Original Paper

A Regional Study of Poisoning in Children

Cyriac Job*

ABSTRACT

Poisoning is one of the major causes of morbidity and mortality in pediatric population. Since reliable information as to the incidence of childhood poisoning is lacking in this part of India (Calicut), this study was conducted with special emphasis on assessing the incidence, pattern of poisoning, presentation, complications, final outcome, and postmortem findings (in fatal cases). The study comprised studying both clinical and pathological features over a period of six months starting from 01-01-1999. The results suggest that the majority of the cases were accidental (96.8%), while 2.5% of cases were homicidal. There is male preponderance. Kerosene is the commonest poison involved (42.5%). Majority of the patients were toddlers between the ages of 1 and 3. Improper storage of toxic substances, curiosity on the part of the victim, and ignorance about the hazardous nature of a particular substance were the commonest factors in all the accidental cases of poisoning.

Key words: Pediatric poisoning, Incidence of poisoning, Kerosene

Introduction

Poisoning is one of the major causes of morbidity and mortality in pediatric population. It is a major problem not only for the child, but also for the family and the society at large. Common offending substances vary from place to place, and even from house to house or from time to time. These substances may be household agents like kerosene, pharmaceutical drugs, pesticides, or cleaning solutions. Availability of poisons, socioeconomic status, cultural influences, etc., constitute other factors, which could modify the pattern of poisoning.

Methodology

This study comprised studying both clinical and pathological features of pediatric poisoning over a period of six months starting from 01-01-1999. The clinical study was conducted among the children admitted to the pediatric ward of the Institute of Maternal and Child Health, Calicut. This is considered as a referral hospital in the Malabar area of Kerala. All patients admitted with alleged history of poisoning was studied in detail. The pathological aspects were studied in the Department of Forensic Medicine, Medical College, Calicut. All cases below the age of 13 years brought for postmortem examination were included, and those with a history of poisoning were studied in detail. Tissues for histopathological examination, as well as viscera and body fluids for chemical examination were collected during postmortem examination. Chemical analysis was done at The Regional Chemical Examiners Laboratory, Calicut. The subjects were divided into six groups: those with history of ingestion of medicinal substances, ingestion of non-medicinal substances, ingestion of poisonous plants, inhalation of poisonous gases, those who had been stung or bitten by venomous creatures, and those who had suffered from food poisoning. All available recent literature in this regard were reviewed and compared.

***Assistant Professor & Deputy Police Surgeon, Department of Forensic Medicine, Medical College, Calicut 673008, South India**

Results

In the clinical part of the study, out of a total of 3423 admissions, 160 cases (04.67%) were poisoning cases (**Table 1**). The majority of the cases were accidental (96.8%), while 2.5% of cases were homicidal (**Table 2**). There is male preponderance of 2.13:1 (**Table 3**). Kerosene is the commonest poison ingested (42.5%) (**Tables 4 & 5**). All these cases of kerosene ingestion developed chemical pneumonitis, with 14% going on to full blown pneumonia. However, there were no fatalities in ingested poisoning cases (**Table 6**). Inhalation of poisonous gas occurred in 10 children, while 17 children were poisoned with medicinal products, and 4 suffered from food poisoning. Kerosene poisoning is substantially more common among toddlers aged 1 to 3 years (**Table 7**). Among those aged more than nine years, bites and stings were the commonest kinds of poisoning. Only four children died due to poisoning, of which two were cases of snakebite, one was due to food poisoning, and the fourth was a case of ammonium dichromate ingestion.

Table 1: Incidence of poisoning in children

Total number of hospital admissions	3423
Poisoning cases	160
Percentage	4.67

Table 2: Manner of poisoning in children

Manner	**Number**	**Percentage**
Accidental	155	96.8
Homicidal	04	02.5
Suicidal	01	00.6
Total	160	100

Table 3: Sex-wise incidence

	Number	**Percentage**
Male	109	68
Female	051	32
Ratio	2.13: 01	

Table 4: Pattern of poisoning in children

(Total 160 cases)

Serial number	**Type of poisoning**	**Number**	**Percentage**
1	Medicinal products	17	10.6
2	Non-medicinal household products	82	51.3
3	Poisonous plants	05	03.1
4	Inhalant poisons	14	08.7
5	Bites and stings	38	23.8
6	Food poisoning	04	02.5

