

# Analysis of Profile of Childhood Poisoning in A Tertiary Care Medical College Hospital

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## ABSTRACT

**Introduction:** Paediatric population is very vulnerable to acute unintentional poisoning. Poisoning is one of the most important causes of mortality and morbidity among children. Prevention plays a pivotal role in reducing its morbidity and mortality. This study was conducted to understand the profile of poisoning in children with special reference to the etiological agents causing it.

**Materials and methods:** Children hospitalized with acute poisoning at the paediatric intensive care unit (PICU) between January 1<sup>st</sup> 2010 and December 31<sup>st</sup> 2015 were retrospectively evaluated from hospital records. A detailed history was taken using the proforma having special reference to age, sex, poisoning agents and route of intake, time of admission of the poisoned patients, socio- economic status of the family.

**Results:** A total of 5806 patients were admitted in the PICU and 401(6.9%) were due to acute poisoning .85% were under the age of six, with a peak age of 2-3 years (31.42%). Pharmaceutical medicine poisoning 128(31.9%) was the most common cause of unintentional poisoning in 91(22.7%) children followed by kerosene (hydrocarbon) poisoning in 88(21.9%) patients. 62 products were identified as various causes of poisoning. All the children were admitted to the PICU, but most only required supportive care. Specific antidotes were administered in 38 cases. Two children died during the study period.

**Conclusion:** All paediatric age groups are at risk of poisoning. Most children suffer due to unintentional poisoning because of easy availability of medications, hazardous liquids and house products. As poisoning is preventable it must be given due importance in health control programs at all levels of health care.

**Keywords:** Poisons, Acute child poisoning, Unintentional, Hydrocarbon (Kerosene, Petroleum), Drugs, Organophosphorus compounds

childhood poisoning from developed countries and many in the in the developing countries as well.<sup>2</sup> ACP is implicated in about 2% of all injury deaths in children in developed countries and about 5% in developing countries.<sup>2,3</sup> Boys are more likely to experience incidents of accidental poisoning than girls.<sup>3</sup> ACP in developed nations are having a decrease trend in the number of admissions due to accidental poisoning.<sup>2,4</sup> Prevention plays a pivotal role in reducing its morbidity and mortality. This study was conducted to understand the profile of poisoning in children with special reference to the etiological agents causing it.

## MATERIALS AND METHODS

The medical college receives patients from nearby four districts as Thrissur district is almost in the centre of Kerala state. Children hospitalized with acute poisoning at the PICU between January 1<sup>st</sup> 2010 and December 31<sup>st</sup> 2015 were retrospectively evaluated from hospital records. A thorough history was taken using the proforma having special reference to age, sex, poisoning agents and route of intake, time of admission of the poisoned patients after ingestion, socio-economic status of the family (according to the modified Kuppusswamy scale). In this retrospective study necessary investigations including complete hemogram, renal function tests, liver function tests, urine analysis, blood level of drugs, and chest x ray were done. Some children with multiorgan dysfunction required bleeding and coagulation profile evaluation, Blood gas analysis and imaging studies. As most of the patients were from the villages and towns near to the medical college none of them had any toxicological analysis report.

Inclusion criteria of the study took into consideration those with definite history of poisoning. snake bites, drug ingestion, corrosive intake, food poison, any comorbid conditions were included in the study. Also we included cases with suspicion of ACP along with unknown bite and drugs intake. All babies below 1 year age, developmentally delayed children, having associated diseases like chronic debilitating encephalopathies and neuropathies, neuro degenerative diseases

## INTRODUCTION

The exposure of child to an agent that, by transference of chemical or radiant energy, can cause symptoms and signs of organ dysfunction leading to injury or death is defined as acute child poisoning (ACP).<sup>1</sup> Paediatric population is very vulnerable to acute unintentional poisoning. ACP is also a health hazard in every country. Poisoning is a major problem all over the world, and the seriousness increases when a child is affected. Its spectrum and the associated morbidity and mortality varies in different countries. The quicker the initial resuscitations measures are administered, gastric decontamination and use of specific antidotes, the better the outcome in a case of ACP.

