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Original Research Article

A Prospective Study on Accidental Poisoning In Pediatric Patients

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Abstract: Toxicology is the science which deals with the chemical properties, action, toxicity, lethal dose, detection of various poisons and treatment of poisons. Poison is any substance which when introduced in to the living body or brought into contact with any part thereof will produce ill effects or death, by its local or systematic action or both. As children start crawling and walking they become very active and try to explore unfamiliar objects by putting them in to their mouth and tasting them. Hyperactive male children are more prone for poisoning. In large families the mother is too busy and tired with household duties and becomes careless in the storage of poisonous household products Absence of a parent is also one of the reasons which may lead to poisoning. In small houses there is little storage facility and poisonous substances may be stored in easily accessible places. In this study, the commonest age involved 1 – 3 yrs age group (Toddlers) with 39 Cases followed by 4 – 5 yrs age group (Preschool) with 13 cases. The age group least involved was below one year (infant group) with 3 cases. Accidental poisoning was more in male children than female children. Out of 72 cases, most of the cases were of organophosphate poisoning (34 Cases) and snake bite (4 Cases) cases contributed the least. Out of 72 cases, 48 cases of poisoning occurred through oral route, and remaining 24 cases occurred through parenteral route (other than alimentary canal). Most cases of accidental poisoning are preventable by close watch on the toddlers and younger children who have a habit of tasting unknown things.
Keywords: Poisoning, Organophosphates, Snake Bite, Scorpion Sting, Toddler, And Parenteral Drugs.

INTRODUCTION

Poisoning is a global health problem. According to 2014 annual report of the U.S./ American Association of Poison Control Center (AAPCC), there were 28,90,909 accidental exposures to various poisons , 10,31,927 (48% of total exposure) exposures were in children younger than 6 years, 1,32,067 (6 % of total exposure) were note in the age group of 6- 12 years, 1,58,468 (7 % of total exposure) were noted in the teenage group, 8,25,009 (38 % of total exposure) and 17,671 exposures (1% exposure) in other age groups [1]. However the offending agent and the associated morbidity and mortality vary from place to place and change over a period of time. With the control of infectious diseases, the contribution of poisoning to childhood mortality and morbidity has been increasing in developed countries [2-7].

In India mortality varies between 18 - 30%, and is the 4th most common cause of mortality and 12th leading cause of admissions in the pediatric wards and accounts for 1% of the hospitalized patients [8]. Childhood poisoning accounts for nearly 20% of all poisoning in South India. Poisoning represents one of the most common medical emergencies encountered in young children and accounts for a significant proportion of emergency room visits. Poisoning is defined as an individual's medical or social unacceptable condition as a consequence of being under influence of an exogenous substance in a dose too high for the person concerned. Poison is any substance that when ingested, inhaled, or absorbed, even in relatively small quantities, can cause damage to a structure or disturbance of body function by its chemical action [9]. There are some medications which are toxic to children even in small amounts. Administration of even a medicine, which is otherwise intended to cure a disease, may be referred to as poisoning, if the dose and manner of use is not medically justified. Hence goes a famous saying "The dose makes the poison" [10].

Most poisonings occur at home. Children learn about the world around them by touching and tasting, so they may put anything in their mouth and this puts them

at increasing risk of poisoning. The peak age for childhood poisoning is between 1-3 years [11]. Poisoning in pediatric age group has a bimodal distribution with the highest peak in young children and a continuous increase in adolescence [12]. The pattern of poisoning in India is different from that in western countries, where drugs especially, aspirin and barbiturates are the common offending agents, but in our country household substances (by far the commonest being kerosene, cleaning agents and pesticides) account for the majority of poisoning in young children (1-4yrs). Opium poisoning is common in North India. Organophosphate (OP) poisoning is common in rural areas.

AIM OF THE STUDY

Accidental poisoning in children and to find out commonest poison involved and route of entry, type of poison, clinical features, mortality, and morbidity outcome of cases of accidental poisoning..

MATERIAL AND METHODS

This is a prospective study carried out for a period of 2 years .Children from the age 1 year to 15 years were included in the study. Allergic reactions to plants, food, and idiosyncratic reactions to drugs food poisoning due to infective causes are excluded from the study. Consent from the parents was taken. Institutional ethics and scientific committee approval was also taken for this study. The patient's symptoms and signs which were present were noted along with time of presentation, time of poisoning, place of poisoning, poison consumed, volume of poison consumed, route of poisoning, circumstances of poison consumption and analysis of consumed poison wherever feasible. The patient clinical examination was done. All relevant laboratory investigations were done according to the complaints and clinical features. All the relevant details of the patient were collected using a structured questionnaire. Appropriate treatment was initiated. The patient was followed up till discharge and the outcome of the patient was noted. The data was analyzed using various statistical methods.