Table 5: Nature of non-medicinal household poisoning

Type of chemicals	Number	Percentage
Kerosene	68	82.9
Rat poison	05	06.1
Fabric whitener	03	03.7
Organophosphate insecticide	02	02.4
Ammonium dichromate	01	01.2
Organochlorine insecticide	01	01.2
Carbamate insecticide	01	01.2
Turpentine	01	01.2
Total	**82**	**100**

Table 6: Outcome of poisoning cases

(Total 160)

	Number	Percentage
Recovered	156	97.5
Expired	04	02.5

Table 7: Age-wise distribution

Age group	Number	Percentage
1 to 3 years	96	60
4 to 6 years	29	18
7 to 9 years	15	09
10 to 12 years	20	13

In the autopsy part of the study, out of the 27 children brought for postmortem examination during this period only 4 cases had a clear-cut history of poisoning (**Table 8**). Two children were deliberately administered carbamate insecticide by their parents, while one died due to food poisoning. One child accidentally ingested ammonium dichromate mistaking it for a soft drink powder. In the insecticide and food poisoning fatalities, there was froth at the nostrils, and the organs appeared congested. In the ammonium dichromate case, the lungs showed ecchymosis, (especially right lung), while the liver showed fatty change, and both kidneys showed features of renal failure. Details of histopathological examination are laid out in **Table 9**. Relevant viscera preserved in saturated saline, and blood in sodium fluoride were sent to the Chemical Examiner's Laboratory for chemical analysis. Results showed that carbofuran had been detected in the carbamate poisoning cases, while no poison or toxin could be detected in the other cases.

Table 8: Incidence of unnatural pediatric deaths

Nature of death	Number	Percentage
Traffic accident	07	25.9
Drowning	06	22.2
Burns	05	18.5
Neonatal death (*unexpected*)	04	14.8
Poisoning	04	14.8
Falls	01	03.7
Total	**27**	**100**

Table 9: Histopathological findings in fatal cases

Nature of poisoning	Lungs	Kidneys	Liver
Ammonium dichromate	Pneumonia	Acute tubular necrosis	Fatty change
Food poisoning	Unremarkable	Unremarkable	Congested
Carbamate insecticide	Edema	Cloudy swelling	Congested

Discussion

Poisoning in children is usually accidental,[1] and the majority of the victims are toddlers between the ages of 1 and 3.[2] This is reflective of the findings in the present study. Comparison between different studies with respect to the nature of poison could be misleading, as poisonous materials vary from place to place. Medicinal preparations were the commonest source of pediatric poisoning as per some Western studies.[3,4] In the majority of studies, the manner of pediatric poisoning is generally accidental, with male preponderance, which is again reflective of the present study. The high incidence of poisoning with kerosene in the present study can be attributed to various reasons: easy accessibility (many economically backward communities still rely on kerosene as the main kitchen fuel), exploratory behaviour of children, and carelessness on the part of the parents. It is well known that proper education of the parents, and use of child resistant containers can minimise childhood poisoning to a great extent. None of the cases of kerosene poisoning in this study ended in death, probably because of severe irritation provoking immediate emesis. Also, the dramatic nature of the poisoning is likely to have induced the parents to seek early medical attention.

The lone case of ammonium dichromate poisoning probably did not receive effective medical treatment, since most toxicology textbooks do not contain adequate information on this relatively rare poison. Ammonium dichromate (NH_4 (Cr_2O_7)) is an easily dissociable compound; ammonium and oxides of chromium are the products of dissociation, and these are not easily demonstrable by chemical analysis from viscera and blood.[5]

Conclusion

Morbidity due to poisoning among children still remains high in India, and kerosene appears to the single largest contributor, at least in this part of the country. The incidence is maximum in the age group of one to three years, with peak incidence at two years of age. At this age, children spend most of their time with their mothers who are the usual handlers of kerosene in this region. Improper storage, curiosity seeking behavior of the child, mistaken identity of the substance, etc., are the commonest factors in kerosene poisoning. This study highlights the importance of

understanding the these factors, so that necessary measures can be undertaken in the form of education of parents, increasing awareness of poisoning among doctors and the lay public, and making it mandatory for manufacturers of hazardous medicinal and non-medicinal commercial products to sell them only in child resistant containers.

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