



## SPECTRAL ANALYSIS OF POISONING IN CHILDREN IN TERTIARY CARE CENTRE

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**ABSTRACT**

**Background:** Poisoning in childhood is major health concern. But the profile of substances used & their relative outcome change according to age, availability of substances, pattern of life and medical awareness in different geographical areas. In this hospital-based study, we sought to investigate the epidemiological pattern and outcome of acute poisoning among children admitted to a pediatric emergency department.

**Methods:** This is a retrospective descriptive study conducted in Pediatric department of Rajendra Institute of Medical Sciences, a tertiary care hospital in Ranchi, Jharkhand. Children and adolescents less than 18 years of age with diagnosis of acute poisoning during January 2018 – June 2018 were included in the study.

**Results:** In our study, 97 children presented with diagnosis of acute poisoning (3.32% of admissions). 59 patients (60.8%) were boys. The greatest proportion of patients (45%) were aged between 1 and 5 yrs. Regarding the intention of poisoning, 91.8% were accidental. Bites accounted for 32.9%, followed by drug ingestion (19.5%) hydrocarbon ingestion & pesticide, rodenticide (13.4%) corrosives-(1%) household items- (2%) unknown substance (17%) of the total cases. 14 patients (14.4%) required admission to intensive care unit. Mean duration of hospital stay was 40 hrs. 2 children succumbed to complications during the study period, others were discharged successfully.

**Conclusion:** Most of pediatric poisoning cases are preventable calamities. Death due to poisoning in children can largely be avoided if sufficient awareness can be created among parents and guardians.

**KEYWORDS** : Pediatrics; Poisoning**INTRODUCTION:**

“All things are poison and nothing is without poison, only the dose permits something not to be poisonous” – Paracelsus [1]

Acute poisoning is one of the main preventable causes of morbidity and mortality in India and it contributes to around 3-6% of pediatric admissions to tertiary care hospitals in the country [1,2]. Most of the poisoning in children occurs at home due to their inherent curiosity and exploratory nature leading to inadvertent ingestion of harmful substances (3,4). Intentional poisoning cases are especially seen in adolescents (4,5).

Even though most of the substances are non or minimally toxic, but a significant proportion of the poisonings being admitted require immediate and specific medical intervention to prevent severe morbidity and mortality (6,7).

The pattern of poisoning, etiology and demographics may change over time leading to dilemma and challenge for the treating physicians (3,4,6). Therefore a regular surveillance is required to identify and update the trends and other variables of poisonings. It will help to create preventive strategies, optimal utilization of hospital beds and an updated management skills (6,8). This study will add to the current status, analysis of factors affecting pediatric poisoning reporting emergency department.

**AIMS AND OBJECTIVES:**

The primary objectives of this study were to describe the pattern and frequency of poisoning as a cause of ED admission, the specific agents involved and general outcome of the patients.

**MATERIALS AND METHODS:**

This is a retrospective descriptive study carried out in the pediatric ward of tertiary care unit of Jharkhand (Rajendra Institute of Medical Sciences Hospital, Ranchi). Children and adolescents less than 18 years of age presenting to the ED of RIMS with diagnosis of acute poisoning from January 2018 to June 2018 were included in the study. Total of 97 cases were recorded during the study period. The

details of each case were taken from patients case records available in Pediatric units & Medical Records section of RIMS, Ranchi. The diagnosis of poisoning was based on patients' history and clinical findings.

**RESULTS:**

During the study period, 3026 patients were admitted in RIMS, out of which 97 children (3.20%) were admitted for the complaints of poisoning. 59 patients (60.8%) were boys and 38 (39.2%) were girls. The greatest proportion of patients (45 children, 46.39%) were toddlers, between the age group of 1-5 yrs. mean age of the patients was 4.6 years.

**Table 1.1. Shows the age & gender wise distribution of poisoning cases.**

Age group	Male			Female			TOTAL
	P	V	TOTAL	P	V	TOTAL	
< 1 yr	1	0	1	0	0	0	1(1.2%)
1-5 yr	20	8	28	10	6	17	45(46.3%)
6-10 yr	6	4	10	6	2	8	18(18.5%)
11-15 yr	12	5	17	9	4	12	29(29.8%)
>15yr	1	2	3	0	1	1	4(4.2%)
TOTAL	40	19	59	25	13	38	97
TOTAL	59(60.8%)			38(39.2%)			97

TABLE 1. Showing Age & gender wise distribution; P-poisoning, V-venom

The total no of poisoning cases were 65, out of which 40 were boys, 25 were girls. Total cases of envenomation cases were 32, out of which 19 were boys and 13 were girls.

