) |
| Smooth and skeletal muscle | | 26 | 2 | 0 | 28(5.6) | (4.2) |
| Anti asthmatics | | 10 | 2 | 0 | 12(2.4) | (1.8) |
| cold medications | | 6 | 0 | 0 | 6(1.2) | (0.9) |
| antitussives and expectorants | | 6 | 0 | 0 | 6(1.2) | (0.9) |
| Other | | 4 | 0 | 0 | 4(0.8) | (0.6) |
| Topical medications | | 10 | 0 | 4 | 14(2.8) | (2.1) |
| Hormonal drugs | | 20 | 4 | 0 | 24(4.8) | (3.6) |
| Antibiotics | | 2 | 0 | 0 | 2(0.4) | (0.3) |
| Multidrug | | 56 | 16 | 0 | 72(14.3) | (10.9) |
| Unidentified drugs | | 20 | 0 | 0 | 20(4) | (3) |
| Total | | 436 | 54 | 12 | 502(100) | (76.1) |
| Non- pharmaceutics | | | | | | |
| Pesticides | | 86 | 0 | 0 | 86(54.4) | (13) |
| Organophosphates and insecticides | | 12 | 0 | 0 | 12(7.6) | (1.8) |
| Other | | 74 | 0 | 0 | 74(46.8) | (11.2) |
| Snake bites | | 44 | 0 | 0 | 44(27.8) | (6.7) |
| Bite, sting + scorpion | | 12 | 0 | 0 | 12(7.6) | (1.8) |
| Organic solvents | | 10 | 0 | 0 | 10(6.3) | (1.5) |
| Corrosives | | 2 | 0 | 0 | 2(1.3) | (0.3) |
| Detergents | | 2 | 0 | 0 | 2(1.3) | (0.3) |
| Metals | | 2 | 0 | 0 | 2(1.3) | (0.3) |
| Total | | 158 | 0 | 0 | 158 | (23.9) |

NSAI:nonsteroid anti-inflammatory . A.A.S: acetyl acid salicylic

specific treatment besides symptomatic treatment. in 596 (9 0. 3 %) patients, only symptomatic treatment was applied. The mean hospital stay was 2.77±1.72 days (median: 2 days). Among the hospitalized patients, only 38 (5.8%) were kept as patient need Intensive Care , we do not have a (ICU), and the mean duration of stay as patients needed intensive care was 2.04±1.39 days.

During the study period, four patients died due to acute poisoning. The mortality rate was 0.6%. One case was a 12-year-old girl and another was a six year male boy with snake poisoning; the Third case was an 8-year-old boy with multidrug ingestion for self-inflicted poisoning and the 4$^{th}$ case was girl with 9 year with unknown poisoning (unidentified drugs).

**Table (4):** Clinical presentation of children with poisoning

| Clinical feature | n= | % |
|---|---|---|
| Vomiting | 319 | 48.4 |
| Salivation | 216 | 32.8 |
| Seizure | 146 | 22.1 |
| Miosis | 140 | 21.3 |
| Mydriasis | 135 | 20.5 |
| Coma | 119 | 18 |
| Chest crepitation | 103 | 15.6 |
| Tachypnea | 49 | 7.4 |
| Diarrhea | 49 | 7.4 |
| Abdominal pain | 43 | 6.6 |
| Respiratory failure | 43 | 6.6 |
| Fever | 22 | 3.3 |

## DISCUSSION

The very nature of a young child predisposes the child to explore the surrounding environment. As children grow and learn to become independent, they are compelled to investigate new and interesting items, places and objects. The influence of growth and development upon unintentional poisoning becomes especially important during the toddler and preschool age [1].

Although the numbers of child poisoning deaths have declined dramatically over the last 40 years, there is little evidence that shows a similar decline in emergency department presentations and hospitalizations, despite the prevention strategies implemented over that period [9].

