

CLINICOEPIDEMIOLOGICAL PATTERN AND OUTCOME OF POISONING IN CHILDREN IN A TERTIARY CARE HOSPITAL OF WESTERN NEPAL

Nagendra Chaudhary,¹ Binod Kumar Gupta,¹ Astha Poudel,¹ Pradip Chhetri²

ABSTRACT

INTRODUCTION

Poisoning in children is one of the leading public health problem in low and middle income countries and a common cause of morbidity and mortality.

MATERIAL AND METHODS

This prospective observational study was conducted for one year from 1 June, 2019 to 31 May 2020 to study the clinicoepidemiological pattern and outcome of children with poisoning in a tertiary care hospital of Western Nepal.

RESULTS

Total 38 children with poisoning were admitted and enrolled during the study period. The frequency of poisoning in children aged 0-5 years, 6-10 years and 11-16 years were 47.4%, 18.4% and 34.2% respectively. Poisoning was predominant in females (n=21, 55.3%). Majority poisoning cases (55.3%) were noticed in between May to August. More than three-fourth of the poisoning cases were noticed in the afternoons and evenings. Pesticides (organophosphorus, fungicide, herbicide, aluminium phosphide, and household rodenticides/insecticides) constituted 55.7% of total poisoning cases. Household rodenticides/ insecticides, volatile hydrocarbons and organophosphorus poisonings were noticed in 23.7%, 15.8% and 13.2% respectively.

Three-fourth of the cases were symptomatic during the presentation where vomiting (76.3%), abdominal pain (34.2%) and constricted pupils (18.4%) were three major clinical symptoms and signs due to poisoning. About 84.2% cases survived. Complications were observed in about 15.8% cases where shock and respiratory failure was seen in 10.5% each followed by pneumonia (7.9%) and hepatitis (5.3%).

CONCLUSION

Poisoning was common in children less than 5 years of age and majority of them were accidental in nature. Household rodenticides/insecticides, volatile hydrocarbons and organophosphorus poisonings were common types of poisoning.

KEYWORDS

Poisoning, Children, Agricultural pesticides

1. Department of Pediatrics, Universal College of Medical Sciences, Bhairahawa, Nepal
2. Department of Community Medicine, Universal College of Medical Sciences, Bhairahawa, Nepal

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For Correspondence

Dr. Nagendra Chaudhary
Department of Pediatrics
Universal College of Medical Sciences
Bhairahawa, Nepal
Email: enagendra@hotmail.com

INTRODUCTION

Poisoning is the exposure of an individual to a substance that can cause damage or injury to the body causing organ damage and finally leading to death. It is one of the leading public health problem in low and middle income countries and a common cause of morbidity and mortality.¹

Poisoning is the fourth leading cause for accident related mortality among children and the mortality rate in LMICs is 4-fold more in comparison to high income countries.² The pattern and outcome of poisoning cases vary in different geographic areas globally with different socio-cultural and environmental risk factors. Pediatric poisonings are encountered mainly due to improper storage and their easy accessibility by children. Household substances, agrochemical pesticides, drugs and environmental agents are major poisoning agents in children.¹

There is paucity of data on the exact epidemiological pattern, clinical profile and outcome of poisoning cases especially in Western Nepal. Therefore, this study was conducted to study the clinicoepidemiological pattern and outcome of children with poisoning in a tertiary care hospital of Western Nepal.

MATERIAL AND METHODS

A hospital-based prospective observational study was conducted at Universal College of Medical Sciences-Teaching Hospital (UCMS-TH), a tertiary care hospital situated in Western Nepal. The study was conducted for one year (1st June, 2019 to 31st May 2020) in the pediatric intensive care unit (PICU) and pediatric ward after obtaining informed and written consent from the parents and approval from the institutional review committee of UCMS-TH (ref. no-UCMS/IRC/106/19).

All children of either sex aged 16 years or less admitted with history of poisoning were included in the study. The youngest child admitted with poisoning in the present study was 10-month-old infant. Parents not giving consent and cases of snake bite or insect bites were excluded from the study.

