

# A Scenario of Poisoning in Children in Manipal Teaching Hospital

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## Abstract

**Objective:** To see the pattern and prevalence of poisoning in children in Manipal Teaching Hospital, Pokhara. The cases were also considered in relevance to the age groups with various agents, the commonly observed clinical features in various poisonings and mortality. **Study design:** Hospital based retrospective study. **Study period:** 4 years (January 2006 – January 2010). **Study place:** Department of Paediatric, Manipal Teaching Hospital, Pokhara. **Material and Methods:** A detailed study of all the case files of the children admitted with various acute poisonings, where the causative agent was known, was done. **Results:** A total number of 94 children (56 males & 38 females) were admitted with poisoning (1.79% of the total admissions) during that period. Maximum number of children were of the preschool age group i.e. < 5 years (64.89%). Organophosphorus Compounds (OPC) (27%) and Kerosene Oil (23%) were the two most frequent agents involved. The other agents included Snake bite (19%), Drugs/ Chemicals (16%), Dhatura (12%), and Mushroom poisoning (3%). The most common nature of poisoning noted was accidental (95%). The mortality rate observed was 6.38%. **Conclusion:** OPC and Kerosene Oil poisoning were the two most common poisoning observed in this study comprising almost half the cases; accidental poisoning was the most common pattern noted and there was a male predominance. Early recognition and timely treatment can decrease the mortality.

**Key words:** Poisoning, Organophosphorus and Kerosene poisoning, Snake bite.

## Introduction

Poisoning remains a threat to the health of young children despite the improved triage and management techniques<sup>1</sup>. Poisoning that necessitates hospitalization remains an important source of morbidity and mortality in children. The present study aims to find out the pattern and prevalence of different poisonings in children.

## Materials and Methods

This was a retrospective study carried out over a period of 4 years from January 2006 to January 2010. All children admitted with acute poisoning, where the causative agents were known, were included in this study. The pattern of the various poisonings was analyzed in view of the age, sex, causative agent,

medical condition/ clinical features and the outcome. Suspected cases of poisoning where parents were not sure about the nature of ingestion, food poisoning and minor insect bites were excluded from the study. Each case was subjected to a detailed clinical examination, followed by relevant investigations. All the children were admitted immediately to the PICU (Paediatric Intensive Care Unit) of the hospital and managed accordingly. Data analysis was done using SPSS software (spss sciences, Chicago, IL).

## Results

Out of the total 5249 admissions in the Paediatric Indoor Unit, 94 cases of acute poisoning were studied. The results are as follows: The total number

of known acute poisonings was 1.79% of the total indoor admissions. Of the 94 cases, 21 (22.34%) were admitted in 2006, 19 (20.21 %) in 2007, 29 (30.85%) in 2008 and 25 (26.59%) in 2009 respectively (Figure 1). Of the total 94 cases, 56 (59.57 %) of the patients were males and 38 (40.42%) females (Table 1), with male to female ratio of 1.47:1. Preschool children (age under 5 years of age) constituted 61 cases (64.89%) whereas school going children (older than 5 years) accounted for 33 cases (35.10 %) (Table 2). The age range for males was found to be 1-14 yrs with mean age of 4.2 yrs and for females 2 months – 14yrs with mean of 5.4 yrs. Organophosphorus compounds (OPC) (27 %), Kerosene Oil (23%) were most common poisoning, followed by Snake bite (19%), Drug /Chemical ingestion

16%, Dhatura 12%, and Mushroom poisoning 3 % (Fig 2). Accidental poisoning was the most common nature of poisoning (95%). Other reasons were 4 % intentional and 1 % homicidal. (Fig 3). Incidence of poisonings based on type of agent and age groups : under 1 years of age, 1-2 years, 2-5 years, 5-10 years, >10 years old is shown in Table 3. 2-5 years was the most common age group for poisoning 43 (45.74%). Carbamazepine was the most common drug (33.33%) and Metacid (24%) was the most common OPC ingested (Table 4). Medical conditions recorded revealed neuropsychiatric disorders in 7.14 % of patients (5 cases) and mental retardation in 2.85% of patients (2 cases) (Figure 4). Coming to the outcome 93.61 % of patients (88 cases) improved and 6.38 % (6 cases) died (Figure 5).

