Clinical profile and outcome of children presenting with poisoning or intoxication: a hospital based study

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ABSTRACT

Poisoning is a common preventable cause of morbidity and mortality in children. Most of the poisoning in children less than 5 years of age is accidental. Objective of the study was to study the clinical profile and outcome of childhood poisoning and intoxication. This was a retrospective study done in patients who were admitted in pediatric wards and pediatric intensive care unit (PICU) of BP Koirala Institute of Health Sciences with history of ingestion of poison or intoxication or envenomation from January 2005 to June 2008. The data collected were analyzed with SPSS 12.0 software. There were 122 children enrolled in study. Male: female ratio was 1.4:1. The mean age of presentation was 5.8 years. Among 122 patients, 43.4% received pre-referral treatment in the form of gastric lavage, atropine etc. Organophosphorus poisoning was the commonest poisoning seen in 55 (45.1%) patients followed by hydrocarbon 12 (9.8%), mushroom 10 (8.2%) and organochlorine 10 (8.2%) poisoning. During treatment, 50.0% received antidotes. 55.7% received antibiotics, gastric lavage and anticonvulsants were required in 43.4% and 13.9% respectively. Overall survival was 87.4%. The time interval between intoxication and presentation to hospital, mean Glasgow Coma Scale (GCS) and presence of coma (GCS<8) were significantly different between survivors and expired cases. In conclusion, organophosphorus is the commonest agent involved in childhood poisoning. Overall, the outcome is good with 87.4% survival in our hospital. The time gap between the poisoning and presentation to hospital and presence of coma predict mortality.

Keywords: Childhood poisoning, Clinical profile, Outcome.

INTRODUCTION

Acute poisoning in children is an important pediatric emergency and is a world wide problem.[1] Accidental poisoning in children has been the subject of considerable study in the past decade has in United Kingdom, Europe, Australia and United States.[2-5] The cause and types of poisoning vary in different parts of the world depending upon the factors such as demography, socioeconomic status, education, local belief and customs.[1] More than two million human poisoning exposures are reported annually to the toxic exposure surveillance system of the American Association of Poison Control Centers, more than 50.0% occur in children 5 years of age or younger. Almost all exposures are unintentional.[6] More than 90.0% of toxic exposures in children occur in the home and most involve only a single substance.[6] According to World Health Organization, more than three million poisonings occur in developing countries, particularly among agricultural workers.[7,8] Pattern of poisoning in a given area depends upon the availability of poisonous substance, occupation prevalent in the society, religious and cultural influences.[7] Ingestion is the most common route of poisoning exposure accounting for 70.0% cases, with the dermal, ophthalmic and inhalation routes each occurring in about 6.0% cases.[6] Childhood poisoning is one of the most common reasons for presentation at hospital emergency departments in Australia.[9] Unintentional poisoning in children rarely results in a fatality and in many cases it is preventable.[9,10] while the rate of childhood poisoning has been declined dramatically since before the 1980s, there has been little change in the rate of presentation to hospital emergency department.[2,11] Among poisoning, hundreds of people are admitted to hospitals with mushroom poisoning every year and many lose their lives because of the complications.[12]

Acute poisoning in children is common and in many cases it is preventable.[13,14] The very nature of a young child predisposes the child to explore the surrounding environment.

The exact documented data of poisoning in Nepal is not available. Accidental poisoning is the twelfth leading cause of admission in the pediatric ward in India and accounts for about 1.0% of the hospitalized patients.[15]

Table-1: Baseline characteristics of children presenting with features of poisoning

Baseline characteristics		**n**	**%**
Age (years)	0-5	75	61.5
	6-10	22	18.0
	11-15	25	20.5
sex			
	Male	71	58.2
	Female	51	41.8
Pre-referral treatment		53	43.4
Median duration between poisoning and presentation	4 hours		

The objective of the study was to study the clinicoepidemiological profile and outcome of childhood poisoning at BPKIHS, Nepal.

MATERIALS AND METHODS

It was a retrospective study. All children admitted to pediatric ward and pediatric intensive care unit of BPKIHS with history of ingestion of poison or envenomation between January 2005 and June 2008 were identified and their medical records obtained from medical record department. All cases up to 15 years of age and with history of intoxication or poisoning were included in the study. Those cases who had no signs of life on presentation, or who had food poisoning, or who had snake envenomation or who were discharged home from emergency department after short period of observation were excluded from the study. Data were analyzed using SPSS 12.0 software. Appropriate tests of significance were applied to find out the significance of the results.