Various socio-demographic variables, poisoning details (time, month, type of poison, reason for poisoning), clinical manifestations, treatment given, outcome and complications were entered in a predesigned performa. The duration of poisoning in the present study was calculated from the time of presentation to the hospital till the discharge, leave against medical advice (LAMA) or death. Data was finally entered in excel sheet and descriptive analysis was done using SPSS software (version 20).

RESULTS

Total 38 children with poisoning were enrolled in the present study during the study period. The mean age (\pm SD) of the children was 7.22 \pm 5.01 years where the percentages of children with poisoning in 0-5 years, 6-10 years and 11-16 years were 47.4%, 18.4% and 34.2% respectively. Poisoning was predominant in female children (n=21, 55.3%) in

comparison to males. Majority of children with poisoning were from Rupandehi (42.1%) and Kapilvastu (28.9%) districts followed by Nawalparasi (18.4%). Around two-third cases of poisoning were from rural areas. Poisoning was seen more where parents were illiterate and farmers (Table 1).

Table 1. Showing socio-demographic variables

Variable		Frequency (n)	Percentage (%)
Gender	Male	17	44.7
	Female	21	55.3
Religion	Hindu	35	92.1
	Muslim	3	7.9
District	Arghakachi	1	2.6
	Gulmi	1	2.6
	Kapilvastu	11	28.9
	Nawalparasi	7	18.4
	Palpa	1	2.6
	Rolpa	1	2.6
	Rupandehi	16	42.1
Residence	Rural	25	65.8
	Urban	13	34.2
Father's education	Illiterate	11	28.9
	Primary	8	21.1
	Secondary	10	26.3
	Intermediate	4	10.5
	Bachelor	5	13.2
Mother's education	Illiterate	21	55.3
	Primary	4	10.5
	Secondary	6	15.8
	Intermediate	5	13.2
	Bachelor	2	5.3
Father's occupation	Farmer	24	63.2
	Abroad	5	13.2
	Businessman	8	21.1
	Labourer	1	2.6
Mother's occupation	Housewife	36	94.7
	Working	2	5.3

Twenty one cases (55.3%) of poisoning were noticed in between May to August, 34.2% in between January to April and 10.5% in between September to December. More than three-fourth of the poisoning cases were noticed in the afternoons and evenings. Pesticides (organophosphorus, fungicide, herbicide, aluminium phosphide, and household rodenticides/insecticides) constituted 55.7% of the total poisoning cases. Household rodenticides/insecticides, volatile hydrocarbons and organophosphorus poisonings were noticed in 23.7%, 15.8% and 13.2% respectively (Table 2).

Table 2. Showing various types of poisonings

Types of poisoning substances	Frequency (n)	Percentage (%)
Volatile hydrocarbon	6	15.8
Agriculture pesticides	21	55.2
Organophosphorus	5	13.2
Fungicide	2	5.3
Herbicide	1	2.6
Heavy metals	1	2.6
Aluminium phosphide	4	10.5
Mushroom	4	10.5
Drugs	3	7.9
Household rodenticides and insecticides	9	23.7
Household items	0	0
Corrosives	1	2.6
Unknown	2	5.3

About 42.1% children were brought to the hospital within 2-6 hours of poisoning and majority of them were due to accidental intake (68.4%). Only 28.9% cases received pre-referral treatment. Three-fourth of the cases were symptomatic during the presentation where nausea/vomiting (76.3%), abdominal pain and cramps (34.2%) and constricted pupils (18.4%) were three major clinical symptoms and signs due to poisoning (Table 3). The mean (\pm SD) duration of hospital admission was 65.7 ± 40.21 hours (minimum 12 hours to maximum 168 hours).

Table 3. showing epidemiological and clinical profile of poisoning

Variables	Frequency (n)	Percentage (%)	
Time required to arrive the hospital	<30 min	5	13.2
	30-60 min	10	26.3
	1-2 hrs	7	18.4
	2-6 hrs	16	42.1
	Accidental	26	68.4
Reason of poisoning	Suicidal	11	28.9
	Homicidal	1	2.6
Pre-referral treatment	Yes	11	28.9
Clinical Profile	Asymptomatic	9	23.7
	Symptomatic	29	76.3
Nausea Vomiting	Yes	29	76.3
Salivation	Yes	6	15.8
Headache	Yes	5	13.2
Fever	Yes	3	7.9
Loose stools	Yes	3	7.9
Abdominal pain/cramps	Yes	13	34.2
Seizure	Yes	1	2.6
Altered sensorium delirium	Yes	3	7.9
Miosis	Yes	7	18.4
Mydriasis	Yes	2	5.3
Bleeding manifestations	Yes	1	2.6
Fast breathing	Yes	2	5.3
Cough	Yes	1	2.6

