

Pattern of Child Poisoning at Ain Shams University Hospital of Year 2012 Compared to 1983: What Has Changed in Three Decades?

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Abstract

Childhood poisoning is a major cause of morbidity in the developing as well as the developed world. In spite of the success of some interventions to prevent accidental poisoning in the pediatric population, deaths due to un-intentional poisonings still occur

The present study aims to describe epidemiology of child poisoning at Ain Shams University Hospital during year 2012 and to compare the most common poisoning agents during 2012 with that during year 1983.

Descriptive Cross sectional study was carried out at Poison Control Centre (PPC), Ain Shams University Hospital. 4240 cases of child poisoning (age ≤ 15 years) reach the Emergency Room (ER) during year 2012 and 145 cases during the year 1983 was included. Then analysis were done using SPSS version 18 and all results presented in the form of frequency and percentage.

Results revealed that more than 50% of child poisoning during 2012 were at age group less than three years and accidental manner was responsible for 68.5% of cases, non-drug poisoning was responsible for larger percentage (55.7%) of cases of child poisoning than drugs poisoning (44.3%). The opposite was the condition during 1983, drugs poisoning responsible for more than 83% of cases.

Introduction

Poisoning is defined as 'An individual's medical or social un-acceptable condition as a consequence of being under influence of an exogenous substance in a dose too high for the person concerned' (Maklad et al, 2012). Poisoning in childhood is a common phenomenon worldwide and this is because of the innovative, inquisitive nature of children and their mouthing tendency. In spite of the success of some interventions to prevent accidental poisoning in the pediatric population, deaths due to un-intentional poisonings still occur (Ugwu et al., 2012).

On exposure to poisons, children are more likely to suffer serious consequences because they are smaller, have faster metabolic rate and their bodies are less capable of neutralizing toxic chemicals (NSKC, 2004). Poisoning is a major cause of morbidity and mortality amongst children and it is the third major killer in the United States of America (USA) (Brostein et al.,2009).

Poisoning can have long term psychological and physical consequences for children and may result in large societal costs (Alazab, 2012).

In Japan, the poison centers received 31510 enquiries in 2010 about poisoning in children less than 6 years of age, 20% enquiries relating to children less than 1 year old (Goto et al, 2011). The American Association of Poison Control Centers reported approximately 1.6 million potentially toxic exposures for children and adolescents ages 0 to 19 years during the year 2007, these pediatric exposures represent 64.7 % of the reported exposures for all age groups during this year (Bronstein et al, 2008).

In 2002, more than 1.2 million un-intentional poisonings among children aged 5 years or less were reported to U.S. poison control centers .In the same year in the United Kingdom almost 31,500 children less than 15 years old went to the hospital because of a

suspected poisoning – over 26,000 of these were under five years old (Child Accident Prevention Trust, 2004).

The pattern of childhood poisoning may change over time, this change follows the introduction of new consumed products (Fallahzadeh et al., 2014). According to American Poison Control Centers, approximately 56% of reported pediatric exposures are due to non-pharmaceuticals' agents, substances that are commonly found around the house such as cleaning agents, cosmetics, hydrocarbons, and insecticides; whereas approximately 44% are due to pharmaceuticals' agents (Fine, 2006).

Few analytical epidemiological studies on childhood poisoning have been undertaken worldwide and the results are not in agreement. The prevalence and types of poisoning vary considerably across the world and depend on socioeconomic status and cultural practices, as well as on local industrial and agricultural activities (Hassan and Siam, 2014). Therefore, epidemiologic surveillance specific for each country is necessary to determine the extent of problem and the preventive measures which need to be taken.

Objectives

The present study aim is to describe epidemiology of child poisoning at Ain Shams University Hospital during year 2012 and to compare the most common poisoning agents during 2012 with that during year 1983.

Methodology

Study design: Descriptive Cross sectional study.

Site: Poison Control Centre (PPC), Ain Shams University Hospital.

Study subjects: Cases of child poisoning (≤ 15 years). The number was 4240 cases of child poisoning reached the Emergency Room (ER) during the year 2012 and only 145 cases recorded during the year 1983.

Data Management

- **For cases of 2012:** Data entry was done using Excel sheet by personnel responsible for data entry of hospital records at the Centre. Two Excel sheets were available one for whole ER cases and another more detailed one for admitted cases (Inpatient and ICU).

