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Original Research Article

Pharmacoepidemiology of Common Poisoning Cases in Children at a Tertiary Care Teaching Hospital, Odisha, India

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Abstract: Acute poisoning caused more than 45 000 deaths in children and youth less than 20 years of age. Fatal poisoning rate is high in low and middle income countries like India. Childhood poisoning can be prevented with proper first aid, early management with appropriate treatment. On this background this study aimed to determine the demographic profile, pharmacotherapy and risk factors associated with fatal outcome in paediatric poisoning cases at a tertiary care teaching hospital. This descriptive cross sectional study had been conducted in the emergency department of paediatrics at M.K.C.G. Medical College and Hospital, Brahmapur, Odisha from March, 2016 to August, 2016. 105 paediatric poisoning cases of both the sexes were enrolled in this study with prior consent from parents. The protocol was approved by IEC. Relevant data were collected from hospital record and asking question to parents in a predesigned case record form. The categorical data were presented as percentage and risk factor association were analysed by Chi-square test. The children under 5years (57%) and males (67%) were predominantly affected. Maximum mortality observed i.e 25% with 1 month to 1 year age group. Rural area cases (84%) and accidental poisoning (93%) contributed the major share. Poisoning with biological agents (52.3%) with 93% cured rate. Urban cases could get earlier treatment than rural cases with 98% cure rate ($p<0.01$). The trends for paediatric poisoning cases attended to this centre were similar to other hospital based studies of India. Time lapsed to reaching the hospital was an important risk factor associated to mortality was observed. Establishment of poison information centre and raising public awareness would help in improving treatment outcome.
Keywords: Paediatric patient, biological agents, accidental poisoning, time lapse, mortality.

INTRODUCTION:

Poisoning refers to cellular injury or death resulting from exposure to an exogenous substance. Poison can be inhaled, ingested, injected or absorbed. The exposure may be acute or chronic and the clinical presentation varies accordingly [1]. The factors determining the severity of poisoning and its outcome are interrelated. These include type of poison, dose, formulation, and age of the child, state of nutrition of child and presence or absence of other diseases [1, 2]. According to the WHO and UNICEF, poisoning is common in childhood as they are curious and explore their world with all their senses, including taste [16]. Most of the time they are at home ,and the home and its environment can be an unsafe place where poisonous substances can be ingested unintentionally [1].

Poisoning is a public health problem across the globe. In 2004, deaths due to acute poisoning were more than 45000 in children and youth less than 20 years of age. It is the second most common cause of health problem resulting in hospitalization among under five children. Fatal poisoning rates in low-income and middle-income countries are four times higher than that of high-income countries (WHO) [1]. In Africa, low and middle income countries of Europe and Western Pacific region have highest rate of poisoning. Poisoning is attributable to 0.64-11.6% of total paediatrics admissions and responsible for 0.6% of deaths during childhood in India [3]. Common poisoning agents in high income countries include pharmaceuticals, household products such as bleach and cleaning agents, pesticides, poisonous plants and bites from insects and animals. Common poisoning agents in low and middle income countries are fuels such as paraffin, kerosene, pharmaceutical and cleansing agents [1].

The time interval between the exposure to poison and appearance of clinical symptoms is a critical time for the management of poisoning cases. During this period it is important to minimize absorption by removing or neutralizing the poison (if ingested) [4]. Understanding the pattern of poisoning is helpful for reducing the risk of unintentional poisoning as well as preventing intentional poisoning. The changing trends of poisoning need to be studied on a regional basis for proper health care policy planning, so as to equip health care centres in a particular region for proper management of such cases.

There are a few studies from India that describe the profile of poisoned paediatric patients with regards to management and outcome. With increasing urbanisation and rapid socioeconomic development in India during the last two decades, some change in paediatric poisoning profile and outcome is to be expected**.** On this context, this study was carried out to understand the various aspects of cases of paediatric poisoning pertaining to its pharmacotherapy, morbidity, mortality and the risk factors associated with a fatal outcome.