**Table 1:** Age and Sex distribution of cases

| Age group    | Male               |            | Female             |            | Total      |
|--------------|--------------------|------------|--------------------|------------|------------|
|              | Number             | Percentage | Number             | Percentage |            |
| <1 year      | 0                  | 0%         | 1                  | 100%       | 1(1.06%)   |
| 1-2 year     | 10                 | 62.5%      | 6                  | 37.5%      | 14(14.89%) |
| 2-5 year     | 32                 | 72.72%     | 12                 | 27.27%     | 44(46.80%) |
| 5-10 year    | 9                  | 56.25%     | 7                  | 43.75%     | 16(17.02%) |
| >10 years    | 6                  | 35.29%     | 11                 | 64.7%      | 17(18.08%) |
| <b>Total</b> | <b>56 (59.57%)</b> |            | <b>38 (40.42%)</b> |            | <b>94</b>  |

**\*\*Male: Female (Ratio) = 1.47:1**

**Table 2:** Distribution as per Preschool and school age groups

| Age group            | Male      |            | Female    |            | Total       |
|----------------------|-----------|------------|-----------|------------|-------------|
|                      | Number    | Percentage | Number    | Percentage |             |
| Pre-school ≤ 5years  | 41        | (67.21%)   | 20        | (32.78%)   | 61(64.89%)  |
| School age > 5 years | 15        | (45.45%)   | 18        | (54.54%)   | 33 (35.10%) |
| <b>Total</b>         | <b>56</b> | <b>-</b>   | <b>38</b> |            | <b>94</b>   |

**\*\*\*Age range male; 1 yr–14 yrs: mean age 4.2 yrs**

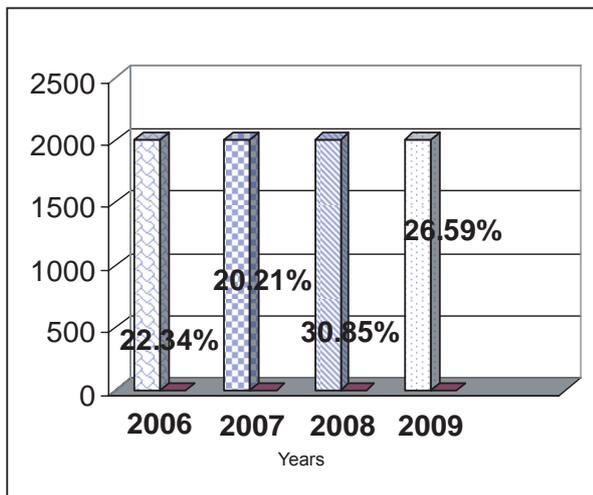
**\*\*\*Age range female; 2 month– 4 yrs: mean age 5.4 yrs**

**Table 3:** Incidence of poisoning in relation to age.

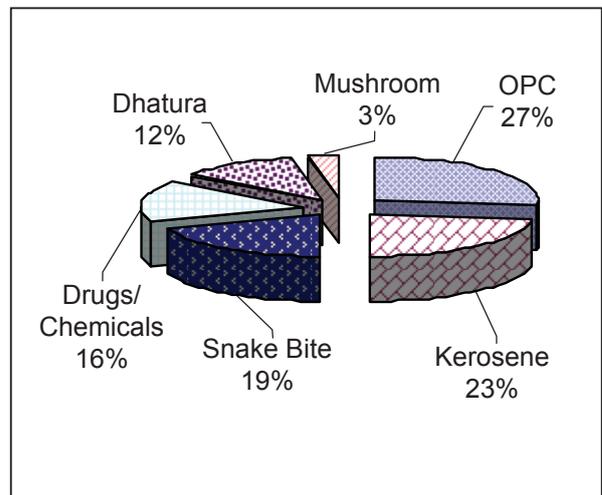
| Age group    | OPC        | Kerosene  | Snake bite | Drugs / chemical | Dhatura    | Mushroom  | Total     |
|--------------|------------|-----------|------------|------------------|------------|-----------|-----------|
| < 1 yr       | 0(0%)      | 1(4.5%)   | 0(0%)      | 0(0%)            | 0(0%)      | 0(0%)     | 1         |
| 1-2 yrs      | 6(42.8%)   | 6(42.8%)  | 0(0%)      | 2(12.5%)         | 0(0%)      | 0(0%)     | 14        |
| 2- 5yrs      | 10(22.72%) | 15(34%)   | 1(2.2%)    | 8(18.18%)        | 10(27.72%) | 0(0%)     | 44        |
| 5-10yrs      | 6(37.5%)   | 0(0%)     | 10(62.5%)  | 0(0%)            | 1(6.25%)   | 1(6.25%)  | 16        |
| >10 yrs      | 3(17.6%)   | 0(0%)     | 7(41.17%)  | 5(29.41%)        | 0          | 2(11.76%) | 17        |
| <b>Total</b> | <b>25</b>  | <b>22</b> | <b>18</b>  | <b>15</b>        | <b>11</b>  | <b>3</b>  | <b>94</b> |