Data are cleaned and coded as data entry was done by text even for type of poisoning with a lot of spelling differences, thus a lot of effort was done during this step.

Then analysis were done using SPSS version 18 and all results presented in the form of frequency and percentage.

Chi square test were used to clarify difference in sex distribution in different age groups and Fischer exact test for mode of poisoning among different age groups.

- **For cases of 1983:** It was available as hospital records hard copy. Excel sheet was done for

data entry and analysis (frequency and percentage).

Ethical Consideration

Data was obtained after agreement of the head of the Poison Control Centre. And confidentiality of the data was kept by replacing names with identification numbers.

Results

Table (1): The majority of cases (76.8%) of child poisoning reaching ER were treated at ER and 22.3% were either hospitalized at inpatient and ICU of PPC or referred to other department. Only one case died at ER.

Table (2): Two deaths were reported among hospitalized cases at inpatient. Meanwhile, 21 deaths with percentage about 12% were reported among ICU admitted patients.

Table (3): Overall the number of male cases was slightly higher than females with percentage of 51.3% for males and 48.7% for females. More than 50% of child poisoning during 2012 were at age group less than three years. It was more in males than in females during this age group. The least frequency was at the age group ($>9-12$) to be raised again among females above 12 years old.

There was statistical significant difference as regard sex distribution in different age groups and it was tested using Chi square test.

Figure (1, 2): 51% of child poisoning were males (74 cases). Most cases of child poisoning were less than 3 years old with percentage 68%. The least percentage was at age above 9 years old.

Table (4): About 82% of study subjects were from "The Greater Cairo" and 18% of study subjects were from all other governorates. Other governorates include Suize (63) cases, Fayium, Minia, Sharquia, Beni Sweef and others but with few number of cases.

Table (5): During 2012 accidental mode was responsible for 68.5%, Majority of them at young ages, suicidal mode was responsible for 29.8% majority of them above 12 years old.

During 1983 accidental mode was responsible for about 78% of cases (120 cases), 12% of child poisoning occurred by therapeutic error and only 5% occurred by suicidal mode.

There was statistical significant difference as regard mode of poisoning among different age group and this was tested by Fischer exact test.

Table (6): Most of child poisoning cases during 2012 were mainly by oral route (96.9%).

Table (7): 73.8% of hospitalized patients were cured and discharged in less than 24 hours. Length of stay was less than 7 days in 97.6% of hospitalized cases and exceed seven days in 1.4% of hospitalized cases during year 2012.

Table (8): During 2012 non-drug poisoning was responsible for larger percentage (55.7%) of cases of child poisoning than drugs poisoning (44.3%). The

opposite was the condition during 1983, drug poisoning was responsible for more than 83% of cases.

Table (9): Analgesics and anti-inflammatory drugs were responsible for 11.8% of drug poisoning cases followed by antipsychotic and antidepressants (11.7%) and tramadol alone was responsible for 9.2% of cases.

Table (10): About one third 28.8% of non-drug poisoning cases were caused by corrosives. Insecticides and rodenticides were responsible for about 25.9% of

cases. Food poisoning was responsible for more than 20%.

Table (11): Antipsychotic and antidepressants were responsible for more than one third (34.7%) of all cases of drug poisoning during year 1983 followed by Spasmo - cibalgin (20.6%). Regualse was responsible for 9% of cases.

Table (12): Scorpion poisoning was responsible for 11 cases during year 1983 representing 45.8% of cases of non-drug poisoning followed by insecticides (29%).

Table (1) Distribution of cases reaching Emergency Room (ER) as regard outcome during year (2012):

Patient outcome (ER)	N (%)
Discharge	3258(76.8)
Inpatient	739(17.4)
ICU	177(4.2)
Referral	31(0.7)
Discharge by patient request	23(0.5)
Escape	11(0.3)
Death	1
Total	4240

Table (2): Patient outcome after hospitalization (Inpatient and ICU) during year (2012):

Patient outcome	Inpatient N (%)	ICU N (%)
Discharge	737(99.7)	156(88.1)
Death	2(0.3)	21(11.9)
Total	739	177

Table (3): Distribution of study subjects as regards age and sex during year 2012:

