

Original Article**Clinico-Epidemiological Profile and Outcome of Poisoning in Children Presenting at a Tertiary Care Hospital of Eastern Nepal**

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Article Received: 12th January, 2023; Accepted: 30th April, 2023; Published: 30th June, 2023DOI: <https://doi.org/10.3126/jonmc.v12i1.56282>**Abstract****Background**

Pediatric poisoning is common emergency worldwide and represents major and preventable cause of morbidity and mortality in children. The study describes epidemiology and outcome of acute poisonings in children presenting to Nobel Medical College through Emergency and Outpatient department and determines causative agents and characteristics of acute poisoning in several pediatric age groups.

Material and Methods

This was hospital based prospective cross-sectional study which included all acutely poisoned patients under 18yrs age of either sex who presented to Nobel Medical College Teaching Hospital during 1year period (January 2021 to December 2021). Various socio-demographic variables, poisoning details, clinical manifestations, treatment given, outcome and complications were entered in predesigned proforma. Data was entered in excel sheet and descriptive analysis was done using SPSS software (version 20)


Results

During the study period total 56 children with poisoning were admitted and enrolled. The mean age (\pm SD) of children with poisoning was 8.18 ± 5.50 Years. Poisoning cases were predominant in male children (n=56, 53.6%). The most common poison was organophosphates (OP) compounds (41.1%). More than three-fourth of cases (92.9%) were symptomatic where nausea/vomiting (78.6%) was most common clinical symptoms, About 83.9% children survived, 10.7% expired and 5.4% left against medical advice (LAMA). Complications were seen in about 37.5% where shock was most common complications

Conclusion

Poisoning was common in adolescent age group. Overall nature of poisoning was accidental however, in adolescent age group majority of them were suicidal in nature. Organophosphates (OP) compounds was most common type of poisoning

Keywords: Children, Nepal, Poisoning

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Introduction

Poison is harmful chemical substances that are life-threatening and lethal to human beings [1]. Usually, poisoning occurs after swallowing, inhaling, ingesting, or exposure to such toxins through the skin either intentionally or accidentally [2]. Acute poisoning in children has been a major public health problem and a global emergency [3, 4, 5]. It represents a major and preventable cause of morbidity and mortality worldwide. To prevent and manage pediatric poisoning routine surveillance is required for public health authorities and physicians.

There is a dearth of epidemiologic data on child poisoning in many low- and middle-income nations [6]. There are regional variations in the epidemiology of pediatric poisonings, including the chemicals consumed and the consequences for patients. The most significant factors affecting children are the dominant social, occupational, economic, and cultural norms as well as the accessibility to particular poisons. This demonstrates the critical need for epidemiologic studies that are tailored to each nation and region in order to identify the characteristics of this issue and develop prevention strategies [7]. However, due to a dearth of trustworthy data, it is challenging to gauge the scope of childhood poisonings in many developing nations [8].

This study investigated and updated the characteristics of children admitted to Nobel Medical College Teaching Hospital with acute poisoning. The main goals were to explain the incidence of poisoning as a reason for hospital admission, the demographics of the children who were harmed, the precise chemicals responsible for the poisoning in children under the age of 18, complications, and outcomes.

Materials and Methods

A hospital-based prospective observational study was conducted at Nobel Medical College Teaching Hospital, a tertiary care hospital situated in Eastern Nepal. The study was conducted for one year (Jan, 2022 to Dec 2022) in the emergency department, pediatric intensive care unit (PICU) and pediatric ward after obtaining informed and written consent from the parents and obtaining approval from the institutional review committee of Nobel Medical College Teaching Hospital with Ref: IRC-NMCTH 607. Various studies showed the prevalence rate of poisoning in children varied between 0.74% to

3% [9]. Hence, using 3% as prevalence rate sample size was calculated using the formula n (sample size) = $Z^2 P (1 - P)/d^2$, where Z (level of confidence at 95%) = 1.96, P (expected prevalence) = 3% & d (precision) = 5% which came out to be 45.

All children of either sex aged 18 years or less admitted with history of acute poisoning were included in the study. So the sampling method employed in the study was convenience sampling method. Parents not giving consent and cases of insect bites and chronic poisoning 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 proforma and data was collected from accompanying person of patients under 18 years old presenting with poisoning at the Nobel Medical College Teaching Hospital. All the acute poisoning cases were stabilized in the emergency department and were transferred to either PICU or pediatric ward depending upon the condition of the patient and the treatment was instituted according to the standard treatment protocol for individual poison.