AIMS AND OBJECTIVES:

This study was conducted to explore the socio-demographic characteristics, to assess the clinical profile and pharmacotherapy and to evaluate the treatment outcome and the various risk factors associated with mortality of common poisoning in children

MATERIALS AND METHODS:

This is a descriptive, cross sectional study conducted in the emergency department of paediatrics at M.K.C.G. Medical College and Hospital from March 2016 to August 2016. A total of 105 cases were enrolled in this study. Relevant data were collected in a specially designed case record form. Informed consents were taken from parents / guardians in a predesigned ICF in each case. Ethical approval for the study was obtained from IEC prior to the onset of study.

Inclusion Criteria:

All children from 1 month to 14 yrs of age who got admitted with a definite h/o poisoning or suspected poisoning including snake bite or scorpion stings were included in this study

Exclusion criteria:

Infants less than 1 month with unknown bites without features of local or systemic envenomation, food poisoning and animal bites were excluded from this study.

OBSERVATION:

Table 1: Socio-demographic characteristics of poisoning cases in children

SL NO	Demographic parameter		% cases
1	Age	1mth – 1 yr	3.8
		1 yr – 5 yrs	**53.3**
		> 5 yrs	42.8
2	Sex	Male	**67**
		Female	33
3	Location	Urban	16
		Rural	**84**
4	Type of poisoning	Accidental	**93**
		Suicidal	5
		Homicidal	2
5	Nature of poison	Household subst.	6.6
		Biological agents	**52.3**
		Hydrocarbons	**30.5**
		Agricultural agents	5.7
		Industrial chemical	2.9
		Drugs	1.9

n=105, data expressed in percentages

The children within 1-5 yrs age group were more affected i.e 53.3% followed by 5-10 years (23.8%) and 10-14 years (19 %) cases while only 3.8% belonged to 1mth – 1yr age group (Table no.1). Males constituted more percentage of cases i.e 67% with M:F ratio of 2:1. Accidental poisoning constituted 93% of cases in this study followed by suicidal and homicidal which were only 5% and 2 % respectively. More number of cases from rural area (84%) in comparison to urban area. Maximum no. of cases were due to biological agents (52.3%) followed by hydrocarbons (30.5%). Among the hydrocarbon group all were due to kerosene ingestion. Among the biological agents 47% cases had snake bite,

46% cases had scorpion sting, 7% patients had consumed Datura.

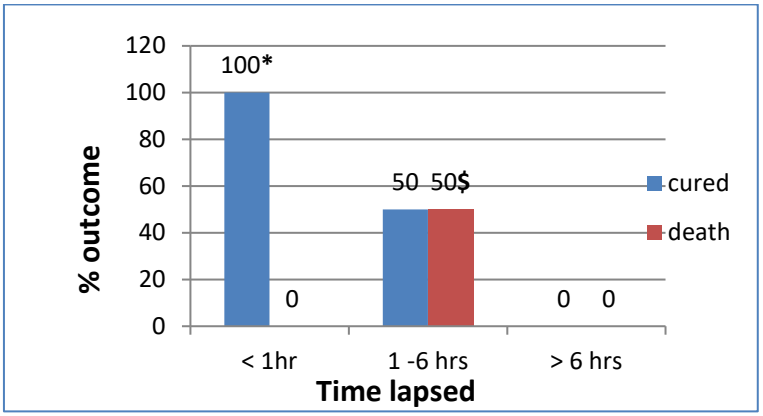

Fig 1a: Outcome Vs time lapse for hospitalisation in urban patients of poisoning

n=17**,** Chi squre test, p <0.001, * indicates significantly higher cure rate in cases who admitted to the hospital within 1 hour, **$** indicates significantly higher death rate in cases who admitted to the hospital within 1- 6 hours of poisoning**.**