Age group	Females N (%)	Males N (%)	Total
≤3	1037 (50.2)	1294 (59.5)	2331 (55.2)
>3-6	326(15.8)	470 (21.6)	796 (18.8)
>6-9	116 (5.6)	119(5.5)	235(5.5)
>9-12	106(5.1)	112 (5.1)	218 (5.1)
>12-15	480 (23.2)	180 (8.3)	660(15.6)
Total	2065(100)	2175(100)	4228 (100)
Total (% within sex)	2065 (48.7)	2175 (51.3)	4240 (100)
P value <0.001			

Table (4): Distribution of study subjects as regard residence during year (2012):

Residence	N (%)
Cairo	2361 (55.7)
Giza	421 (9.9)
Qaluibeya	722 (17)
Suiz	63 (1.4)
Others	673 (15.8)
Total	4240

Table (5); Distribution of hospitalized patients as regard mode of poisoning among different age groups during 2012:

Age group	Accidental N (%)	Suicidal N (%)	Others* N (%)
≤3	440 (70)	0	4(26.6)
>3-6	143 (22.7)	0	1 (6)
>6-9	43 (6.8)	1(0.3)	3 (20)
>9-12	2 (0.3)	42 (15.3)	3 (20)
>12-15	0	230 (84.2)	4 (26.6)
Total	628(100)	273 (100)	15 (100)
Total (% within Mode)	628 (68.5)	273 (29.8)	15 (1.6)

P <0.001

* Others are: Iatrogenic (5 cases), overdose (addict) (2 cases), and criminal (2 cases above 12 years old)

**The total number is "916" it is the number of hospitalized cases whose data for mode was available.

Table (6): Distribution of hospitalized patients as regard route of poisoning during year 2012:

Route	N (%)
Oral	888 (96.9)
Bite/sting	13 (1.4)
Inhalation	12 (1.3)
Intravenous/Intramuscular	2 (0.2)
Total	916 (100)

Table (7): Distribution of hospitalized cases as regards length of stay during year 2012:

Length of stay	N (%)	Cumulative percentage
<1day	676 (73.8)	73.8%
1-<2 days	150 (16.4)	90.2%
2-<3days	43 (4.7)	94.9%
3<7days	25 (2.7)	97.6%
>7days	13 (1.4)	100%
Missing	9 (1)	
Total	916 (100)	

Table (8) Main categories for type of poisoning during year 2012 and 1983:

	Year 2012 N (%)	Year 1983 N (%)
Drug	1877(44.3)	121(83.4)
Non - drug	2363(55.7)	24 (16.5)
Total	4240	145

Table (9): Distribution of drug poisoning cases according to type of drug during year 2012:

Drug Type	N (%)
Analgesics and anti-inflammatory	223 (11.8)
Antipsychotic and antidepressants	221 (11.7)
Tramadol	173 (9.2)
*Drugs for CVDs	158 (8.4)
Theophylline	137 (7.2)
**OCPs	123 (6.5)
Antibiotic	122 (6.4)
Antiepileptic drugs	118 (6.2)
Antihistaminic	65 (3.5)
Anti- diabetes	51 (2.7)
***Miscellaneous	178 (9.4)
Unspecified	308 (16.4)
Total	1877 (100)

* CVDs: Cardiovascular disease , **OCPs: Oral contraceptive pills,***Miscellaneous : includes all other types of drugs present at home like iron and other vitamins, antitussive, anticoagulants etc., all are present but in few numbers.

Table (10): Distribution of Non-drug poisoning cases according to type of poison during year 2012:

Type	N (%)
Corrosive	681(28.8)
Insecticides and rodenticides	613 (25.9)
Food poisoning	504 (21.3)
Hydrocarbons	240 ((10)
Poisonous gas	98 (4)
Cannabis, Opiates and Nicotine	79 (3.3)
Phenol	68 ((2.8)
Scorpion and Snake	44 ((1.8)
Ethyl and Methyl Alcohol	23 (0.9)
Miscellaneous	13 (0.5)
Total	2363 (100)

