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Clinical Profile of Acute Accidental Poisoning among Children- A Retrospective Study



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Abstract

Acute toxicity is a frequent but avoidable cause of morbidity and mortality in children, especially in developing countries such as India. The present study assesses patterns of acute toxicity among children of different age groups.

The study sample included all hospitalised paediatric victims of acute accidental poisoning at the King George Medical University, Lucknow, India from 2010-2011. Their histories, baseline characteristics,

clinical treatments and outcomes were reviewed.

Most children were males less than three years of age with 4% overall mortality. Kerosene oil was implicated in most cases.

Childhood poisoning was common among patients 1-3 years of age with a male preponderance. The accidental ingestion of household poisons, especially kerosene oil, was responsible for most cases. Parents must be educated about the dangers of these toxic household substances and warned to store them in suitable containers out of the reach of children.

Keywords: Forensic Sciences, Paediatric, Acute Poisoning, Kerosene, Clinical Outcome.

الصورة السريرية للتسمم العرضي الحاد بين الأطفال -
دراسة بأثر رجعي

المستخلص

تعد التسممات الحادة من الأسباب المتكررة التي يمكن تجنبها لحالات زيادة الإصابة بالمرض والوفاة بين الأطفال وخاصة في البلدان النامية، بما في ذلك دولة الهند. تقيم هذه الدراسة نمط حالات

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التسممات الحادة وعلاقتها بالفئات العمرية المختلفة. أجريت هذه الدراسة بأثر رجعي واستهدفت جميع الأطفال المصابين بحالات التسمم العرضي الحاد في مستشفى جامعة الملك جورج الطبية؛ في مدينة لكانا خلال الفترة بين سنة 2010-2011م، وتم دراسة التاريخ المرضي والأعراض الأولية والإجراءات العلاجية السريرية والنتائج النهائية لهذه الحالات. وكان معظم الأطفال من الذكور بعمر أقل من ثلاث سنوات مع نسبة إجمالية للوفيات تساوي 4%. وكان زيت الكيروسين هو المتسبب في معظم الحالات. إن التسمم في مرحلة الطفولة هو الأكثر شيوعاً خلال الفترة العمرية من 1-3 سنوات مع زيادة ملحوظة لدى الذكور. وكانت السموم المنزلية، وخصوصاً زيت الكيروسين هي المسؤولة عن معظم حالات تناول عن طريق الخطأ. ويجب تعليم الوالدين وتحذيرهم وحثهم على إبقاء هذه المكونات السامة بمكان آمن في عبوات مناسبة وبعيداً عن متناول الأطفال.

الكلمات المفتاحية: علوم الأدلة الجنائية، طب الأطفال، التسمم الحاد، الكيروسين، النتيجة السريرية.

1. Introduction

Acute Poisonings, whether suicidal, accidental or homicidal, claim considerable numbers of lives throughout the world. The fact that the prevalence of poisoning in developing countries is significantly high where health-care facilities are already sorely lacking clearly signifies the urgent need for extensive research to strengthen toxicological services in affected areas.

Globally, acute paediatric toxicities are a cause of morbidity and mortality. Despite attempts to prevent unintentional paediatric poisoning, it continues to be a criti-

cal issue [1]. Poisoning may be accidental, deliberate or homicidal, but rarely suicidal or iatrogenic in young children. Deliberate poisoning is commonly attributed to older children (particularly, young girls); otherwise it is mostly accidental in nature. Children in the age group of 1-3 years are curious and often explorative in behaviour. Behaviours such as hand to mouth activities and playing close to the ground further magnify their exposure to toxic substances.

Patterns of paediatric poisoning can differ from country to country. In third world countries, including India, insecticides and other household substances are the most common causes of poisoning. Apart from these, studies have also recognized kerosene, petrol and medicines to be other major toxic hazards for children.

In American children (1-14 years), after traffic accidents, burns and drowning, poisonings were the fourth most common cause of inadvertent injury [2]. In the US in 2009, it was reported that children (<6 years), made up 50.9% of poisonings and 2.4% of fatalities. Furthermore, pharmaceutical products (drugs) were implicated in most cases [3], and 429.4 poisonings per 100,000 children were treated in hospital emergency departments in 2004 in spite of non-fatal poisonings in children younger than 5 years of age [4].