In our study, we found that intoxications represented 11% of the total pediatric patients hospitalized in our department during the study period. In the study of Mintegi et al [15] Childhood intoxications accounted for 15.2% of their hospitalized children. Our results also differ from those of Gauvin et al [13]., who reported that the average incidence of hospitalization for intoxication in children was 45 per 100,000 children per year in

Washington, and intoxication accounted for 0.06% of all pediatric hospitalizations. These different results may be explained by the differences among the study populations, regional differences in health care, the extent of the medical facilities and surrounding environment.

In this study, children <5 years old constituted the majority (72.1%) of the hospitalizations, Our findings may agree with the prior reports done by Shotar [16] who reported that, among the children admitted due to drug poisoning, the majority (89.7%) were <6 years old. In the study of Mintegi et al in Spain [15], 67% of children intoxication were <4 years old, 57% of whom were boys. In other study of Andiran et al.[17], among pediatric poisoning cases, 63.6% were <5 years old; among those <10 years old, 52.3% of those intoxicated were boys, while in those >10 years old, more girls (79%) were involved.

As in the literature, pharmaceutics agents were the most common agents in childhood poisonings in our study. This finding parallels with other studies such as Gauvin et al [13] that reported rate at (80%) while Andiran et al [17] reported (57.7%) and Izuora et al [18] at (64.3%). Furthermore, Andiran et al [17] And Gauvin et al [13] reported that analgesics were the most common agents, followed by antidepressants. In contrast to other reports, Izuora et al [18]. reported in their study that tricyclic antidepressants were the leading cause (22%) of pediatric hospitalizations due to poisonings. Similarly, according to our data, psychotropic drugs, especially tricyclic antidepressants, were the most common drugs (27.1%).

Our hospital is located in the northern region of Yemen (area of civil-crisis) , where the most residents can be described as belonging to a lower socioeconomic stratum, illiteracy and poverty, so This finding in our study may explained by the widespread use of various antidepressants without prescription due to war critical crisis more affect to those area located behind, some of which are quite inexpensive and can be easily obtained. Among medicine prevalence of poisoning by analgesics and anti-inflammatory drugs are compatible with the finding of studies in Saudi Arabia, UAE [19]. In other previous study in Basra by Alsadoon showed that sedatives and hypnotic drugs were coming first regarding type of drug poisoning [20] and this changes reflect wide of availability of anti-inflammatory and pain killer drugs at community - hands, also the Organophosphorus poisoning was found Tobe the third most common agent, this finding in our study was similar to Karachi study [21]. This higher percentage of unintentional poisoning might be due to exploratory behaviors of the young children.

The finding in our study that non-pharmaceutic agents were identified in 24% of the patients, of which the most common agents were pesticides followed by snakes bite poisonings. These findings may show that non-pharmaceutic agents also play an important role in childhood poisonings, and the type of the involved agent may reflect the socioeconomic, cultural and environmental features of each population.

In this present study, the majority of cases were due to accidental poisonings that occurred mostly in children <5 years old, mainly by pharmaceutic agents, followed by self-inflicted intoxications, which had the highest ratio in children aged >10 years. This pattern is consistent with previous reports [22,23]. But our study finding is differ from that study in india by Pillai et al [22], the majority of poisoning cases were due to accidents (84.6%) and suicide (11.2%) [22].

Our findings are consistent with the results of Al Hazmi [19], who found that the highest percentage of accidental poisoning was within the 2-5 years of age group (61%). Al

Hazmi [19] reported that children ingesting medications generally experienced only mild symptoms and therefore presented late for medical attention, in most cases more than two hours after ingestion. Our findings of a mean duration of time from ingestion to hospital admission of 3.72±5.56 hours and of the majority of patients being asymptomatic (65.5%) were consistent with previous reports [18]. And those who were symptomatic (34.5%) they presented with vomiting (48.4%),excessive salivation (32.8%),seizures (22.1%) and changing of pupil size (miosis 21.3% & mydrasis 20.5%) (Table 4).The data about the length of stay (LOS) of pediatric poisoning cases differ widely. In this study, the median LOS was 2 days.

