ORIGINAL RESEARCH PAPER

Pharmacology

PHARMACOEPIDEMIOLOGY OF COMMON POISONING CASES IN CHILDREN AT A TERTIARY CARE TEACHING HOSPITAL IN JHARKHAND , 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.. On this background this study aimed to determine the demographic profile, pharmacotherapy and risk factors associated with fatal outcome in paediatric poisoning cases. This study was conducted in the emergency department of paediatrics at Patliputra Medical College and Hospital, Dhanbad, Jharkhand from August 2018 to January 2019. 105 paediatric poisoning cases of both the sexes were enrolled in this study . The protocol was approved by IEC. Relevant data were collected in a predesigned case record form. The categorical data were presented as percentage and risk factor association were analysed by Chi square test. 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). Time lapsed to reaching the hospital was an important risk factor associated to mortality was observed.

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 [16]. The factors determining the severity of poisoning and its outcome are interrelated. These include type of poison, dose, formulation, age of the child, state of nutrition of child and presence or absence of other diseases[8,16]

According to the World Health Organization (WHO) and the UnitedNations Childrens Fund (UNICEF), poisoning is common in childhood as children are curious and explore their world with all their senses, including taste.[16]

Poisoning is a significant global public health problem. In 2004, acute poisoning caused more than 45 000 deaths in children and youth less than 20 years of age . It is the second most common cause of injury resulting in the hospitalization of children under the age of five years. Fatal poisoning rates in lowincome and middleincome countries are four times that of highincome countries (WHO) [16]. It is the cause for 0.64-11.6% of total peadiatrics admissions and responsible for 0.6% of deaths during childhood in India.[5] .Common poisoning agents in low and middle income countries are fuels such as paraffin, kerosene, pharmaceutical and cleansing agents.

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) [1] . 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 a case of paediatric poisoning pertaining to its morbidity, mortality, pharmacological interventions and the risk factors associated with a fatal outcome.

AIMS AND OBJECTIVES:

This study was conducted to explore the sociodemographic 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 Patliputra Medical College and Hospital from August 2018 to January 2019. 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
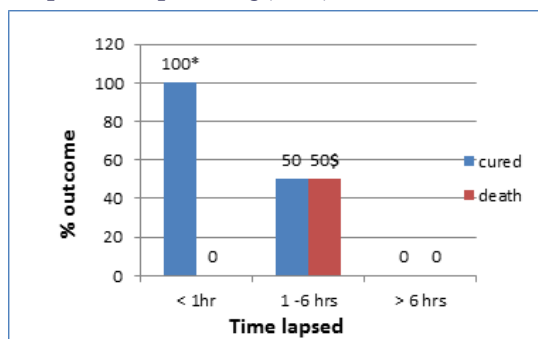
EXCLUSION CRITERIA:

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

Table No. I Demographic charateristics of poisoning cases in children (n=105)

| 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

Fig Ia. Outcome Vs time lapse for hospitalisation in urban patients of poisoning (n=17)

Chisqure 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 Ib. Outcome Vs time lapse for hospitalisation in rural patients of poisoning   n= 88
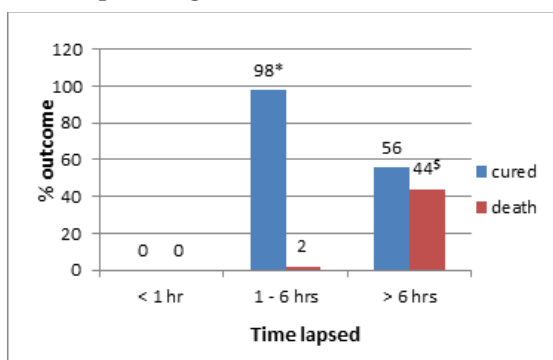
Chi square test, p< 0.001,* indicates cure rate was significantly higher in cases who got admitted within 6 hrs.$ indicates death rate was significantly higher in cases who got admitted after 6 hours

In urban cases maximum cases presented within 1 hr with a cure rate of 100% whereas rural patients mostly presented within 1- 6 hrs 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).