About 94.7% (n=36) children received supportive therapy and only 21.1% received antidote. Three children received anticonvulsants and four required ventilatory support. The frequency of PICU and ward admission in poisoning cases were 60.5% and 68.4% respectively. The present study showed that about 84.2% cases survived and were able to be discharged whereas three children (7.9%) expired and three (7.9%) underwent leave against medical advice (Table 4). Complications in the enrolled cases were observed in about 15.8% cases where shock and respiratory failure was seen in 10.5% each followed by pneumonia (7.9%) and hepatitis (5.3%).

Table 4. Showing treatment, outcome and complications of poisoning cases

Variables	Frequency (n)	Percentage (%)	
Supportive	Yes	36	94.7
Antidote	Yes	8	21.1
Anticonvulsants	Yes	3	7.9
Ventilatory supports	yes	4	10.5
PICU Admission	Yes	23	60.5
Ward Admission	Yes	26	68.4
	Survived/discharge	32	84.2
Outcome	LAMA	3	7.9
	Expired	3	7.9
Complications	Yes	6	15.8
Pneumonia	Yes	3	7.9
Shock	Yes	4	10.5
Sepsis	Yes	1	2.6
Coma	Yes	1	2.6
Respiratory failure	Yes	4	10.5
AKI	Yes	1	2.6
Abnormal LFT	Yes	2	5.3

LAMA- leave against medical advice, AKI- acute kidney injury; LFT- liver function test

DISCUSSION

Acute poisoning in children is one of the major causes for hospital admission especially in low and middle income countries.^{3,4} This prospective study was designed to find the clinicodemographic profile, epidemiological pattern and outcome of poisoning in children in a tertiary care hospital of western Nepal.

The present study showed that majority (47.4%) of children presenting with poisoning were 5 years or younger which was consistent with a recent study conducted in rural Sri Lanka by Dayasiri et al.⁵ A study conducted by Chhetri et al from Nepal showed that about 60% children admitted with poisoning were in the under-five group.⁶ Another Asian study from Saudi Arabia also found similar findings.⁷ The reason for high incidence of poisoning in under 5 children could be due to

improper attention by parents and the easy availability or accessibility of poisoning substances to such children. On the other hand, exploratory behaviours of the young children could also be an important factor contributing to it.

Several epidemiological studies on accidental poisoning in children show consistent age and gender distribution with predominance in male children of less than six years.⁸ A study by Sil et al (2016) from India⁹ and Dayasiri et al (2018) from Sri Lanka⁵ also found higher incidence of poisoning in males. In contrast to it, our study showed poisoning to be predominant in female children. Children from rural areas were more likely affected by poisoning in a study conducted by Hassan and Siam in Egypt.¹⁰ We also noticed that poisoning was more in children having illiterate parents and from rural background. This could be because of rural population exposed more to farming and use insecticides/pesticides in comparison to the urban population.

Maximum number of poisoning cases in the present study were observed in between May to August which was also seen in a study from our neighbouring country India.¹¹ The high proportion of poisoning cases during May-August could be due to the farming season for paddy transplantation and use of various pesticides and herbicides at fields and homes to control them. Majority of the cases presented during the afternoon (36.8%) and evening (36.8%) followed by night time (15.8%). Study conducted by Gyenwali et al¹² found that majority (43.7%) of the cases were poisoned during evening hours followed by day time (30.4%) and morning hours (24.1%). High proportion of the cases were accidental in the present study followed by 28.9% with suicidal tendency. Only one case was homicidal in nature. Previous study from Nepal has also reported that majority of the poisoning cases (76%) were of accidental in nature⁶ whereas another Nepalese study conducted by Marahatta et al on poisoning cases attending the emergency department showed suicidal poisoning to predominate in children aged 11-14 years.¹³ This suggests that the reason for poisoning may vary in different regions of the same country necessitating the need for large multicentre studies.