Literature review has revealed a lot of data about accidental

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**How to cite this article:** Menon Narayanankutty Sunilkumar, Vadakut Krishnan Parvathy. Analysis of profile of childhood poisoning in a tertiary care medical college hospital. International Journal of Contemporary Medical Research 2016;3(2):507-510.

were excluded. Profile of paediatric population with ACP, their symptoms, type of ACP and outcome after treatment were analyzed. The study design was approved by Institutional Ethics Research Committee.

**RESULTS**

A total number of 5806 patients were admitted in the PICU during the study period and 401(6.9%) admissions were due to acute poisoning. Male children were 65.8% and females 34.2% (Figure 1). Majority, 126(31.2%) of these were between 2 to 3 years of age, 18(4.5%) less than 1 year, 109(27.1%) 1-2 years, 52(12.9%) 4-5 years, while 32(5.2%) were of more than 10 years of age. (Table 1). 85% were under the age of six, with a peak age of 2-3 years (31.2%).

As regard with the etiological agents involved, sixty two products were identified as various causes of ACP. ACP due to drugs and medicines poisoning was noted in 128(28.7%) patients. This was followed by kerosene (hydrocarbons) in 91(22.7%) cases. The poisons identified in the PICU in

the study are mentioned in Table 2. They include drugs and medications 128(28.7), hydrocarbon (including kerosene) 118(29.4%), insecticides and pesticides 43(10.7%), corrosives (acids and alkali) 24(5.9%), plant poisoning 13 (3.2%), organophosphorous 12(2.9%), snake bite 11(2.7%), unknown bite 8(1.9 %), Bee sting 6(1.4%), food poisoning 5(1.2%), scorpion sting 5(1.2%), dyes 3(0.7%), alcohol ingestion 2(20.4%) and miscellaneous 23(5.7%). The various drugs and medicinal preparations included anti psychotics (19%), acetaminophen (15%), cardiovascular drugs (12%), unknown drugs (9%), benzodiazepines (7%), hormones (thyroxine tablets) (7%), anticonvulsants (6%), antihistamines (4.5%), antibiotics (3.5%), salbutamol (3%), Dapsone (3%), oral hypoglycaemic agents (3%), vitamins (2.5%), non-steroid anti-inflammatory drugs (2%) (NSAIDS), wound cleaning agents such as povidone iodine (1.5%) and antiemetics (1%). (Figure 2).

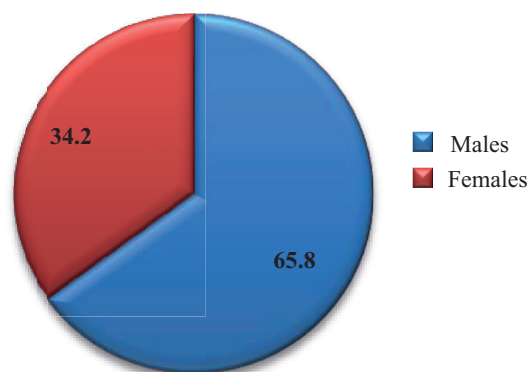
All the patients were admitted to the PICU, but most only required supportive care. According to the social status majority belonged to lower socio-economic status 305(76.2%) and were from the villages and rural areas. Majority of the ACP presented within 6 hours of the exposure 290(73%) and there was even delay in one child of about 14 hours and he expired of acute dichromate poisoning.<sup>19</sup> More than 90% of the ACP had vomiting and nausea as the initial symptom after exposure. Specific antidotes were administered in 38 cases. Among these 401 ACPs only 2 children expired and children with severe ACP were regularly followed in the out-patient clinic.

Age in years	Total and %
Less than 1 year	18
1 to 2 years	109
2 to 3 years	126
3 to 4 years	52
4 to 5 years	29
5 to 6 years	8
6 to 7 years	6
7 to 8 years	9
8 to 9 years	8
9 to 10 years	4
10 to 11 years	5
11 to 12 years	6
12 to 13 years	7
13 to 14 years	7
14 to 15 years	3
Total cases 401	