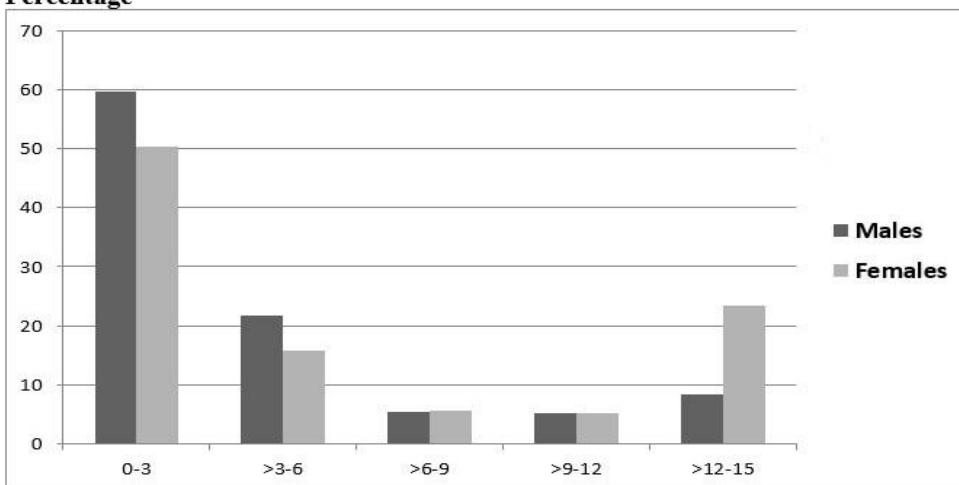
Table (11): Distribution of drug poisoning cases according to type of drug during year 1983:

Drug Type	N (%)
Antipsychotic and antidepressants	42 (34.7)
Spasmo- cibalgin (Codeine)	25 (20.6)
*Regulase	11(9)
Mebromate (Migranil)	8 (6)
Digoxin	8 (6)
Theophylline	5 (4)
Miscellaneous	15 (12.3)
Unspecified	7 (5.7)
Total	121 (100)

*Regulase: is an old drug. It was a combination of Phenoparbitone, Antispasmodic and Mebromate

Table (12): Distribution of Non-drug poisoning cases according to type of poison during year 1983:

Type	N (%)
Scorpion	11(45.8)
Insecticides	7 (29)
Corrosive	2 (8)
Hydrocarbons	2 (8)
Datura	1 (4)
Food poisoning	1 (4)
Total	24(100)

Percentage**Figure (1) Distribution of study subjects as regards age and sex during year 2012.**

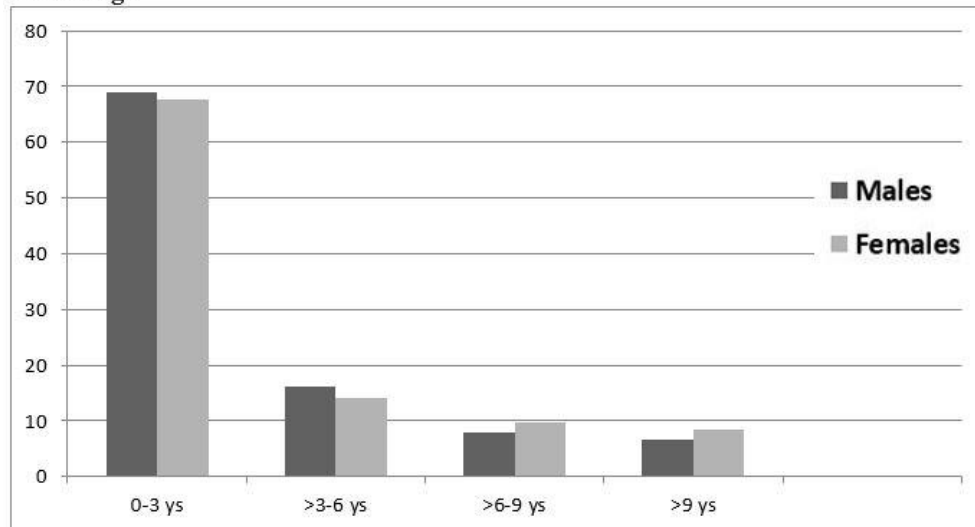
Percentage

Figure (2): Distribution of study subjects as regards age and sex during year 1983

Discussion:

Acute poisoning is a common cause of morbidity and mortality among children, accounting for more than 1 million cases annually reported to the Toxic Exposure Surveillance System (TESS) of the American Association of Poison Control Centers. Intoxication represents one of the most frequent emergencies in pediatrics leading to high social and economic burden (Hassan and Siam, 2014). Its epidemiological characteristics differ from country to country, so special epidemiological studies in each country and each region is necessary to determine how this health problem can be prevented (Franklin and Rodgers, 2008).