RESULTS

There were 3586 children above one month of age admitted in pediatric wards and PICU during the study period. Among them 153 (4.3%) were admitted with history of ingestion of poison or with envenomation. Among those cases, 31 cases were due to snake bite, which were excluded from the study. Final analysis was done in 122 (3.4% of total admissions) cases. Mean age of cases was 5.84 (SD 4.18) years; with age range of one to 15 years. Male: female ratio was 1.4. Other baseline characteristics of children with poisoning and envenomation are presented in Table-1.

Various agents responsible for poisoning are presented in Table-2. Insecticides were the most common agents responsible for poisoning in 59.9% cases. Among insecticides, organophosphorus was the most common agent, which accounted for 45.1% of total cases. Other agents were plants, hydrocarbons, drugs, chemicals, insect venom and alcohol. In 4.9% cases actual agent involved in intoxication could not be identified by history and clinical findings.

Common clinical features of poisoning are presented in Table-3. Vomiting was the most common clinical feature followed by altered pupil size, increased salivation and seizure. Coma was present in 18.0% cases and 6.6% cases had respiratory failure.

Average duration of presentation was 4 hours after ingestion. Pre referral treatment was received by 43.4% cases before presentation to our centre. Antidotes were given to treat 50.0% of cases. Atropine was the most common antidote used in 45.0% cases. Other antidotes used were pralidoxime, vitamin K and sibilin. In

Table-2: Agents causing poisoning in children

	Type of poison	**n**	**%**
Insecticides		**73**	**59.9**
	Organophosphorus	55	45.1
	Organochlrorine	10	8.2
	Cypermethrin	4	3.3
	Zinc phosphide	3	2.5
	Carbamate	1	0.8
Plant		**15**	**12.3**
	Mushroom	10	8.2
	Dhatura	4	3.3
	Strychnine	1	0.8
Hydrocarbon		**12**	**9.8**
Drugs		**4**	**3.3**
	Avomine	1	0.8
	Amitryptilene	1	0.8
	Lorazepam	1	0.8
	Sodium stibogluconate	1	0.8
Chemical		**5**	**4.1**
	Acid	3	2.5
	Phenol	1	0.8
	Bleaching powder	1	0.8
Insect envenomation		**4**	**3.3**
	Wasp	2	1.6
	Scorpion	2	1.6
Alcohol		**3**	**2.5**
Unknown		**6**	**4.9**
Total		**122**	**100**

Table-3: Common clinical features of poisoning in children

Clinical features	n	%
Vomiting	59	48.4
Salivation	40	32.8
Seizure	27	22.1
Miosis	26	21.3
Mydriasis	25	20.5
Coma	22	18.0
Crepitation in chest	19	15.6
Tachypnea	9	7.4
Diarrhoea	9	7.4
Abdominal pain	8	6.6
Respiratory failure	8	6.6
Fever	4	3.3

remaining 50.0% cases, antidotes were not available to treat. During treatment, 55.7% cases were treated with antibiotics, 13.9% cases received anticonvulsants and 2.5% cases required vasopressor support for hypotension. Respiratory support in the form of mechanical ventilation was required in 8 (6.6%) cases for respiratory failure.

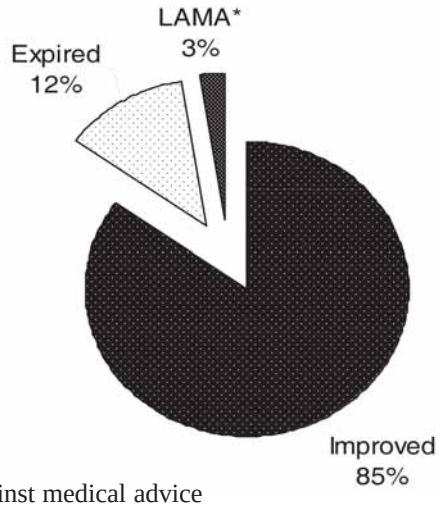
Various clinicoepidemiological parameters were analyzed to test the association with survival. These are presented in Table-4 and Table-5. Among various parameters, time interval between poisoning and presentation to our hospital, mean GCS and presence of coma were significantly different between survivors and expired cases. Duration of hospital stay was also significantly longer for survivors as compared to that for expired cases (p=0.001). Other parameters like age, sex, pulse rate, respiratory rate, mean arterial pressure, presence of vomiting, respiratory failure, abnormal pupil size, seizure, pre referral treatment and treatment with antidote were not significantly different between survivors and expired cases.