TABLE NO II Distribution of cases according to duration of hospital stay (n=105)

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

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 NO. III Treatment and Outcome in different types of poisoning

Nature of Poison	No.of cases	Treatment		Outcome	
		Sympt treatmnt	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 poisonigs

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 physostigmine 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 NO. I V Possible risk factors associated with mortality caused by poisoning (n=105)

	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

The above table shows that time elapsed from poisoning to starting of treatment is likely a risk factor associated with death rate. 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 mth – 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 poor transportation and lack of awareness.

DISCUSSION
Acute poisoning is one of the important causes of emergency admissions in developing countries It is responsible for 0.33% to 7.6% of total admissions in paediatric wards at various hospitals across India.[5]

As Table no. 1 shows children between 1 - 5 years were most commonly presented with poisoning (53.3%) which was consistent with most of the other studies. Studies by Lam Reith et al. and Morrison et al. indicated that children 04 years of age were most frequently hospitalized due to poisoning.[9,13] . 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.

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Maximum number of cases were accidental in nature (93%) followed by suicidal (5%) as most of the study subjects were within 6 years of age with accidental poisoning where as suicidal poisoning constituted very less percentages of cases mostly adolescents. This reaffirms data published in various studies[2,3,6,11] wherein most cases of poisoning in children < 6-year or-old were accidental in nature in contrast to adolescents in which it is more often deliberate self-poisoning (suicidal).

Maximum no. of cases (53.2%) were due to biological agents like snake bite, scorpion sting and datura poisoning , followed by hydrocarbons (30.5%) mainly due to kerosene ingestion. This is in contrast to other studies in India and adjoining regions were kerosene has been shown as the major culprit [2,5,7,11]. This may attributed to the fact that most of the patients were from rural area, low socioeconomic status and low education background .Many cases of snake bite are also referred to our centre due to free availability of ASV. Kerosene caused maximum ingestion largely due to its widespread use as household fuel in this region. Ingestion of household substances and agriculture poison constituted 6.6% and 5.7% cases respectively and reflect the rapid rate of urbanization.

Maximum no. of patients (84%) were from rural areas with a rural:urban ratio of 5:1.This was in accordance with study done by S.Vijaykumar,M. Sasikala, and G. Vijay Kumar in the same region[15]. The majority of our patients were from a rural background as our hospital caters to a large rural area and is the only tertiary care teaching hospital in the region.

As per this study result , maximum number of cases from urban area came within 1 hour of poisoning to the hospital compared to that of rural area cases i.e within 1- 6 hours. This was in line with observation made by Bhat et al [10] were average time of presentation was 5 hrs for rural patients.

As per Fig no.1, urban cases that presented within 1 hr, cure rate was 100%. In rural patients 98% of cases who presented within 6 hrs were cured whereas only 56% of cases who presented after 6 hrs could be cured. There was a direct co-relation between time lapse and no. of deaths due to poisoning. This could be due to transportation difficulties in rural areas or treated by local healers prior to hospitalisation or lack of knowledge about first aid[7]

Duration of hospital stay was within 48 hrs in our study in maximum no. 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. (Table no 2)

The cases of poisoning with biological agents, received specific antidote and having a cure rate of 93%. All the cases of hydrocarbon poisoning received symptomatic treatment with a cure rate of 94%. Poisoning due to agricultural agents, mainly OP compounds, carried a mortality rate of 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. This was in accordance with a study done by Thomas et al and Menon et al [4,12] which showed increased use of pesticides for suicides.

Poisoning related mortality in pediatric age group has been reported from as low as 0.8% to as high as 12.5% in different studies [5,8]. Mortality rate was 5.7% in our study .(Table no.3)

As per table no.4 , time lapsed in reaching the hospital, age of the patient and location have been indicated as major risk factors determining mortality in poisoning cases in children. It was found in this study that the death percentage was maximum in patients who came after 6hours whereas it was nil in those who got treated within 1hour of poisoning. As the first hour is considered as golden hour for treatment any further delay could be detrimental for the patient. Rural patients attributed to higher mortality rate which may be due to late onset of treatment and lack of awareness. 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.

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 pediatric 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 partsof 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 time 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 .As most of our patients required 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. Establishment of poison information centres all over the country with easy accessibility and implementation of strict policies is paramount to providing care for a growing pediatric population.

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