Poisoning with agricultural pesticide use was predominantly seen in the present study (55.2%) followed by volatile hydrocarbons (15.8%). Kerosene was the volatile hydrocarbon poisoning in the present study. Among the agricultural pesticides, household rodenticides/insecticides (23.7%), organophosphorus compounds (13.2%) and aluminium phosphide (10.5%) were the three major reasons of poisoning in the present study. Sil et al found that volatile hydrocarbons accounted for the major proportions of poisoning cases.⁹ A retrospective study done in South India by Ram et al also noticed that kerosene (n=23, 28.4%) and organophosphate compounds (n=16, 19.8%) were the most common agents responsible for poisoning in children.¹¹ Another descriptive epidemiological study from the central region of Nepal¹² found that the pesticides responsible for poisoning were mostly insecticides (59.9%) and rodenticides (20.8%) where the most common chemicals used were organophosphates (37.3%) and pyrethroids (36.7%).

A study conducted in central Nepal showed that 14.4% of the

cases arrived within one hour, more than half (59.9%) of the patients reached between one and three hours and a fourth of them consulted a doctor after three hours or more.¹² In the present study, more than half of all poisoning cases arrived the hospital in two hours or less time elapsed while around 42.1% of them reached the hospital in between 2 to 6-hour duration. Only 13.2% of cases reached the hospital within 30 minutes in our study. Another retrospective study done at Patan Hospital, Nepal demonstrated that 60% patients reached the hospital emergency within three hours while 77% within six hours of the incident.⁶ Reasons for delayed presentation at hospital emergency could be due to lack of concern by family members regarding the urgency of the situation and lack of knowledge regarding possible complications.⁵ Lack of transport facilities in rural areas of Nepal could also be an important contributing factor for the delayed presentation to the health care centre. Ignorance along with financial and transport difficulties have been reported as reasons for delayed presentations in similar studies from South Asia.⁵

The signs and symptoms of poisoning mainly depends on the type of poison consumed and may vary from one region to another depending on the nature of poisoning. More than three-fourth of the cases were symptomatic on presentation. Nausea and vomiting was seen in 76.3% of the cases followed by abdominal cramps in the present study. Vomiting was also the major clinical finding in a study done by Budhathoki et al.¹⁴ The reasons for these clinical manifestations in both the studies could be because of organophosphorus (13.2% in ours and 45.1% in Budhathoki et al) and mushroom poisoning (10.5% in ours and 8.2% in Budhathoki et al) which are known to have gastrointestinal signs and symptoms. Other studies from Nepal¹⁵, India⁹ and Pakistan¹⁶ also suggest gastrointestinal symptoms to be predominant in children with poisoning whereas studies from Europe¹⁷ demonstrated neurological symptoms in children with medication poisoning.

The overall complication rate in the present study was seen 15.8% of the cases with each 10.5% cases having respiratory failure and shock. Pneumonia was noticed in 7.9% admitted children. Dayasiri et al⁵ observed an overall complication rate of 12.5% where chemical pneumonia due to kerosene oil ingestion was predominant. About 60.5% of all the poisoning cases required admission to PICU in this observational study whereas only 41.3% cases required PICU admission in a study conducted by Gyenwali et al.¹² The case fatality rate in a study conducted by Gyenwali et al was lesser than that of our study (3.8% vs. 7.9%). Although Budhathoki et al from Nepal¹⁴ demonstrated the mortality rate of 12.3%, the overall survival rate of children was almost similar to our study.

Our study had few limitations. The sample size of our study was small and necessitates further studies on large sample size to get the more precise clinicoepidemiological pattern of poisoning in Western Nepal. Again, as our study was a single centre study, it could not be generalized to the whole community, region or country as a whole. Further multicentre studies could address it.

CONCLUSION

Accidental poisoning was more common in toddlers and school going children in rainy season and was more in rural population with illiterate parents. The overall survival rate was 84.2% and necessitates the need for further improvement in the health care delivery system. The epidemiological aspects of childhood poisoning should further be assessed by prospective multicentre studies throughout the country.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interests.

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