In Japan, poison canters in 2010 received 31,510 cases of childhood intoxication (< 6 years). 20% of enquiries were related to infants, who made up 35.7% of these cases [5].

Globally, a number of children are inadvertently intoxicated every year, mostly due to lack of supervision and their innovative and explorative nature and mouthing tendencies. Furthermore, new and complex chemicals such as pesticides, cleaning substances, and other solutions have



increased the range of harmful items to which kids may get exposed.

There is a lack of extensive research and literature on childhood toxicity, especially in the region in which the present study was conducted. The present study aimed to assess the clinico-epidemiological profile of childhood intoxication in order to monitor trends and identify areas for prevention.

2. Materials and Methods

This retrospective observational study was conducted at the King George's Medical University (KGMU), Lucknow, India. It is a tertiary care centre and the largest hospital in the region. All cases of suspected poisoning admitted to the paediatric emergency department of KGMU were included in the study. Patients with a history of ingestion of poison, intoxication or envenomation from August 2010

to July 2011 formed the study sample. A total of 100 cases were included and divided into seven age groups (a) less than 1 year, (b) 1-3 years, (c) 3-5 years, (d) 5-7 years, (e) 7-9 years, (f) 9-11 years (g) 11-14 years. Various factors were studied: Their histories, baseline characteristics like age, sex, address, rural/urban, date of admission/discharge, socioeconomic status, nature of poisoning (unintentional/intentional), mode/route of poisoning, type and amount of poison ingested, signs and symptoms, management given and outcome in terms of morbidity and mortality.

Only confirmed cases were included. Cases were excluded in which poisoning could not be ascertained or where history and circumstantial evidences were untrustworthy. Diagnosis of poisoning was made by reliable information from the victims, their relatives, and used containers/foil packaging of medicine brought by them. In suspected cases, this was later confirmed by the lab investigations. After