**Table 4:** Various types of medicaments and OPC ingested.

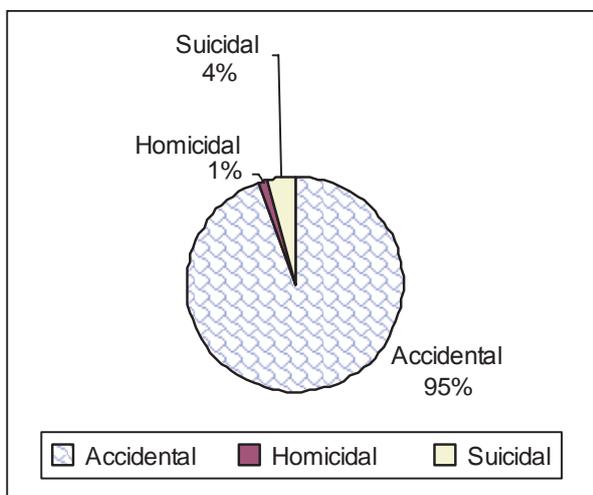
| Drugs/ chemicals           | Number (n= 15) | Remarks                    |
|----------------------------|----------------|----------------------------|
| Carbamazepine              | 5 (33.33%)     | Improved                   |
| Benzodiazepines            | 4(26.66%)      | Improved                   |
| Haloperidol                | 1(6.66%)       | Improved                   |
| Olanzapine                 | 1(6.66%)       | Improved                   |
| Acetoaminophen             | 2 (13.33%)     | Improved                   |
| Acid                       | 1(6.66%)       | Expired                    |
| Alkali                     | 1(6.66%)       | Improved                   |
| Organophosphorus compounds | Number (n=25)  |                            |
| Metacid (Meyhtl parathion) | 6((24%)        | Improved, <b>1 expired</b> |
| Housefly poison            | 5(20%)         | Improved                   |
| Rat poison                 | 3(12%)         | Improved                   |
| Benzyl benzoate            | 3(12%)         | Improved                   |
| Tik 20                     | 2(8%)          | Improved                   |
| Baygon (Carbamate)         | 2(8%)          | Improved                   |
| Mortein,                   | 2(8%)          | Improved                   |
| Gammabenene hexachloride   | 2(8%)          | Improved                   |



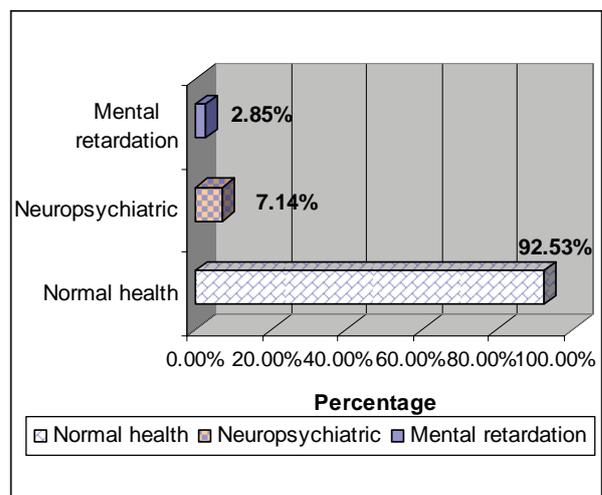
**Fig 1:** Percentage of cases in different years