Our results contrast with those of Gauvin et al [13]. And Oguche et al [24]. With a median LOS of 1 and 0.66 days, respectively. Al Hazmi [19] found that, among children with accidental drug ingestion, the majority stayed less than 48 hours and all were discharged within 72 hours. Although treatment policies for childhood poisonings are universally similar, the diverse types of agents involved and the institutional differences in medical facilities in each study population could account for this difference. During our study period 5.8% of the hospitalized patients were kept as patients need intensive care, because we do not have a separate PICU at this hospital. In the study of Mintegi et al [15], among hospitalized children due to intoxications, 1.5% were admitted to the ICU. Similarly, Kohli et al [25].

From India reported that 2.7% of pediatric poisoning cases were admitted to the Pediatric Intensive Care Unit (PICU). These variations may reflect the differences among the agents of poisonings, availability of PICUs and different departmental referral strategies to the PICU. Gauvin et al [13] reported a mortality rate of 0.2% among hospitalized pediatric poisoning cases, we found a low mortality rate of 0.6%. The early awareness of poisoning and implementation of appropriate therapeutic measures seem to contribute to a very low mortality rate.

In conclusion, acute intoxications, particularly with pharmaceutic agents (mostly psychotropics and analgesics) are important causes of childhood poisoning in Sadah and neighbor governorates in Yemen. This observation points out the urgency of the promotion and implementation of the use of child-proof drug prescription bottles in order to eliminate or reduce accidental childhood drug poisoning. Country political measures must be taken to avoid over stress and civil crisis upon society. Parental education about the prevention of childhood poisoning at home remains a major issue, especially about keeping everyday medications and household products out of the reach of children.

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# اصناف حالات التسمم بين الاطفال في مستشفى السلام محافظة صعدة ـ اليمن

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## ملخص

**الخلفية والاهداف:** التسمم بين الأطفال هو حالة طارئة يعاني منة الأطفال في جميع أنحاء العالم و تختلف هذه الحالة من مكان الى اخر. تهدف هذه الدراسة الى دراسة الملف السريري ونتائج تسمم الطفولة في اليمن.
**المرضى وطرق البحث:** في هذه الدراسة الوصفية تم إدراج جميع المرضى الذين تم استقبالهم وترقيدهم في قسم الأطفال في مستشفى السلام بمحافظة صعدة بسبب تناولهم للسموم خلال الفترة من يناير 2010 إلى ديسمبر 2011. تتراوح أعمار الفئة المستهدفة بين 6 أشهر و 14 سنة. تم جمع البيانات من السجلات الطبية بأثر رجعي وتم تحليلها باستخدام برنامج SPSS اصدار12.
**النتائج:** بلغ العدد الإجمالي للحالات 660 مريضا منها 368 (55.8 %) اناث و 292 (44.2 %) ذكور، وبلغت نسبة الإناث : الذكور 1:1.26. تراوحت أعمارهم بين 6 أشهر و 14 سنة. تظهر هذه الدراسة ان 486 مريضا (72.1%) كانوا دون سن الخامسة. المواد الدوائية المسببة تم تحديدها عند 502 حالة (76.1%) بأغلبية علاجات الدعم النفسي (33.9%)، يليها العلاجات ضد الاكتئاب بنسبة (27.1%). اما العناصر غير الدوائية فقد تم تحديدها عند 158 مريضا (23.9%) منهم (54.4%) مبيدات الآفات. 90% من حالات التسمم كانت عرضية غالبا ما تكون العناصر الدوائية هي السبب من ذلك (72.1%) لدى الاطفال دون سن الخامسة من العمر. يلي ذلك حالات التسمم الذاتي بنسبة (8.2%) منها (6.7%) فوق سن العاشرة.
**الاستنتاج:** يعتبر التسمم مشكلة صحية خطيرة خاصة بين الأطفال دون سن الخامسة من العمر. ان اتخاذ التدابير الوقائية مثل استخدام زجاجات بأغطية مؤمنة للأدوية والعقاقير الطبية، وحسب الوصفة الطبية وتثقيف الجمهور بمخاطر إبقاء الادوية والسموم في متناول الأطفال يؤدي الى التقليل من حدوث حالات التسمم والحد من مخاطرها.

**الكلمات المفتاحية:** الطفولة ، التسمم ، وحدات الطوارئ للأطفال.