**TYPES OF POISON:**

Drug poisoning accounted for 19.5% of the total cases. Among the drugs, the drug and respective no of poisoning cases are listed as follows: Amlodipine - 1, Carbamazepine-2, Iron-1, Permethrin-1, Levosalbutamol-2, and Triclofos-2. The name, and information of

certain drugs (10 cases) could not be provided by the attendants or the parents, these included herbal preparations also. Study conducted by Raman et al, has showed that neuropsychiatric medicines are commonly involved in accidental ingestion, which is not so in our study. [7].

Children had relatively equal chance of being poisoned with Hydrocarbons (13.4%) and common poisons such as insecticides & rodenticide (13.4%) were the next common toxic agents. Hydrocarbon ingestions only occurred in children between 1-5 years of age, most common being kerosene poisoning followed by turpentine oil.

Pesticide poisoning, namely organo phosphorus compounds, accounted for 9.1% of cases, majority of which were noted in the adolescent age group (11-16) yrs, for fulfilling suicidal tendency. Rodenticide poisoning, mainly rat killer poison was responsible for 4.3% of the cases.

Household items such as cleaning agents -phenyl, Dettol were accidentally consumed in 2% of the children. Corrosives such as acid ingestion, was also encountered in 1 child, who reported with esophageal stricture.

Envenomation by snake bite (26.5%) was the most common, followed by equal incidences of scorpion sting, bee bite and insect bite (2.4%). Among the snake bite cases, 16 were asymptomatic and 10 were symptomatic. 17.5% of the children presented with poisoning by unknown substance, admitted based on the history given by parents or siblings or neighbors.

**Table 1.2 showing frequency of different types of poisons involved**

	Types Of Poisons	No Of Cases	Percentage (%)
Drugs	Tricloflos	2	19.5%
	Carbamazepine	2	
	Iron	1	
	Permethrin	1	
	Amlodipine	1	
	Levosulbutamol	2	
	Unknown	10	
Household items	2	2%	
Common poison	Pesticide	9	13.4%
	Rodenticide	4	
Venom	Snake bite	26	32.9%
	Scorpion sting	2	
	Bee bite	2	
	Unknown bite	2	
Corrosives	1	1. %	
Hydro Carbon	Kerosene	8	13.4%
	Turpentine oil	5	
Unknown substance		17	17.5%

**TIME LAPSE INTREATMENT AND RELATED OUTCOME:**

**Table 1.3 shows the time lapse in treatment and outcome**

LAPSE PERIOD	NO. OFCASES	DEATHS
< 1hr	30	0
1-6 hrs	56	0
>6hrs	11	2

Table 1.3 shows the time lapse in treatment and outcome. Poisoning was noted immediately by the parents or sibling and timely help was sought within 1 hour, in 30.9% of the cases. In 57.7% of the cases, there was a delay in starting treatment, patient being brought to the ER, after 1 hr and within 6 hrs. Significant number of cases (11.3%) were brought after 6 hrs, with time period being delayed up to 48 hrs.

Some of these cases were brought with unexplainable symptoms,

being retrospectively diagnosed as poisoning, after thorough history taking and examination. Where there was a time delay in bringing the child to the hospital of more than 24 hrs, 2 children succumbed to complications.

**DURATION OF HOSPITAL STAY:**

52 children required admission for 24 hours, 22 children for 48 hours, 15 children for 72 hours, 4 children for 5 days and 4 children for more than one week. The mean duration of hospital stay was 40 hrs.

**INTENTION OF POISONING:**

Accidental ingestion of poisons, included 91.8% of the cases, maximum incidence in the age group between 1-5 yrs. Suicidal intentions (8.2%) were common in the adolescent age group (11-16 yrs.), the most common toxic agent being pesticide consumption.

**STATUS OF REFERRAL:**

Out of 97 cases, 64 cases(65.9%) were referred from primary / community health centre. Rest of the cases was brought directly to RIMS.

**TREATMENT DONE:**

64.5% of the children had received first aid before reporting to the ER by private doctors or nearby primary health centers before being referred to RIMS. Nevertheless, all patients of poisoning received basic therapeutic measures for poisoning including gastric lavage (if poisoning had occurred less than 1-6 hrs prior to admission) except in hydrocarbon poisoning.