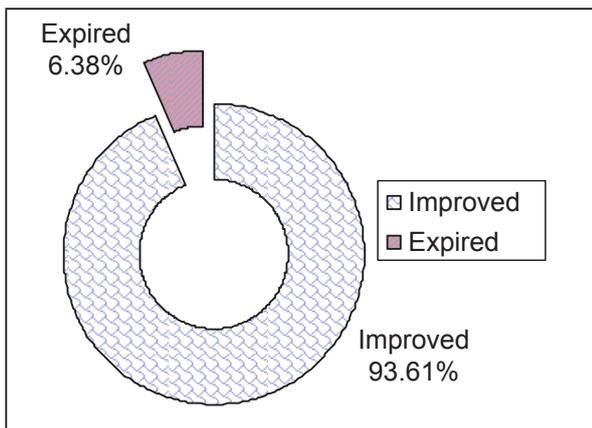
**Fig 2:** Nature of Poisoning



**Fig 3:** Reason for Poisoning



**Fig 4:** Medical Condition Record



**Fig 5: Outcome of Patients**

## Discussion

Poisoning incidents are one of the serious accidents involving children, when they explore the world, using all their senses including taste. They typically put everything in their mouth trying to find out what it could be. Many household articles are dangerous in this respect and comprise the various causes of poisoning. Poisoning that necessitates hospitalization remains an important source of morbidity in children<sup>2</sup>. The reported incidence of childhood poisoning in various studies vary from 0.3 to 7.6%<sup>3,4</sup>. The prevalence in our study was found to be 1.79%, which was similar to those reported by various other authors<sup>3-6</sup>.

There was an overall male predominance, with male to female ratio of 1.47:1. This ratio was 1.6: 1 in another study<sup>7</sup>. Boys had a higher rate than girls in almost every age group which could be due to their more active and inquisitive behavior, curiosity, limited knowledge and bolder developmental ability at this certain age. Girls had a higher rate in the age group of >10 years which could be due to their emotional nature; having more tendency towards suicidal attempts. Preschool age (under 5 years of age) constituted 64.89% and this was 81.2% in another study by Khadgawat et. al<sup>7</sup>. Among the preschool age group common age for poisoning was 2-5 years (46.80%) in our study but this was 1-2 years (39%) in another study<sup>8</sup>.

The pattern of poisoning was ingestion of OPC (27%), Kerosene (23%) followed by Snake bite (19%), Drugs /chemicals (16%) Dhatura poisoning (12%) and Mushroom poisoning (3 %). This pattern was different from another study where ingestion of kerosene was the commonest poisoning (48.8%), followed by ingestion of drugs (11.7%), and snake bite (11.2%). Other causes included Dhatura poisoning (8.1%), food poisoning (7.2%) and ingestion of Paris Green (3.1%)<sup>7</sup>. Yet in

another study incidence of food poisoning was 48.8% was commonest followed by that of Kerosene (24%), Pesticides (9.6%), Chemicals and Medicaments (8.4%), Plants (3.6%) and Animal bites (3.2%)<sup>9</sup>. Hospital- based studies from five major hospitals in Nepal in 1999- 2000 showed OP compounds to be the most common form of poisoning comprising 52% of total cases.<sup>10</sup> Hence one could conclude that the pattern may vary in different setups.

In our study 95% cases were accidental poisoning and 4% were intentional and 1% homicidal. The cause of homicidal poisoning was unwanted female child where kerosene was given by the father to his two month old daughter. She expired 12 hours after hospitalization. The percentage of accidental poisoning in another study was 96.2%<sup>11</sup>. This fact emphasizes the lack of family education, lack of local safe storage for medications and lack of proper labeling and packaging of chemicals and drugs.

Incidence of poisoning based on type of agent and age groups was also studied. When seen according to age group the commonest accidental poisoning noted was ingestion of Kerosene oil in < 5 years accounting for 76.8%, 42.8 % in age group 1-2 yrs and 34 % in age group 2-5yrs (Table 3). This was noted to be 48.8% in another study<sup>7</sup>. Kerosene is extensively used as fuel for cooking and lighting purpose in this part of the world and is stored in used soft drink bottles. Children when left unattended accidentally ingest kerosene thinking it to be soft drink specially when kept within their reach. The common presenting features in these children were fever (20 of 22) and dyspnea (in 14 of 22), aspiration pneumonia (12 of 22) and convulsions (2/22), out of which one expired. Thus mortality in this group was 1/94 (1.06 %) which was 1.6%<sup>9</sup>, 0.8%<sup>11</sup>, 3.4%<sup>12</sup> respectively in other studies.