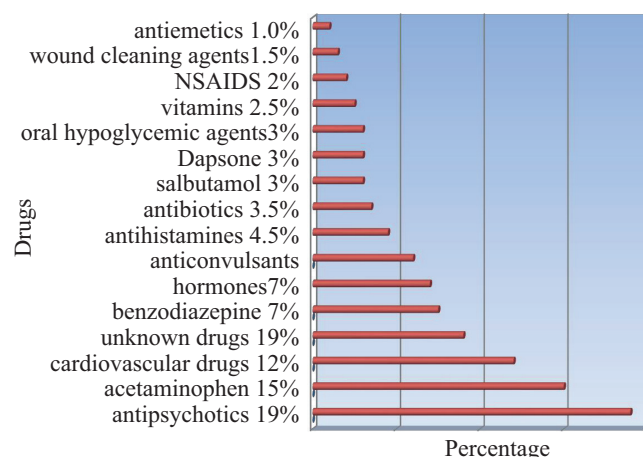
**Table-1:** Distribution of age

S. No	Types of poisoning	Number of cases (%)
1.	Drugs and medications	128 (28.7)
2.	Hydrocarbon (including Kerosene)	118(29.4)
3.	Insecticide and pesticides	43(10.7)
4.	Corrosives(acids and alkali)	24 (5.9)
5.	Miscellaneous	23 (5.7)
6.	Plant poisoning	13 (3.2)
7.	organophosphorous	12(2.9 )
8.	Snake bite	11(2.7)
9.	Unknown bite	8(1.9 )
10.	Bee sting	6 (1.4)
11.	Food poisoning	5 (1.2)
12.	Scorpion sting	5(1.2 )
13.	dyes	3(0.7 )
14.	Alcohol ingestion	2(20.4)
	Total	401

**Table2:** Types of poison agents



**Figure-1:** Gender distribution



**Figure-2:** Drugs in poisoning and percentage

## DISCUSSION

Acute poisoning and exposure to chemicals is a major problem around the world and ACP is an alarming health issue to any health care facility. Poisoning is the fourth leading cause of mortality and morbidity following road traffic accident, burns and drowning.<sup>2</sup> Children are very vulnerable and the paediatric population below the age of five years constitute about 15% of unintentional poisoning related deaths.<sup>3,4</sup> This is substantially due to an increasingly rapid rate of industrialization with an increase in the number and types of chemicals available world wide.<sup>5</sup>

Pertaining data and studies revealed that children under five years of age are particularly at risk from accidental ACP.<sup>6</sup> In our study 85% of ACP were under the age of six, with a peak age of 2-3 years (31.42%). This is in similarity to the mean age of 2.73 years in other national study.<sup>7</sup> The children are inquisitive and often are poisoned accidentally when they ingest them orally. Male children were 65.8% and females 34.2% in our study and is in accordance with many studies.<sup>8</sup> Lin YR, Liu TH et al<sup>9</sup> and Yang CC, Wu JF et al<sup>10</sup> also demonstrated the male predominance.

According to the social status majority belonged to lower socio-economic status 305(76.2%) and were from the villages and rural areas with a similar data of 72.3% has been reported from a referral center in India.<sup>11</sup> Children in urban areas are more vulnerable as they are exposed more to the poisonous agents like household products such as mosquito repellents, bleaching powders and drugs and medicinal preparations such as mouth wash and antiseptic lotions such as povidone iodine. There is also lack of immediate conveyance in some rural areas to reach the hospital in time.

ACP due to drugs and medicines poisoning was noted in 128(28.7%) patients. This was followed by kerosene (hydrocarbons) in 91(22.7%) cases. Pharmaceuticals drugs and medicinal preparations were the most common cause of poisoning in our study with psychotropic agents (19%) and acetaminophen (15%) being common. Other studies also have noticed the drugs as a leading cause of ACP.<sup>9,10,12</sup>

Kerosene oil was the second commonest agent involved as a cause of ACP in our study. It has been reported as the commonest substance involved in accidental childhood poisoning in India as well.<sup>13</sup> Also other studies from the developing countries in Asia (India, Malaysia) and Africa (Nigeria) have mentioned the prevalence of this hydrocarbon ingestion.<sup>14-17</sup> Kerosene oil is used as a fuel for cooking and other purposes in most of the developing countries. It is sold sometimes openly and parents store them in medicine bottles, household containers or soft drink bottles. Children have an easy access in the kitchen and unintentionally consume them. This can result in severe aspiration pneumonias and some time the child can become very sick. So the various poisons identified in the PICU in the study are similarly seen in other studies as well.<sup>2-4,6-8,9-18</sup> They include drugs and medications 128(28.7), hydrocarbon (including kerosene) 118(29.4%), insecticides and pesticides 43(10.7%), corrosives (acids and alkali) 24(5.9%), plant poisoning 13(3.2%), organophosphorous 12(2.9%), snake bite 11(2.7%), unknown bite 8(1.9%),

Bee sting 6(1.4%), food poisoning 5(1.2%), scorpion sting 5(1.2%), dyes 3(0.7%), alcohol ingestion 2(20.4%) and miscellaneous 23(5.7%).