On admission, 56 children (57.7%) were asymptomatic, being admitted for observation purposes. 14 patients (14.4%) required admission to intensive care unit. The remaining 27 patients (27.8%) needed close monitoring in hospital wards.

Among the patients that required intensive care included: 7 cases were due to snakebite, 3 showing limb swelling, out of which 2 needed fasciotomy, 2 showing hemo toxic symptoms , 2 showing neurotoxic symptoms, all the patients were shifted to the hospital wards after mean duration of stay of 72 hrs. All were treated with anti snake venom serum according to the national protocol of snake bite management.

Of the other cases who required intensive monitoring, 2 children developed chemical pneumonitis due to kerosene poisoning, 4 children were admitted for pesticide poisoning, of which, one died due to respiratory arrest after staying on mechanical ventilator support for 3 days, and 1 adolescent girl admitted for amlodipine poisoning succumbed to bradyarrhythmias and sudden cardiac arrest, in spite of intensive care. A total of 2 deaths due to poisoning occurred during the study period.

Child psychiatric consultation for guidance and prevention of recurrence of suicidal episodes were also done for the needed cases.

**DISCUSSION:**

Children, especially toddlers behaviour to constantly explore the environment and taste objects with their mouth puts them at an increased risk for accidental poisoning. Current study observed that accidental poisoning was more common in toddlers [5,8]. Physiological immaturity of the infants puts them at a greater risk for fatal poisoning as the toxicity of most substances depend on the dose per kilogram of bodyweight [9, 10].

In our study, males had a higher overall risk for poisoning. Children younger than 5 y/o accounted for more cases than other age groups. Male patients predominated among victims, both in young and adolescents. This is similar to the results obtained in other studies, both from India and outside India, which shows a male predominance among the victim group [11, 12]

Accidental ingestion of a substance is the common form of

poisoning in children; Intentional poisoning was also seen in our study, in nearly 8.2% of the cases, almost all belonging to the adolescent age group. Adolescent age group is associated with emotional lability, which explains their suicidal tendency.[5,11]

In our study 17.5% cases were poisoned by unknown substance, a great number of children were asymptomatic, mainly because of ingestion of negligible amount of poison needing only close observation or ingestion of nontoxic agents (7). Krenzelok and Mrvos reported similar observations from children poisoned with ornamental household plants in the United States (12). Some complicated cases required ICU admission, with 3 of them needing mechanical ventilator support.

Venom-injected by bite or sting was the most common poisoning route (32.9%); probably high incidence can be explained due to a large proportion of people depending on agriculture as the main occupation. Similar studies from Eastern India suggest that snake bites are more common in the grazing fields than at home [3, 10, and 13].

Snake bite due to water snakes is justified by the abundance of rivers and water bodies in Jharkhand. There is deficiency in awareness about proper management after snake bite among masses. This often leads to application of home made paste, tourniquet application etc. leading to frequent complications. These complications include gangrenous changes, compartment syndrome, wound sepsis etc.

Pesticide & rodenticide is a common agent of nonpharmaceutical ingestion poisoning in our study. Jharkhand is an agricultural state, so a high frequency of pesticide poisoning, both in children and adults is noted in this region. The unrestricted supply and humungous use of pesticide in farming practices have led to an increase in poisoning by pesticides among children.

Household supplies including cleaning substances, were also common sources of poisoning at home. Among them, caustic agents are the most dangerous because it can cause severe esophageal burns.[14]

Identifying intentional poisoning is crucial, as this could be an indication of mental health for behavioral problems or child abuse. Physicians treating poisoned patients should always be aware of these possibilities, which require both careful management and psychiatric or behavioral support.[15]

#### LIMITATIONS:

This study was conducted in a tertiary care hospital and may not present epidemiological profile of all pediatric poisoning cases in the region. It was a retrospective study and the data could be incomplete.

#### CONCLUSION:

Thus significant opportunities exist for prevention of poisoning related morbidity and mortality. Bites were the leading cause of poisoning, followed by drugs and non pharmaceutical substances. Most poisonings occurred in young children, at home, via accidental ingestion. Children especially toddlers of either gender are vulnerable to unintentional exposures and need constant supervision by an adult. Adolescents were engaged in intentional poisoning, which shows their vulnerability and suicidal behavior. Educating parents about hazards associated with inappropriate storage of household items, medicines, chemicals in the reach of children will reduce a great number of poisoning in children. Parents must be educated about appropriate first aid measures in poisoning events.

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