On the other hand Snake bite was more common in 5-10 years (62.5%) and in >10 year age group ingestion of various medicaments was higher 29.41 %. The higher incidence of ingestion of various medicaments could also be attributed to many factors like impulsive act with an attempt to suicide at this age, easy availability of drugs from medical shops without physician's prescription, repeated administration of drugs by parents without the advice of treating physician and less knowledge of drug dosage and drug interactions to most of the private practitioners. Similar finding was also noted in another study<sup>7</sup>. The incidence of chemicals and medicaments contributing to poisoning was 16% in our study where as 15.71% in another study<sup>9</sup>. Two of the siblings, 8 year old male and 6 year old female and another 11-year-

old boy had taken very high dosage (120-123mg/kg) of Carbamazepine and they had presented with coma (GCS 5-6/15). They recovered uneventfully following treatment with activated charcoal 1gm/kg 4 hourly for 48 hours. One 4 year old male with acid poisoning expired.

The pesticides encountered were Metacid 6(24%), Housefly poison 5(20%), Rat poison 3(12%), Benzyl benzoate 3(12%), Tik twenty 2(8%), Baygon 2(8%), Mortein, 2(8%), gammabenene hexachloride 2(8%). No complications were noted except one that could not be revived because he was brought 18 hours after ingestion. Similar types of pesticides were also noted in another study<sup>9</sup>. Organophosphorus (OP) compounds are used as pesticides, herbicides, and chemical warfare agents in the form of nerve gases<sup>13</sup>; hence are readily accessible to the toddlers and also for adolescents at times of stress.

Plant poisoning comprised 12 % in our study and this was 17.14 % in another study<sup>9</sup>. All had ingested Dhatura in both studies. The plant Dhatura is wildly prevalent in this area and accidental ingestion especially by young children is a common occurrence. None of our patients developed complications and all improved. Unlike other studies, incidence of snake bite was high 18 (19%) in our study where three were due to poisonous and 15 due to non-poisonous snakes. The presence of unhindered overgrowth of vegetation in and around Pokhara and proximity to the terai by road may be attributed to the increased incidence of snake bite. Incidence of animal bite including snake bite poisoning as reported by Chatterjee and Banerjee<sup>14</sup> was 4.76% and 3.2% in another study.<sup>9</sup> The snake-bite poisoning was treated with anti-snake venom serum and supportive measures but one patient died due to neurotoxicity.

Mushroom poisoning was also noted in three cases (3.19%), out of three two died from same family as they had consumed wild mushroom from the forest. They had presented with hepatic encephalopathy. In Iran poisoning in children due to hygiene products and cosmetics were reported to be 463 cases out of 3895 patients over two years<sup>1</sup>. This was not seen in our study. Further follow up of patients revealed neuropsychiatry disorders in five patients (7.14 %) and mental retardation in two (2.85%) patients. Similar finding was also reported by Khare M, Bhide M, Ranade A et al<sup>8</sup>.

Of all the cases, 93.61 % (88 cases) improved and 6.38% (6 cases) (Kerosene ingestion 1, Acid poisoning 1, Mushroom poisoning 2, OPC poisoning 1, Snake bite 1) died. The mortality in our study was higher in comparison to other studies which showed mortality

as low as 0.8%<sup>9</sup> and 0.3%<sup>8</sup>. The probable causes of high mortality in our study could be attributed to the delayed initiation of treatment due to the unavailability of proper, specialized health care at the local level, lack of awareness regarding the urgency of treatment on part of the people and, also to the fact that our hospital is a referral center.

## Conclusion

Accidental poisoning in children remains a significant, preventable cause of mortality and morbidity. Simple precautions/ measures like family education, better child care and, safe storage of potentially harmful substances away from children's reach can markedly reduce the mortality and morbidity. Legal enforcement to prevent 'Over the Counter' sale of drugs should be done. Other measures include use of mass media such as TV, radio, newspapers for spreading the simple rules of prevention of poisoning. Prompt institution of treatment, availability of flow charts for emergency management and specific antidotes at all health centers, establishment of a National Poison Center hotline all play a significant role in decreasing the mortality and morbidity.

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**Conflict of Interest:** None

**Permission from IRB:** Yes

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