There has been a reduction in the incidence of childhood acute poisoning in recent years (Tsalkidis et al, 2010). This was in agreement with the present study which reported the total cases of acute poisoning among children admitted to Poison Control Centre (PPC), Ain Shams University Hospital during the year 2012 was 4240, while the total cases of acute poisoning among children admitted to Ain Shams University (poison control center) during the year 2008 were 8841 (ASPCC, 2008) and during the year 2004 were 12018 cases (Aglan, 2007). Here we should not forget the fact that much minimal ingestion at home may not warrant a visit to the hospital and therefore, the true incidence may be higher than reported here.

Also it was found in the present study that majority of cases (76.8%) of child poisoning treated at ER, 17.4% were hospitalized at inpatient and 4.2% were admitted to the ICU. Similar result was reported by Mintegi et al (2006), who found a total of 83.3% of patients were treated as outpatients, 15.2% were hospitalized, and 1.5% were admitted to the intensive care unit. This could be attributed to that the most

common childhood ingestions involve non-toxic substances or non-toxic doses of potentially toxic drugs or products (Dempsey, 2007).

The mortality rate due to acute poisoning ranges from 7.6% to 0.4% in literature (Sahin et al., 2011; Mutlu et al., 2010). The rate of mortality in our surveillance was 0.56% during the year 2012 and 4% during the year 1983, the mortality has declined significantly, which could be due to heightened parenteral awareness of poisoning resulting in large number of cases visited ER but most of children had no life-threatening symptom and could be discharged by short term observation. In the present study 73.8% of hospitalized patients were discharged in less than 24 hours which is in agreement with a study by Gheshlaghi et al (2013) who found that about 81 percent of the patients have been discharged in the first 24 hours, considering that most of children had no life-threatening symptom and could be discharged by short term observation.

In the present study most of the childhood poisoning events occurred among children aged up to 6 years, with a slight male predominance. Similar results have been reported elsewhere (Mutlu et al., 2010; Alazab, 2010; Maklad et al, 2012). The commonest age group involved in acute poisoning universally (1-3 years) (Akhtar et al 2006); this is the same as seen in our study where children younger than five years of age accounted for more than half of the patients (Table 3). Children in this age group are reported to have a higher propensity to explore and put everything in their mouth. As in the literature (Gheshlaghi et al., 2013; Alazab 2012; Alazab et al., 2012), the present study revealed that (96.9%) of

the studied cases were poisoned through the oral route (Table 6).

Andiran and Sarikayalar (2004) found that poisonings <10 years of age were more frequent in males whereas poisonings >10 years of age were more common in females which was compatible with the present study (Table 3). This could be explained as in young children males are more active than females, less obeying orders, less intelligent, more curious to explore world around them. After 10 years of age, self-poisonings were the leading cause, with females predominance.

As reported by previous studies, accidental poisoning was the commonest (Maklad et al., 2012; Andiran and Sarikayalar, 2004; Sahin et al., 2011). The present study showed that 68.5% of all poisonings were accidental, the majority of them ≤ 3 years, while 29.8% occurred as suicidal attempt, the majority of them were above 12 years old.

Unintentional poisonings may occur as part of cognitive development in young children who put almost anything into their mouths while discovering the environment (Alazab, 2012). Akhtar et al (2006) reported that suicidal poisonings are commonly seen in older children (6-12 years). The precipitating factors may be minor arguments with friends or parents. Such episodes should not be regarded as trivial.

When the two periods (1983, 2012) were compared regarding manner, accidental poisonings were the leading cause in both, the increase in the incidence of self-poisonings was remarkable in 2012 as in the world (Andiran and Sarikayalar, 2004). On the other hand, the incidence of therapeutic error as a cause of poisoning decreased significantly, which is probably due to the increased skill of the population regarding drug usage.

According to the American Poison Control Centers, approximately 56% of pediatric exposures are to xenobiotics that are commonly found around the house, such as cleaning products, cosmetics, plants, hydrocarbons, and insecticides, whereas approximately 44% are to pharmaceutical agents (Fine, 2006). Approximately the same result was reported in the present study (Table 8).

Household products were shown to be the leading causative agents for acute poisoning in the present study. Corrosive alone was implicated in 681 (28.8%) cases, Pesticides were the next common household products implicated in the present study, 613 (25.9%) cases, and hydrocarbons accounted for 240 (10%) cases.

As children are mostly kept at home, the pediatric acute poisonings frequently occur in the household and the substances causing poisoning are often domestic products. The improper storage of dangerous household products like caustics, rodenticides, kerosene, detergents, etc. lead to the majority of poisoning (Haghighat et al, 2013). More than 20,000 children drank laundry bleach in 2002, often mistaking it for water or

juice because it was stored in a glass or cup (Watson et al, 2003).