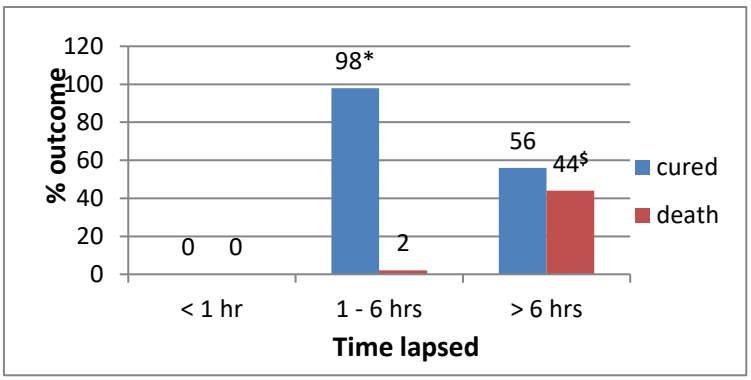

Fig 1b: Outcome Vs time lapse for hospitalisation patients in rural patients of poisoning

n= 88, Chi square test, p< 0.001

* indicates cure rate was significantly higher in cases who got admitted within 6 hrs.**$** indicates death rate was significantly higher in cases who got admitted after 6 hours.

In urban cases maximum cases presented within 1 hr with a cure rate of 100% whereas rural patients mostly presented within 1- 6 hours, showed a cure rate of 98%. Only 56% of cases were cured who presented after 6 hrs from rural area (Fig no. 1a, Fig No.1b). From urban area no cases presented after 6 hour whereas there were no cases within 1hour from rural area.

Table 2: Distribution of cases according to duration of hospital stay

Duration of hospital stay	No. Of. Cases	Percentage
Less than 48 hrs	55	52.3
2days to 4 days	42	40
5 days to 7 days	6	5.7
More than 1 week	2	1.9

n=105, data expressed in percentage

52% cases stayed in hospital for less than 2 days. 40% cases stayed for 2 to 4 days. Only 2 % cases stayed for more than 1 week.

Table 3: Treatment and Outcome in different types of poisoning

Nature of Poison	**No.of cases**	**Treatment**		**Outcome**	
		Symptom treatment	Sp. Antidote	CURED %	DEATH %
Household subst (Dettol, phenyl)	7	7	0	100	0
Hydrocarbons (kerosene)	**32**	**32**	**0**	**94**	**6**
Biological agents (snake bite, scorpion sting, Datura)	**55**	**6**	**49**	**93**	**7**
Agriculture (OP compounds)	6	0	6	83	17*
Industrial chem.	3	3	0	100	0
Drugs	2	2	0	100	0

Chi-square test, p value <0.01,* indicates that death rate was significantly higher in OP poisoning than other types of poisoning

All cases of poisoning due to household substances and hydrocarbon received symptomatic treatment like gastric lavage, antacids, antibiotics, IV fluids, and oxygen. Ceftriaxone was the most common antibiotic used (96%) whereas only 4% cases received ampicillin with a cure rate of 100%. Salbutamol nebulisation was given cases of kerosene poisoning who developed respiratory distress. Sucralfate was prescribed to 92% cases as a Gastroprotective agent. In biological agents like snake bite, scorpion sting and Datura poisoning patients received specific antidote ASV, prazosin respectively and physo stigmine with a cure rate of > 90%. There were only 2 deaths due to ARF in snake bite case. Out of 6 cases of OP poisoning that received atropine, 1 patient died due to delay in starting of treatment.

Table 4: Possible risk factors associated with Fatal Outcome

	Time lapsed in reaching hospital			Age of patient			Location	
	< 1 hr	1 to 6 hrs	> 6 hrs	1mth- 1yr	1yr – 5 yrs	> 5 yrs	U	R
% cured	100	97.6	56	75	92.9	97.8	94.2	94
% Deaths	0	2.4	44	25	7.1	2.2	5.8	6

n=105

The above table shows that time elapsed from poisoning to starting of treatment is likely a risk factor associated with death rate. This time gap is directly proportional to death percentage. It was found in this study that the death percentage was maximum in patients who came after 6 hours whereas it was 0% who get treated within 1hour of poisoning. Age could be another potent risk factor with maximum mortality rate seen in 1 month – 1 yr age group (25%) while it was only 2.2% in > 5 yrs age group. Mortality rate was more in rural patients (6%) compared to urban population pointing towards the associated high risk due to poor transportation and lack of awareness.