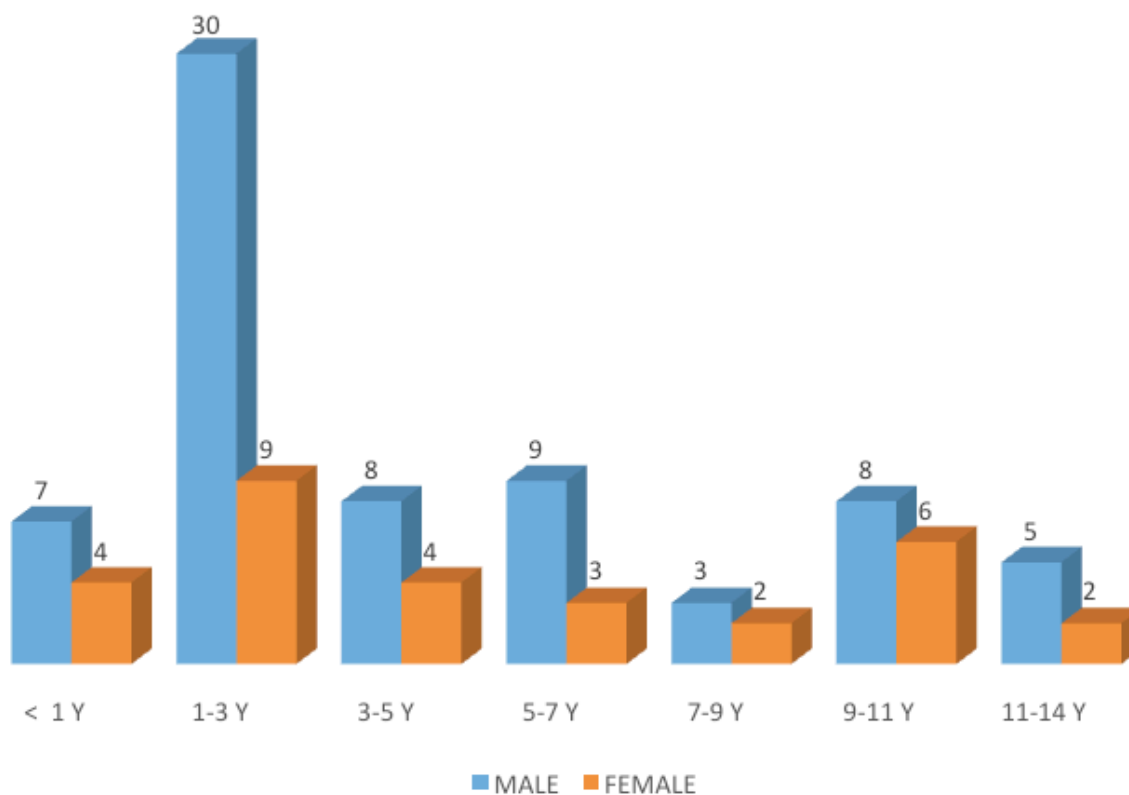


Figure 1- Age distribution of cases.



talking to the patient as well as their relatives, all these unfortunate incidences were found to be purely accidental in nature. Appropriate tests of significance were applied.

3. Results

Among 100 victims, the largest majority of cases (39%) were children 1-3 years of age, and the minimum amount of cases (5%) were seen in children 7-9 years old. Figure-1 shows that males clearly outnumbered females (M = 70%, F = 30%) with a male to female ratio of 2.33:1.

The various types of agents responsible for poisoning are shown in Table-1. Most (27) cases were caused by Kerosene oil followed by Snake/Scorpion bites and drug ingestion. The most common drug ingested was paracetamol. In most cases, oral ingestion (57%) was found (Table-2). This study presents a correlation of incidence with age, sex,

route of exposure and type of poisoning.

Patients in 70% of cases recovered through supportive treatment, while 30% required specific treatment. In 96% of cases, patients recovered, and the remaining 4% died. The mortality rate was highest (50%) for organophosphorus poisoning followed by kerosene poisoning and snake bite (25% each).

4. Discussion

Overall, around 10% of casualty admissions in India are caused by acute poisoning. This is the third leading cause of death in India, especially among the young population. Most cases are caused by oral ingestion of extremely toxic agrochemical compounds; inhalational poisoning is rarely reported among children and elderly [6].

A complete ban on agrochemical compounds is not

Table 1- Distribution of cases according to the type of poisons.

SN	Types of Poison	No. of Cases
1	Kerosene poisoning	27
2	Snake bite	23
3	Scorpion stings	15
4	Drug ingestion	12
5	Organophosphates	5
6	Mortein ingestion/ Insect repellent	3
7	Moth balls (Naphthalene poisoning)	3
8	Insect bite	3
9	Toxic gas inhalation	2
10	Acid	1
11	Alkali	1
12	Turpentine oil	1
13	Peppermint oil	1
14	Common salt	1
15	Formaldehyde	1
16	Dhatara seeds	1
	Total	100



Table 2- Distribution of the poisoning cases according to the route of administration.

SN	Route of administration	No. of cases
1	Oral	57
2	Inhalation	2
3	Bites	41
	Total	100

feasible; however, substituting them with newer less toxic compounds like Imidacloprid, Pendimethalin, and Pencycuron etc. is of great value. They generally demonstrate low human lethality but may still be hazardous [7,8].

The present study reported a maximum incidence of poisoning in the 1-3 years age group (39 %), which is fairly similar to other studies [9-13]. This could be due to their natural curiosity and high oral exploratory activity aided by their newly acquired mobility and hand skills. In addition, they are unable to discriminate between dangerous and safe products. With increasing age, fewer cases were reported, as elder children can be warned against harmful products by responsible adults.

Males (70%) significantly outnumbered females, corroborating other studies [14-16].

This could be explained as males are often more active, less obedient, and more curious to investigate the world around them.

Kerosene oil was the commonest toxic agent ingested by the children. This finding mirrors other studies [10-11, 16]. In Indian homes, it is normally available due to its frequent use for cooking, lighting and agriculture work. It is stored in loosely capped soft drink or mineral water bottles in easily accessible places such as kitchen floors, low tables or low shelves.

Younger children (1-3 years) who consumed kerosene might have thought it to be soft drinks or mineral water.