The pattern of children's acute poisoning change with time, this change follows the introduction of new consumed products (Lawson et al, 2011). Our study showed that drugs were shown to be the leading causative agents for acute poisoning in children in 1983 more than 83% of cases, while 55.7% of cases were due to non-pharmaceutical products in 2012 (Table 8).

Caustic corrosive substance ingestion also showed more than three-fold increase in the year 2012 compared to 1983 (28.8 vs 8% respectively). This most probably resulted from the storage of many household chemicals within easy reach at home. While venomous animals (1.8%) not represent a problem among children in the present study during the year 2012, the opposite was the condition during 1983, where scorpion poisoning was responsible for 45.8% of cases.

This result was not seen in United Arab Emirates, Oman, Turkey, Greece and many other studies where drugs was implicated as the major cause (Dawson et al., 1997; Hanssens et al., 2001; Andiran and Sarikayalar 2004; Azkunaga et al., 2012;). This could be referred to the fact that childhood poisoning depends on lifestyle factors and environmental conditions that vary substantially across countries and population groups.

Analgesic, and psychotropic medications were the source of the majority of pediatric pharmaceutical exposures in our study, This is compatible with studies from other parts of the world (Waston et al, 2004; Maklad et al, 2012; Haghighat et al, 2013). This shows that conventional drugs used by parents or household members serve as potential sources for acute poisoning of children.

Tramadol ranked number three in the list of medicinal products. The high rate of tramadol poisoning in our study demonstrates that this substance is highly available for consumption in our country.

Considering that most of children had no need for hospitalization and treated at ER, it seems that it is not necessary to refer all cases of poisoning to clinical toxicology center and educational course regarding poisoning for pediatricians who faced with toxicological cases is essential.

The increased incidence of the cases of self-intoxication as seen throughout the world highlights the need for psychological consultations for preventing these catastrophic events.

As majority of cases in the present study were due to household products like corrosive, pesticides and hydrocarbons greater precautions are needed when storing such hazardous products.

Because of frequent poisoning with medications, the pharmaceutical companies should use child-resistant packages for their products to prevent children access to such items. Educational program for mothers during pregnancy about how to poison-proof her child's environment is strictly recommended.

Potential limitations of this study were its retrospective design and difficulties in data retrieval from old unorganized data collection system.

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الملخص العربي

نمط تسمم الاطفال في مستشفى عين شمس الجامعي خلال عام ٢٠١٢ مقارنة بعام ١٩٨٣: ماالذي تغير في ثلاثة عقود؟

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يعد تسمم الاطفال واحدا من اهم الاسباب المرضيه الرئيسيه لدى الدول الناميه وايضا الدول المتقدمه. و بالرغم من نجاح بعض التدخلات لمنع حوادث التسمم في الاطفال الا انه لازال هناك حالات وفاه تحدث نتيجة حالات التسمم غير المتعمده. كان الهدف من هذه الدراسه وصف حالات تسمم الاطفال في مستشفى عين شمس الجامعي خلال عام ٢٠١٢ و مقارنه اكثر المواد المتسببه في حالات التسمم خلال هذا العام بمثيلاتها عام ١٩٨٣. اجريت دراسه مستعرضه في مركز علاج السموم بمستشفى عين شمس الجامعي شملت ٤٢٤٠ حاله تسمم اطفال (عمرهم اقل من او يساوي ١٥ سنه) وهو عدد الحالات التي تم صولها الى استقبال وحدة السموم خلال عام ٢٠١٢ و ١٤٥ حاله تم علاجها خلال عام ١٩٨٣ اوضحت النتائج ان اكثر من ٥٠٪ من حالات تسمم الاطفال خلال عام كان عمرهم اقل من ثلاث سنوات و كان حوالي ٨٦ ٪ من الحالات عن طريق غير متعمد . و كانت حالات التسمم الناتجة عن التعرض للمواد غير الدوائيه (حوالي ٥٦٪ من حالات تسمم الاطفال) اكبر من تلك الناتجة عن التعرض للمواد الدوائيه و ذلك خلال عام ٢٠١٢ ولكن خلال عام ١٩٨٣ كانت المواد الدوائيه تمثل النسبه الاكبر من الحالات (٨٣ ٪).

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