Data was finally entered in excel sheet and descriptive analysis was done using SPSS software (version 20).

Results

In the present study, a total of 56 pediatric cases of acute poisoning were enrolled during the study period. During the study period there were total of 1425 pediatric admissions in the year 2021. So, the incidence of acute poisoning among the pediatric population in our teaching hospital was 3.93%. In our study, the most common age group with acute poisoning was 11-18 years (42.8%), followed by 1-5 years (39.3%). The mean age (\pm SD) of the children presenting with poisoning was 8.18 ± 5.50 Years. The results showed that poisoning was predominant in male children ($n=56$, 53.6%) in comparison to females and majority of them belong to Hindu religion (98.2%). Most of the children with poisoning were from Morang district (32.1%) followed by Sunsari (28.6%). The districts with least number of cases were from Mahottari, Rautahat and Sarlahi.e. 1.8% for each district. More than three-fourth (82.1%) cases of poisoning were from rural areas. Poisoning in children was seen more



where parents were illiterate and labor. (Table 1)

Table 1: Socio-demographic characteristics of patients

	Variables	Frequency	Percentage
Gender	Male	30	53.6
	Female	26	46.4
Age(years)	< 1 year	2	3.6
	1-5	22	39.3
	6-10	8	14.3
	11-18	24	42.8
		8.	18 ± 5.50 Years
Religion	Hindu	55	98.2
	Muslim	1	1.8
	Bhojpur	2	3.6
	Jhapa	5	8.9
Address	Mahottari	1	1.8
	Morang	18	32.1
	Rautahat	1	1.8
	Saptari	5	8.9
	Sarlahi	1	1.8
	Siraha	4	7.1
	Sunsari	16	28.6
	Udaypur	3	5.4
	Rural	46	82.1
	Urban	10	17.9
Residence	Illiterate	20	35.7
	Primary	16	28.6
	Secondary	13	23.2
Father Education	Intermediate	3	5.4
	Bachelor	4	7.1
	Illiterate	32	57.1
Mother Education	Primary	19	33.9
	Secondary	5	8.9
	Farmer	13	23.2
Occupation	Businessman	4	7.1
	labor	20	35.7
	Foreign Employ	4	7.1
Father Occupation	Service holder	15	26.8
	Housewife	48	85.7
	Mother Occupation	Employee	1
	Service holder	7	12.5

In the present study, maximum number of poisoning cases occurred during the month of November (26.8%) followed by October (14.3%) and September (10.7%). The results showed that most of the children ingested poison in the afternoon (37.5%) and evening (35.7%) time. In more than half of the cases, the most common reason for ingestion of poison was accidental (55.4%), followed by suicidal (41.1%). There were two homicidal cases of poisoning. The most common poison involved in acute poisoning among children were organophosphates (OP) compounds (41.1%), followed by Snake Envenomation (8.9%) and Insecticides (7.1%), which is quite obvious as more than three-fourth of paediatric acute poisoning cases were from rural areas (pesticide usage in agriculture) in our study. Also,

acute poisoning due to prescription drugs was seen in more than one-twentieth of paediatric cases Phenytoin (3.6%) and Clozapine (1.8%). Consumption of Rodenticides (Zinc Phosphide) in 5.4% of children and Kerosene consumption in 3.6% of children. More than one third of children was brought to the hospital within 2 to 6 hours after ingestion of poison and only 1.8% of children could arrived to the hospital less than 30 minutes after ingestion of poisoning. Only 33.9% children received pre-referral treatment. The mean number of admission days in ward was 2 ± 0.97 days and mean number of admission in PIC was 4.34 ± 3.13 days. (Table 2)