This also explains the maximum occurrence of incidents in the summer season.

Kerosene toxicity is manifested by Tachypnoea, cough and crepitations. Male gender and malnutrition (weight for age <80%) were significantly associated with prolonged hospital stay [12].

In third World countries like Pakistan, India and Sri Lanka, Kerosene oil is the commonest hazardous substance ingested accidentally by children [17]. Surprisingly, it has also been reported from industrialized countries [18-19]. The same is also true for Kuwait, Ahwaz, and Vienna. But in the United Arab Emirates, Oman, Turkey, and Greece, drugs were implicated as the major cause. In Nepal, hydrocarbons were responsible in 9.8% to 43.0% of cases [21]. This figure is 25.3% in India [22], while only 0.9% in Columbia [23].

Animal bites (38%) and Drug toxicities (12%) are the most frequent causes of poisoning after kerosene.

This study also records organophosphorus compound (OPC) poisoning in 5% of cases, which is well documented in the literature [26-28].

In Nepal, insecticides were implicated in most cases of childhood poisoning (59.9%), and among them, OPC was responsible for 45.1% of cases. [21]. In Australia and Columbia, they were responsible for only 2.4% and 4.0% of cases, respectively [29].

The most common route of poisoning (Table-2) was



oral ingestion (57%), similar with other studies [10,16,30]. Inhalational poisoning is rarely seen among children and the elderly, but cases may occur [6].

Our results disagree with some studies, e.g. in Israel drugs and household cleaning products caused most cases in children aged 2-5 and 14-18 years [24].

Similarly, in the Greater Athens area, cigarettes were mostly implicated among infants, whereas medicinal products dominated all other childhood age groups [31].

In Burkina Faso, children aged 1 to 4 years were most commonly affected, with a peak incidence in April with male predominance. Household products accounted for 44.7% of cases followed by drugs (22.7%) and food poisoning (22%). Kerosene and other petroleum products again topped the list of household products (54.5%) [32].

Children are curious and often explorative. Behaviours such as hand to mouth activities and playing close to the ground further magnify their exposure to harmful substances. In addition, children cannot differentiate between safe and harmful products, Parental awareness always plays a crucial role in preventing incidents of toxication.

In an episode of mass poisoning, a group of adults and children consumed fallen *Jatropha* seeds mistaking them for edible sunflower seeds. Victims had to be hospitalised for severe gastrointestinal complications and other symptoms. This demonstrates the dangers of a lack of awareness and knowledge [33].

In some regions like Bilaspur, a district of Chhattisgarh, acute *Jatropha* poisoning has been a major cause of poisoning due to its mass cultivation for biodiesel production and its unregulated large scale growth along roadsides.

This study aimed to make the people aware of the potential dangers of acute paediatric poisonings so as to mini-

mize cases and ease the financial burden on community health services. As part of raising awareness, school children, especially in rural areas, must be taught in schools to avoid experimentation with unfamiliar plant substances and household chemicals [33].

Because the main causes of paediatric poisoning are negligence, ignorance, lack of education, poor socio-economic status and overcrowding in large families, many deaths and disabling sequelae could very easily be prevented if more attention were given to implementing preventive measures at home. In addition, a strong socio-political will along with stern efforts is also required.

Laws and regulations

A comprehensive preventive strategy must include laws supported by enforcement. In 1970, the United States introduced child-resistant packaging in its Poisons Prevention Packaging Act, which proved quite effective and is one of the best-documented successes in preventing the unintentional poisoning of children.

Limitations of the study

This is a single centre study, and it is therefore difficult to generalize the results and to calculate the rate of poisoning in the entire Indian population. Despite these limitations, this article provides valuable information on accidental childhood poisoning in a developing country. Furthermore, it suggests some approaches to prevent these hazards.

5. Conclusion

This study defines the characteristic pattern of paediatric poisoning with respect to different age groups and gen-



der. A male predominance was noticed (70 %), and household products were reported in most cases. Kerosene alone was implicated in (27%) of all cases. Health officials, the media, and the community must all help to increase awareness about the dangers of poisoning and the importance of preventive measures.

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Conflict of interest

None declared.

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Nil.

Ethical Clearance

N/A

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