RESULTS

The commonest age involved 1 – 3 yrs age group (Toddlers) with 39 Cases followed by 4 – 5 yrs age group (Preschool) with 13 cases. The age group least involved was below one year (infant group) with 3 cases **(TABLE 1, CHART 1)**.

In this study, poisoning was more in male children than females. Male to Female ratio is 1.9: 1**(TABLE 2).**

In this study, out of 72 cases 59 cases belong to rural areas whereas 13 cases are from urban area **(TABLE 3).**

Out of 72 cases, 48 cases of poisoning occurred through oral route, and remaining 24 cases occurred through parenteral route (other than alimentary canal) **(TABLE 4)**.

Out of 72 cases, most of the cases were of organophosphate poisoning (34 Cases) and snake bite (4 Cases) cases contributed the least **(TABLE 5)**.

The commonest gastrointestinal symptom was vomiting. One patient of kerosene poisoning had symptoms and signs of peritonitis namely abdominal tenderness and guarding. The commonest symptoms were cough and breathlessness whereas the commonest lung finding was a crepitations, increased respiratory rate. Tachycardia was the commonest cardiovascular finding which however cannot be taken as a specific sign because it could have been due to the patient's anxiety.

Most of the cases in this study are due to organophosphate poisoning and they were treated with 2- PAM or Pralidoxime, snake bites and scorpion stings were treated with anti-snake venom , kerosene poisoning was treated with supportive therapy and ventilation care.

Table 1: Age Wise Distribution of Cases

AGE	NUMBER OF CASES	PERCENTAGE
< 1year (INFANT)	03	4.2
1-3 yrs (TODDLER)	39	54.2
4- 5 yrs (PRE-SCHOOL)	13	18
6-10 yrs (SCHOOL AGE)	10	13.8
11 – 14 yrs (PRE-ADOLESCENCE)	07	9.8
TOTAL	**72**	**100**