DISCUSSION:

The children between 1-5 years age group (53.3%) were predominantly affected by poisoning in this study which was consistent with Lam Reith et al and Morrison et al, which stated that children of 04 years of age, were most frequently hospitalized due to poisoning [5, 6]. Rapid neurological development, leading to increased exploratory activity, and a natural oral curiosity to mouth objects, could be the reasons for frequent involvement of preschool children in poisoning accidents. Those males constituted 67% of the total cases with an M: F ratio of 2:1 in our study which showed a similar trend with other studies [7, 3, 8, 9]. Maximum cases were accidental in nature (93%), involved less than 6 years of age group whereas suicidal cases only 5% affected adolescents. [7, 10, 8, 11] The age group of 1month to 1year was more vulnerable for death due to poisoning as observed in this study which may be due to less development of biotransformation system for drugs/poisons in the body.

Higher percentage (53.2%) of poisoning cases were due to biological agents like snake bite, scorpion sting and Datura followed by hydrocarbons (30.5%) mainly kerosene ingestion. This is in contrast to other studies in India and adjoining regions where kerosene has been shown as the major culprit. [7, 3, 9, 11] This may attributed to the fact that most of the patients were from rural area, low socioeconomic status and low education background who reside in thatched houses situated nearer to agricultural land. Kerosene ingestion was the second most cause of poisoning because of its widespread use as household fuel in this region. Patients

from rural area constituted more percentage i.e 84% with a rural: urban ratio of 5:1 [12]. As per this study result, maximum number of cases from urban area attended hospital earlier i.e within 1 hour of poisoning compared to that of rural area which was within 1- 6 hours [13]. The mortality rate was higher with rural area patients who received delayed treatment after 6 hour of poisoning. So there was a direct co-relation between time lapse and percentage of deaths due to poisoning. Only 56% of cases who presented after 6 hrs could be cured. This could be due to transportation difficulties in rural areas or treated by local healers prior to hospitalisation or lack of knowledge about first aids [9].

Duration of hospital stay was within 48 hrs in our study in maximum number of cases i.e 52.3% which is with similar trends seen in a study from Pakistan i.e 2.6 days [14]. Only one case of OP poisoning and another case of snake bite stayed for more than 1 week, as they required additional life support. The cure rate in poisoning with biological agents was 93% with specific antidote whereas hydrocarbon poisoning had a cure rate of 94% with symptomatic treatment. But organophosphate poisoning carried a higher mortality rate i.e 17% even though specific antidote was given. This was attributed to delay in starting of treatment as in most of cases it was consumed with suicidal intentions [15, 16]. Our study had 5.7% mortality which was similar to other studies who stated that poisoning related mortality in paediatric age group has been reported from as low as 0.8% to as high as 12.5% [3, 2].

CONCLUSION:

In spite of all the modern advances in the field of medicine, poisoning due to various reasons, continue to pose a major challenge to the paediatric population contributing to significant morbidity and mortality. The trends for paediatric poisoning noted at our centre are not very different from those observed in hospital based studies conducted in other parts of our country. However, poisoning cases due to biological agents like snake bite and scorpion sting were more at our centre compared to kerosene ingestion and insecticides as suggested by other studies. This study shows a direct co-relation between times lapsed in reaching the hospital and mortality rate highlighting the need for proper sensitisation general public for early consultation and referral as well as maintenance of adequate transportation to and from the hospitals. The main causes of paediatric poisoning are negligence and ignorance. If more attention were given to implementing preventive measures at home, many deaths and disabling sequelae could be easily prevented. As most of our patients require hospitalisation in contrast to developed countries, due to severity of symptoms and poison involved, emphasis should be on the proper upkeep of hospitals and adequate availability of antidotes. Poison information centres to be established all over the country with easy accessibility and implementation of poison management policies with generation of awareness among people is the concept paramount to providing care for future paediatric population.

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