Table 2: Poison related variables

	Poison related variables	Frequency	Percentage
Month of poisoning ingestion	January	2	3.6%
	February	5	8.9%
	March	2	3.6%
	April	1	1.8%
	May	4	7.1%
	June	5	8.9%
	July	2	3.6%
	August	1	1.8%
	September	6	10.7%
	October	8	14.3%
	November	15	26.8%
	December	5	8.9%
Time of ingestion	Afternoon	21	37.5
	Evening	20	35.7
	Morning	8	14.3
Reason of poisoning ingestion	Night	7	12.5
	Accidental	31	55.4
	Homicidal	2	3.6
Type of poison	Suicidal	23	41.1
	Organophosphorus	23	41.1
	Snake Envenomation	5	8.9
	Insecticides	4	7.1
	Household Items (Cleaning Agent)	4	7.1
	Rodenticides (Zinc Phosphide)	3	5.4
	Datura Poisoning	3	5.4
	Drugs (Clozapine, Phenytoin)	3	5.4
	Volatile Hydrocarbons	3	5.4
	Aluminium Phosphide	2	3.6
	Kerosene	2	3.6
	Sulphuric Acid	2	3.6
Herbicide (Paraquet)	1	1.8	
Unknown (Tricentanol)	1	1.8	
Time of arrival of hospital	1 to 2 hours	11	19.6
	2 to 6 hours	36	64.3
	30-60 minutes	8	14.3
	Less than 30 minutes	1	1.8
Pre-referral treatment	Yes	19	33.9
	No	37	66.1
Admission in wards(days)	1	10	17.9
	2	14	25.0
	3	5	8.9
	4	1	1.8
	5	1	1.8
		2 ± 0.97 days	
Admission in PIC(days)	1	8	14.3
	2-5	34	61.2
	6-10	12	21.6
	>10	2	3.6
		4.34 ± 3.13 days	



In our study, more than three-fourth of the cases (92.9%) were symptomatic during the presentation where nausea/vomiting (78.6%), altered sensorium/delirium (28.6%), miosis (28.6%) and abdominal cramps (17.9%) were major clinical symptoms and signs due to poisoning. All children (n=56) included in the study received supportive therapy and 48.2% of children received antidote. Seven children received ventilator support and four required anticonvulsants. In the present study, the complications seen in the enrolled cases were about 37.5% where shock was seen in 12.5% followed by pneumonia (10.7%) and Coma & Abnormal LFT (5.4%) each. The present study showed that about 83.9% children survived and were able to be discharged whereas six children (10.7%) expired and three (5.4%) left against medical advice (Table 3).

Table 3: Clinical profile, treatment, complications and outcome of poisoning cases

Variables	Frequency	Percentage	
Clinical Profile	Asymptomatic	5	8.9
	Symptomatic	52	92.9
Nausea/vomiting	Yes	44	78.6
Salivation	Yes	5	8.9
Abdominal cramps	Yes	10	17.9
Seizure	Yes	1	1.8
Altered Sensorium/Delirium	Yes	16	28.6
Miosis	Yes	16	28.6
Bleeding	Yes	1	1.8
Manifestation			
Fast Breathing	Yes	4	7.1
Cough	Yes	1	1.8
Blurring of vision	Yes	1	1.8
Ulcer of mouth	Yes	1	1.8
Slurring of speech	Yes	3	5.4
Excessive Sleepiness	Yes	1	1.8
Irritability	Yes	2	3.6
Ptosis	Yes	3	5.4
Supportive Treatment	Yes	56	100
Received Antidote	Yes	27	48.2
Anticonvulsant	Yes	4	7.1
Ventilator Support	Yes	7	12.6
Complication seen	Yes	21	37.5
Pneumonia	Yes	6	10.7
ARDS	Yes	3	5.4
Shock	Yes	7	12.5
Sepsis	Yes	5	8.9
Coma	Yes	3	5.4
Respiratory Failure	Yes	2	3.6
CCF	Yes	1	1.8
AKI	Yes	2	3.6
Abnormal LFT	Yes	3	5.4
Others	Yes	5	9
Outcome	Survived and Discharged	47	83.9
	LAMA	3	5.4
	Expired	6	10.7

Discussion

The present study showed that majority (42.8%) of children presenting with poisoning were between 11-18 years followed by 5 years or younger which was consistent with a study conducted in northern India by Sharma J, Kaushal R [10] done in 2014. There are very few studies of pediatric poisoning between the age group of 0-18 years. The reason for high incidence of poisoning between age group of 11-18 years could be due to easy accessibility of poisoning substances and impulsive and aggressive behavior and suicidal attempt.

According to Indian researchers like Brata Ghosh et al., NK Bhat et al., U Kohli et al. [7, 11, 12] and similarly by KP Dawson et al., N Andiran et al., S Budhathoki et al. [13,14,15], poisoning is observed to be more common in children in the age group of 1 and 5 years. According to S Rathore et al., NK Bhat et al., and K Basu et al. [7,16,17], men were more often the victims of poisoning incidents. Similar accounts were also found in our investigation, with a male to female ratio of about 1.15:1. The overall predominance of men seems to be a result of the different socialization techniques used for men and women in the community. Females are not given the same freedom as men are, and are even given monitoring to obey the customs, whereas men are permitted and encouraged to engage in outdoor and risk-taking activities. In a study [18] conducted in Egypt by Hassan and Siam, children from rural areas were more likely to experience poisoning. We also observed that children from rural backgrounds and those whose parents lack literacy were more likely to become poisoned. This might be as a result of rural residents being more exposed to farming and pesticide/insecticide use than urban residents.