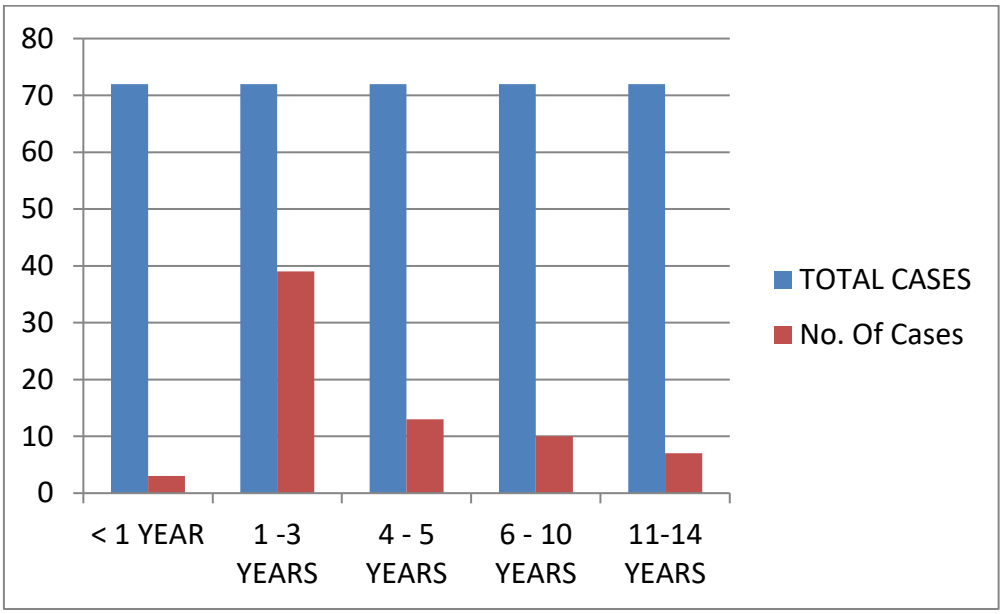

Fig 1: Age wise Distribution of Cases

Table 2: Sex Distribution

SEX	NUMBER OF CASES	PERCENTAGE
MALES	47	65.3
FEMALES	25	34.7
TOTAL	**72**	**100**

Table 3: Area Wise Distribution

AREA	NUMBER OF CASES	PERCENTAGE
RURAL	59	82
URBAN	13	18
TOTAL	**72**	**100**

Table 4: Routes of Poisoning

ROUTE	NUMBER OF CASES	PERCENTAGE
ORAL	48	66.6
PARENTERAL	24	33.4

Table 5: type of poisoning

NAME OF POISON	NUMBER OF CASES	PERCENTAGE
ORGANOPHOSPHATE	34	47.2
SCORPION STING	20	27.8
KEROSENE	09	12.5
DRUG OVERDOSE	05	6.95
SNAKE BITE	04	5.55
TOTAL	**72**	**100**

Table 6: Clinical Features

GENERAL SYMPTOMS	LOCAL SYMPTOMS	GIT SYMPTOMS	RS SYMPTOMS	CNS SYMPTOMS	CVS SYMPTOMS
FEVER	BITE MARKS	VOMITING	COUGH	IRRITABILITY	PALPITATION
SWEATING	CELLULITIS	ABDOMINAL PAIN	BREATHLESSNESS	SEIZURES	
ABNORMAL SMELL		ORAL ULCERS	GROANING	ALTERED SENSORIUM	
		HEMATEMESIS/ MALEANA	CHEST PAIN		
		ABDOMINAL DISTENSION			
		DIARRHOEA/CONSTIPATION			
SIGNS	**SIGNS**	**SIGNS**	**SIGNS**	**SIGNS**	**SIGNS**
DEHYDRATION	CELLULITIS	ABDOMEN TENDERNESS	CREPITATIONS	PTOSIS	HYPERTENSION
CYANOSIS	PARASTHESIA	PERITONITIS	RETRACTIONS	MIOSIS/MYDRIASIS	TACHYCARDIA
			TACHYPNEA	ATAXIA	

Table 07: Treatment

TYPE	NUMBER OF CASES	PERCENTAGE
Supportive Therapy	19	26.40
Atropine, Pralidoxime	34	47.22
Anti-Snake Venom	13	18.00
Ventilatory Care	06	08.38
TOTAL	**72**	**100**

DISCUSSION

Childhood poisoning remains an important health issue in children globally. More than 2 million human poisoning exposures are reported annually to the toxic exposure surveillance system of American Association of poison control centers (AAPCC),more than 50% occur in children 5 years or younge [13]. The causes and types of poisoning vary in different parts of the world depending on accessibility of poisons to children which depends upon factors such as demography, socioeconomic status, education, local beliefs and customs [14]. Furthermore, introduction of a whole range of new and complex chemicals in the form of pesticides, household cleaners, medicines, etc has widened the spectrum of toxic products to which children may get exposed**.**

Out of the all cases of poisoning the oral route of poisoning accounted for 66.6 % of all cases, whereas the parenteral route accounted for 33.4 % of the all cases. Other studies have shown the incidence of oral route of poisons as 66.7 % [15] and also seasonal difference in the frequency of oral versus parenteral poisoning 61 % oral in summer compared to 51 % parenteral route in winter. The reasons for slightly higher incidence of parenteral poisoning in our study was probably because of the fact that animal bites and sting are more common in rural people and the majority of the cases in this study are from the rural areas.

The male to female ratio in our study was 1.9:1 compared to other studies, where it was 1.25: 1 and 2: 1 and 3.1:1[16-18]. Age wise distribution – the children were divided according to the classification given [19] and according to this the maximum incidence of cases was in the 1-3 years (Toddler) age group- 39 cases. The next highest incidence was seen in the 4- 5 yrs age group-18 cases. In the < 1yr group, only 3 cases were seen. This agrees with the observations given in [19] that toddlers, being the most curious and mobile are most likely to ingest substances unknown to them. This finding is similar to other studies where two thirds (67.6%) were below 5 years. In another study [(54)] the age group of 0-5 yrs constituted 81.2 % of all cases. Indeed, no age is exempt from poisoning. Even intrauterine babies can be poisoned by transplacental transfer of carbamate [20] and children as young as 7 months can be affected [21]. Our study is also in correlation with the studies conducted by Suresh Kumar Gupta *et al.;* [22] and Syed Khasif Abbas *et al.;* [23] where maximum numbers of cases belong to the toddler group – 64.75 % and 83.7 respectively.