Unknown drugs (9%) have been mentioned in our study as in other study.<sup>12</sup> Miscellaneous are such as cockroach repellent sticks, pencils, detergents, and soap solutions used in households. ACP occurs when substances are ingested, inhaled, injected or absorbed through the skin in quantities that are harmful to the body.<sup>1,21</sup> More than 90% of the ACP had vomiting and nausea as the initial symptom after exposure. The other initial symptoms and clinical findings were such as increased drowsiness, breathing difficulty, burns, ataxia, myosis, bradycardia, haematemesis and are varied depending on the particular poisoning.<sup>1-4,18,19</sup>

Ingestion was the most common route (93% of cases). Similar results (96.8%) have been reported in other studies.<sup>12,14-18</sup> Paudyal et al<sup>17</sup> highlighted the incidence of unintentional poisoning 98.4% in children as is the same in our study. Only 2 children above 13 years had intentionally consumed poison in our study. And is in accordance with other studies showing unintentional ACP as the major type of ACP.<sup>8,9,15-18</sup>

The various drugs and medicinal preparations included anti psychotics (19%), acetaminophen (15%), cardiovascular drugs (12%), unknown drugs (9%), benzodiazepines (7%), hormones (thyroxine tablets) (7%), anticonvulsants (6%), antihistamines (4.5%), antibiotics (3.5%), salbutamol (3%), Dapsone (3%), oral hypoglycaemic agents (3%), vitamins (2.5%), non-steroid anti-inflammatory drugs (2%) (NSAIDS), wound cleaning agents such as povidone iodine (1.5%) and antiemetics (1%). It is advisable for the family to keep these drugs away from children. Many families make the child give the medicine in the grand parents and parents mouth. This is a serious problem as there is a chance for the youngster to ingest it and be poisoned. Among these 401 ACPs only 2 children expired. Majority of the ACP presented within 6 hours of the exposure 290 (73%) and there was even delay in one child of more than 14 hours and he expired of acute dichromate poisoning.<sup>19</sup> Sunilkumar MN, Ajith TA, et al<sup>19</sup> discussed the case of a 2 year old child during the study period who accidentally ingested ammonium dichromate crystals in his house. This child was from a rural area and presented to the hospital only after about 14 hours of ingestion and in spite of all resuscitatory measures expired. The second child was a 4 year old who expired of unknown bite (probably snake bite). Sunilkumar MN, Ajith TA, et al<sup>20</sup> also highlighted a case of acute Dapsone poisoning in a 3 year old child, admitted in the same medical college and the recent advances in its treatment. So it is a challenge for the paediatrician to treat such cases of ACP. Specific antidotes were administered in 38 cases.

Special attention should be paid to the high incidence of poisoning in children all over the world and psychology counselling given to the children who are intentionally causing ACP. The medical teaching schedule should give undue importance to the field of Clinical toxicology so that these ACPs issues can be treated timely and successfully with the knowledge acquired.<sup>21</sup>

## CONCLUSION

Accidental childhood poisoning is a major public health problem. The awareness of the various poisonings could reduce the mortality rate as potential antidotes could be administered early. Pharmaceutical drugs and medicines, kerosene, and household chemicals are the main substances responsible for ACP as these substances are not stored properly. Parental education is the hall mark in prevention of ACP at home.

## ACKNOWLEDGEMENT

The authors acknowledge the help of the MRD section of the medical college for their help and support. Also express gratitude to house surgeons, post graduate students, nursing staff, colleagues for their timely help and to Dr Ajith TA, Professor, Biochemistry, Amala Institute of Medical Sciences, Amala Nagar, Thrissur, Kerala, India during the preparation of the manuscript.

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**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 31-12-2015; **Published online:** 21-01-2016