Incidences of poisoning varied seasonally during the unique study period of this particular investigation. There was a period of time when the majority of poisoning patients were admitted, which was between September and November. On the other hand, research by Ram P et al. [19] in the adjacent country of India revealed that the month of May through August saw the highest number of cases. The majority of cases (37.5%) were presented in the afternoon, followed by 35.7% in the evening. According to a study by Gyenwali et al. [20], the majority of poisoning cases (43.7%) and deaths (30.4%) occurred during the day.

In the current study, the majority of instances were unintentional (55.4%), followed by suicidal tendencies (41.1%). There were only two homi-



cidal cases. The majority of poisoning cases (76%) were accidental, according to a previous study from Nepal. [21] In the current study, poisoning from organophosphates (OP) was the most common (41.1%), followed by poisoning from snakes (8.9%) and insecticides (7.1%). Kerosene (n=23, 28.4%) and organophosphate chemicals (n=16, 19.8%), according to a retrospective study conducted in South India by Ram et al., were the most often used poisons to poison kids. Insecticides (59.9%) and rodenticides (20.8%), which are the most often used chemicals, were determined to be the main pesticides responsible for poisoning in the central region of Nepal, according to another descriptive epidemiological study [20].

More than half of all poisoning cases (64.3%) in the current study arrived at the hospital between 2 to 6 hours, compared to 19.6% who did so within 1 to 2 hours and just 14.3% who did so within 30 to 60 minutes. According to a study done in central Nepal, 14.4% of cases arrived within an hour, 59.9% arrived between one and three hours, and a quarter sought medical attention after three hours or more [20] Another retrospective study conducted at Patan Hospital in Nepal revealed that 77% of patients arrived at the hospital emergency room within six hours after the occurrence, and 60% of patients arrived within three hours [21]. The lack of concern from family members regarding the seriousness of the problem and their ignorance of potential complications may be the causes of the patient's delayed presentation at the hospital emergency department. The lack of transportation options in Nepal's rural districts may also have played a significant role in the patient's delayed arrival at the medical facility.

The signs and symptoms of poisoning primarily depend on the kind of poison taken and may differ from one place to another depending on the nature of the poisoning. Affected sensorium/delirium (28.6%), miosis (28.6%), and stomach pains (17.9%) were the main clinical symptoms and indicators of poisoning in more than three-fourths (92.9%) of the cases. Another significant clinical finding in a research by Budhathoki et al. was vomiting. [15]

In the current study, complications were observed in 37.5% of cases overall; shock was the most common complication, occurring in 12.5% of cases, followed by pneumonia (10.7%), coma, and abnormal LFT (each 5.4%). Chemical pneumonia brought on by kerosene oil consumption was the primary complication, according to Dayasiri et al observation of a 12.5% total compli-

cation rate. In this observational study, all cases of poisoning (100%) required admission to the PICU, whereas Gyenwali et al.'s investigation found that only 41.3% of cases did. [20] In a study by Gyenwali et al., the case fatality rate was lower than in our study (3.8% vs. 10.7%).

Our study had some limitations. The sample size of our study was small so further studies on large sample size is needed to get more precise clinic-epidemiological pattern of poisoning in Eastern Nepal. Also our study was a single center study so its finding could not be generalized to the whole community, region or country as a whole. Hence, further multicenter studies could address it.

Conclusion

Poisoning was common in adolescent age group followed by toddlers and pre-school children. The overall nature of poisoning was accidental however, in adolescent age group majority of them were suicidal in nature. Organophosphates (OP) compounds, Snake Envenomation and Insecticides were most common type of poisoning, The most common age group involved in poisoning was adolescent age group.

Recommendation

The poisoning in pediatric age group in eastern Nepal is a significant public health problem and the nature of poisoning was mostly accidental followed by suicidal. The higher prevalence of accidental poisoning in the first five year of life necessitates the need of child safety and injury prevention program in the community along with proper training to the parents regarding storage of medicine, insecticides and pesticides at home.

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Conflict of interest

The authors declare that there is no conflict of interests.

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