Area wise distribution –In this study, most of the accidental poisoning cases were from rural areas than the urban population. 59 cases (82 %) were from rural area, 13 cases (18%) of the cases were from the urban population. Rural to urban ratio was 4.5:1. Our study correlates with one study conducted by Kumar .V. *et al.;* **[17]** that had patients from the rural area than urban – rural to urban ratio of 5: 2. These figures probably depend on the watershed area of the hospital from where it gets its patients. In this study, most common type was organophosphate poisoning which is in correlation with various studies conducted nationwide and worldwide as tabulated in table no. 8

Table 8: Comparison of Incidence of Organophosphate Poisoning

STUDY	INCIDENCE OF ORGANOPHOSPHATE POISOINING
BUCH *et al.;* [16]	15.1
SINGH *et al.;* [18]	23.5
KUMAR *et al.;* [17]	11
SYED KHASIF ABBAS *et al.;* [23]	16.2
NOWNEET *et al.;* [24]	37.6
RATHORE S *et al.;* [25]	12
INDU TH *et al.;* [28]	24.8
PRESENT STUDY	47.2

Among the parenteral poisoning the commonest was scorpion sting. All snake bites and stings accounted for 5.55% and 27.8 % of the cases respectively which are in comparison with the study conducted by Kumar .V *et al.;* 11.2 % and 31 % [17]. Not even a single death reported, probably because the most of the snake bites were of non-poisonous snakes and start of early treatment. In the study by Khadgawat [15], 15 % of all the snake bites were due to non-poisonous snakes. Honeybee stings lead to mostly local reactions in the form of urticaria. In one study [17] snake bite was the commonest study of parenteral poisoning. A few studies have concentrated only on snake poisoning, as those by Kulkarni [26] and Aggarwal [27].

Among hydrocarbons kerosene is the most common agent of poison in children according to the majority of authors as per their experience. Accidental ingestion of kerosene oil was the commonest poisoning encountered in this study. 84% of kerosene poisoning cases were below 3 years of age. Common symptoms included vomiting (61%), hurried respiration (42%), cough (30%), Fever (15%). None of our kerosene poisoning cases died. Various studies reported kerosene to be the commonest offending agent. Even with the increasing usage of LPG for cooking and availability of electricity in rural areas, we found in our study kerosene to be the major cause of accidentally ingested poison because it is still being used as cooking fuel especially by rural population and for lighting because of prolonged power cuts in villages. Storage of kerosene in bottles used for drinking water and in cool drink bottles and easy accessibility as kerosene bottles are kept on the floor or in open cupboards in a majority of households without properly capping the bottles is some of the reasons for common occurrence of accidental ingestion of kerosene [29]. Of late poisoning due to kerosene showed a marked decreasing trend as evidenced by a study conducted by Surjit Singh *et al.;* in a large north Indian hospital [14]. The incidence of kerosene poisoning was 42% in 1970-79 vis-à-vis 14.9% in 1980-89 but still kerosene remains the commonest.

Among the agricultural products, pesticides comprising of organophosphate compounds are the commonest type of poisons ingested unlike in adults were organophosphate is very common, in children it is not often seen, probably because they do not come into contact with these types of compounds which are mainly found in field. But in this study organophosphate poisoning was the commonest as most of the cases were from the rural and tribal population where parents tend to take their children into the field which is a day to day practice. Organophosphate poisoning results from exposure to organophosphates (OP) which cause the inhibition of acetylcholinesterase (AchE), leading to the accumulation of acetylcholine (Ach) in the body. Organophosphate poisoning most commonly results from exposure to insecticides. OPs are one of the most common causes of poisoning worldwide, are usually associated suicides. There are around 1 million OP poisonings per year with several hundred thousand resulting in fatalities annually [(65)].

CONCLUSION

Poison is a substance that is capable of causing the illness or death of a living organism when introduced or absorbed. Accidental poisoning in children is a global problem. It is the Twelfth leading cause of admissions in hospitals in India and accounts for 1% of hospitalized patients. As children start crawling and walking they become very active and try

to explore unfamiliar objects by putting them in to their mouth and tasting them. In this study, most of the accidental poisoning cases were in the age group of 1-3 years – toddlers. Most cases of accidental poisoning are preventable by close watch on the toddlers and younger children who have a habit of tasting unknown things.

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