Overall survival was 87.4%. Among remaining cases, 12.6% cases died in hospital and 2.5% cases left against medical advice. Mean duration of hospital stay of poisoning cases was 3.78 ± 3.33 days. Median duration was 3 days. The mean duration of stay in hospital was significantly longer for survivors as compared to that for expired cases (p=0.001). Mean time interval to death was 1.12 ± 0.36 days from presentation. Among all deaths, 86.7% deaths occurred within 24 hours of presentation.

DISCUSSION

Although the number of child poisoning deaths have declined dramatically over the last 40 years, there is little evidence that shows a similar decline in emergency department presentations and hospitalizations, despite the prevention strategies implemented over that period.[9] The poisoning in children under 15 years of age was 3.4% among total admissions in pediatric ward and PICU in the study hospital. In a similar study done at another hospital of Nepal, 4.0% of total medical admissions were due to poisoning and 1.0% of pediatric admissions were due to poisoning.[7] In a similar study done in India, less than 1.0% of all pediatric admissions below 12 years of age were due to poisoning.[5] In our study, we found that almost two third of all poisonings below 5 years of age were accidental. Singh et al. reported that one third of all poisonings were unintentional.[5] A similar result was observed in a 2 year prospective study done at Oslo, where 81.0% of all poisonings below 8 years of age were accidental.[10] This higher percentage of unintentional poisoning might be due to exploratory behaviours of the young children. The very nature of a young child

Fig. 1. Outcome of childhood poisoning cases



* LAMA: Left against medical advice

Table-4: Clinical parameters and outcome of poisoning cases

Clinical parameters	Survivors (n=104) Mean ± SD	Expired cases (n=15) Mean ± SD	P
Age	5.88 ± 4.33	5.53 ± 3.02	0.766
Glasgow coma scale	12.54 ± 3.32	9.27 ±3.79	0.001*
Mean arterial pressure	73.43 ± 15.18	70.62 ± 10.39	0.490
Interval between poisoning and presentation (hours)	6.38 ± 8.01	14.27 ± 18.74	0.005*
Duration of hospital stay (days)	4.22 ±3.41	1.12 ± 0.36	0.001*
Pulse rate	120.17 ± 25.51	130.40 ± 21.92	0.143
Respiratory rate	31.27 ± 10.58	34.93 ± 17.12	0.254

SD, Standard deviation; * statistically significant

predisposes the child to explore the surrounding environment. As children grow and learn to become independent, they are compelled to investigate new and interesting items, places and objects. The influence of growth and development upon unintentional poisoning becomes especially important during the toddler and preschool age.[1]

In our study, the most common poisoning was due to insecticides. The most common insecticides responsible were organophosphorus compounds. Others were organochlrorine, cypermethrin and zinc phosphide. In one study conducted at another hospital in Nepal, organophosphorus (OP) was the most common cause for poisoning-led hospital admission in overall but the least common cause of childhood poisoning.[7] Organophosphorus was responsible for childhood poisoning in only 2.4% and 4.0% children at studies done in Australia and Columbia respectively.[16,17] In a study done in India, OP poisoning accounted for 10.1% of all childhood poisoning.[5] In eastern Nepal, most people rely on agriculture for living and use of OP as pesticide is common practice. Children may be inadvertently exposed to OP compounds which are available in different forms, and used as agricultural and household insecticides, and in the treatment of animal ectoparasite.[17] In western countries, such compounds are available in child resistant packaging.[9] These compounds are not subjected to child resistant packaging in our set up. Due to low educational status of parents, these compounds are usually not kept away from reach of children. Therefore, OP compounds have been the most common agents of childhood poisoning in our set up. The next common agents of childhood poisoning in our study were hydrocarbon compounds that comprised 9.8% of all poisonings. Similar study done in another hospital of Nepal showed kerosene to be the most common cause of childhood poisoning responsible for 43.0% of pediatric cases.[7] Similar study done by Singh et al. in India showed that 25.3% of all childhood poisonings were due to hydrocarbons.[5] Hydrocarbons were the agents of poisoning in only 0.9% case in another study done in Columbia.[1] Such higher proportion of poisoning by hydrocarbons in our study was likely due to common use of hydrocarbons for daily household purposes like cooking and lightening in our set up. Other common agents were plant products like mushroom and dhatura, drugs, acids, alcohol and insect bites.

In our study, vomiting was the most common clinical manifestation observed in more than half of the children with poisoning. Other common manifestations were abdominal pain, diarrhoea, salivation, seizure, miosis, mydriasis, coma and respiratory failure. Since OP compounds were the major agents responsible for poisoning in children in our study, most of the clinical features were those of OP poisoning. Similar clinical pictures of OP poisoning were reported by Adebayo *et al* in their case reports.[17] Vomiting, diarrhoea and abdominal pain were the major clinical features of mushroom poisoning in studies done in Turkey and Iran.[12,18] Mushroom poisoning was observed in 8.2% of our cases and clinical features matched with those studies.[12,18] The median time between poisoning and presentation to Hospital in our study was 4 hours. The mean interval was 6.8 hours in a study done in India.[5] On admission, 18.0% of the children were comatose. Among them one third required mechanical ventilation. In a similar study done at Oslo, 5% of children with poisoning were comatose on admission, among them one third children required respiratory support in the form of mechanical ventilation.[10]

In our study, children received various forms of treatment in the hospital. Among our cases, 31.1% received gastric lavage, almost half of the children with poisoning received

Table-5: Clinical parameters and outcome of poisoning cases

Clinical parameters	Survivors (n=104) Number (%)	Expired cases (n=15) Number (%)	P
Male sex	60 (57.7)	8 (53.3)	0.750
Seizure	20 (19.2)	5 (33.3)	0.210
Vomiting	53 (51.0)	6 (40.0)	0.427
Respiratory failure	6 (5.8)	2 (13.3)	0.274
Abnormal pupil size	41 (39.4)	9 (60.0)	0.131
Coma (GCS<8)	14 (13.5)	6 (40.0)	0.010*
Pre referral treatment	47 (45.2)	6 (40.0)	0.705
Treatment with antidote	52 (50.0)	7 (46.7)	0.809

* statistically significant

atropine as an antidote. Next to atropine, 31.1% patients got pralidoxime as another antidote. A similar type of treatment like gastrointestinal decontamination and specific antidote were received in a substantial number of patients in a study done in Ethiopia.[19] A hospital based study done in Oslo, all hospitalized children were induced for emesis, 87.0% patients received gastric lavage and antidotes were given only to hospitalized children.[10] Majority of children with poisoning in our hospital were treated with atropine and pralidoxime. This was mainly due to higher proportion of children were admitted with history and clinical feature suggestive of insecticide (organophosphorus) poisoning.

In our study, 85.2% of children with poisoning were improved, 12.3% patients died and 2.5% patient left hospital against medical advice. In a study performed in a tertiary care hospital at Lalitpoor, including adults as well as children, mortality was only 4.5%.[7] Similar mortalities were observed from Bir Hospital and Nepal Medical College Teaching Hospital at Kathmandu.[20,21] This higher percentage of mortality in our study was likely due to exclusion of patients above 15 years of age and patients who were discharged from emergency after observation. A similar result of mortality (12.5%) was found in a study in children with poisoning in india.[5] In contrast, some Srilankan studies report mortalities as high as 60%.[22] Our study showed Glasgow coma scale, time lapse between ingestion of poison and presentation to hospital, and duration of hospital stay were significantly different between survivors and expired cases. Low Glasgow Coma Scale at presentation significantly predicted mortality. Mean duration of hospital stay in survivors was 4.2 days while it was only 1.1 days in expired cases. It shows that there was significantly less hospital stay in expired children. This might be due to poor general condition at presentation of cases that expired. Time lapse from intoxication or ingestion of poison to presentation at hospital was significantly less in survivors (6.4 hours) as compared to expired children (14.3 hours). This suggests that supportive measures and antidotes are less effective if there is much delay in presentation to hospital after poisoning.

The mortality rate in OP, mushroom and organochlorine poisoning were 7.3%, 30.0% and 20.0% respectively. Mortality rates observed in Patan hospital in a study were – 6.0% in OP poisoning, 33.0% in mushroom poisoning and 100.0% in corrosive poisoning.[7] Mortality rates of our study in organophosphorus and mushroom poisoning matched with the study done at Patan hospital. The lower mortality rate in OP poisoning might be due to over diagnosis as cases with very minor exposure to OP agents were probably also diagnosed as poisoning. Another reason was the availability of effective antidote. Higher mortality in mushroom poisoning was most likely due to severe liver toxicity of mushroom, late presentation of symptoms and unavailability of specific antidote in mushroom poisoning.

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