

**CLINICAL AND SOCIODEMOGRAPHIC PROFILE OF CHILDREN ADMITTED WITH POISONING**

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**ABSTRACT****BACKGROUND**

Poisoning among children is one of the most common emergencies in everyday practices, but it received little attention. It remains a leading cause of childhood morbidity and mortality.

The objectives of this study were to find out clinical and sociodemographic profile of children admitted with poisoning in the age group of one month to twelve years and to bring out the predisposing factors that lead to poisoning in above children.

**MATERIALS AND METHODS**

A hospital-based descriptive study was conducted in a tertiary centre in Kottayam. All cases of poisoning during the period of one year was included in the study. Data was collected by direct interview using verbal questionnaire and from case sheets.

**RESULTS**

Children from one month to twelve years was taken into consideration. There is male preponderance in this study. Children less than six years are more susceptible to poisoning, of which the highest incidence is at 12 - 36 months. Incidence is more in the afternoon than forenoon. Poisoning occur more in their own home than neighbourhood. Incidence is more in the month of March and June. They occur more in upper lower socioeconomic class. Accidental poisoning is more common type of poisoning with household chemicals as the commonly used poison. Of the hydrocarbon used kerosene, naphthalene balls among the household chemicals and paracetamol among the drugs was most commonly used. Complication was seen in 7.7% of cases. Incidence was more among anaemic children.

**CONCLUSION**

The present study was carried out to know clinical and socio-demography of poisoning cases in children. This knowledge helps to prevent the leading causes of child injury and thereby reducing the morbidity and mortality in children due to preventable cause.

**KEY WORDS**

Clinical, Sociodemographic, Accidental Poisoning.

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**BACKGROUND**

Poisoning among children is one of the common medical emergencies encountered in paediatric practices. Poison is any substance that causes harm if it gets into the body. Poisoning has been a problem for generations, but received little attention except in the last thirty years.

With reduction in childhood mortality from infectious diseases due to the advent of immunising agents and antimicrobials, childhood poisoning remains one of the leading causes of morbidity and mortality among children worldwide. Poisoning in children which never accounted for a large number of deaths have acquired prominence now, because they have not decreased at the same rate as infectious diseases.<sup>1,2,3</sup> Poisoning can cause effects that range from untoward manifestation to severe toxicity and death.

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Forced vomiting, gastric lavage and specific antidote administration are determining factors in the ultimate severity of outcome.

The branch of medicine that deals with the detection and treatment of poison is known as toxicology.

Poisoning in children is a complex interaction between the child, the ingested substance and the environment. WHO reports estimated childhood poisoning in the age group of nine months to five years as one of the most common cause of increased morbidity rate in children worldwide.

Accidental or suspected poisoning becomes the common reason for young children being admitted into hospitals. The pattern of accidental poisoning in children are changing dramatically. The demographic data varies from time to time, place to place and with age and socio-economic background.<sup>4</sup>

"Emergency physicians see accidental poisoning everyday in the emergency rooms, which is why we urge people to learn about the potential dangers lurking right in their homes" said the president of the American College of Emergency physicians- David Seaberg at the 50<sup>th</sup> Anniversary of National Poison Prevention week March 18 to 24, 2012. Parents in particular should be alert to those items that might entice a child to put something in its mouth. Children ACT FAST and so do POISON. Children under the age of five are the most vulnerable to accidental poisoning, because they learn by touching and putting things in their mouth. From crawling to

learning to walk, they quickly learn to reach and explore new things. The best way to baby proof the home is to get down to a child's eye view.<sup>5</sup>

Incidences in India ranges between 0.3% and 7.6%, while large number go unnoticed. Suicidal poisoning in children are less frequent. The age of the patients attempting suicide was over nine years. Adolescent suicide is viewed as a three stage process- A history of problems, an escalation of problems and finally dissolution of relationship resulting in increased isolation and alienation.

Homicidal poisoning may be associated with forms of psychiatric disorders of parents and thus can be termed as an extended suicide. Poisoning in children is an important paediatric emergency and is a worldwide problem. It has been a subject of study in the past decades in Europe, US, Australia, S. Africa and has shown an increasing index as well as change in pattern.<sup>6</sup>

### Aims and Objectives

To find out clinical and socio-demographic profile of children admitted with poisoning in the age group of one month to twelve years.

## MATERIALS AND METHODS

### Study Design

Descriptive study.

### Duration of Study

12 months.

### Study Location

Department of Paediatrics in Institute of Child Health, Medical College, Kottayam.

### Sample Size

All children in age group of one month to twelve years presenting with history of poisoning.

### Inclusion Criteria

Patients with definite history of poisoning in age group of one month to twelve years.

### Study Tools

- Semi-structured interview schedule.
- Case sheets.

### Operational Definition of Terms

Clinical is the clinical feature present at the time of admission in the hospital.

### Anaemia

Anaemia is defined as by World Health Organisation.

- 6 months - 60 months < 11 g/dL
- > 60 months - 144 months < 11.5 g/dL

### Complications

Complications include adverse effects that was present at time of presentation.

### Age is divided into Four Groups

1. 1 month - 12 months.
2. 13 months - 36 months.
3. 37 months - 72 months.

4. 73 months - 144 months.

### Time of Occurrence

Poisoning occurring in the forenoon and those occurring in the afternoon.

### Site of Occurrence

Poisoning that occurred at home or at neighbourhood.

### Socioeconomic Status

Families were divided in 4 social classes according to modified Kuppaswamy's 'socioeconomic scales.'

Socioeconomic Class	Score
Upper class 1	26-29
Upper Middle Class II	16-25
Lower Middle Class III	11-15
Upper Lower Class IV	5-10
Lower Class V	< 4

As no study group came into class V, this class is not taken into consideration.

### Type of Poisoning

Type of poisoning is classified as accidental poisoning, suicidal and homicidal.

### Poison Used

- Poison used was categorised as hydrocarbons, household chemicals, drugs, vegetative.
- Hydrocarbons were classified as kerosene and others which included petrol and diesel.
- Household chemicals included the entire chemical that is routinely available in a house.
- Vegetative (plant) poison-included nutmeg.

### Methodology in Brief

A hospital-based descriptive study was conducted in all the patients admitted with history of poisoning. Food poisoning cases were not included in this study, because of the difficulties to differentiate poisoning from acute gastroenteritis. Snake envenomation is also not included in this study, because of the lesser role of host factors. Toxic or idiosyncratic effect of drugs administered for therapeutic purpose has not been included.

Child was examined at the time of admission. Preliminary data such as age of the patient, sex, site of occurrence and time of occurrence were noted. Income, education and occupation of the head of the family was noted. Type of poisoning and poisons used was noted. Clinical presentation of the patients with poisoning at the time of admission was noted. Complications at the time of presentation were taken into consideration. Haemoglobin level of the patients at the time of admission was noted.

### Data Entry and Analysis

Data were entered in Microsoft Excel and Data were exported to SPSS 16.0 version.

## RESULTS

With the objective to find out clinical and sociodemographic profile of children admitted with poisoning in the age group of one month to twelve years, of the 9393 admissions in the

period of July 2014 to June 2015, of which 155 cases due to poisoning was studied.

**Distribution of Study Subjects based on Gender**

In this study, a male preponderance is noted. Males (63.9%) outnumbered females (36.1%). Study done by Gupta et al has come to the same conclusion that males are more prone for poisoning.<sup>7</sup>

Sex	Number	Percentage
Male	99	63.9
Female	56	36.1
<b>Total</b>	<b>155</b>	<b>100</b>

*Table 1*

**Distribution of Study Subjects based on Age**

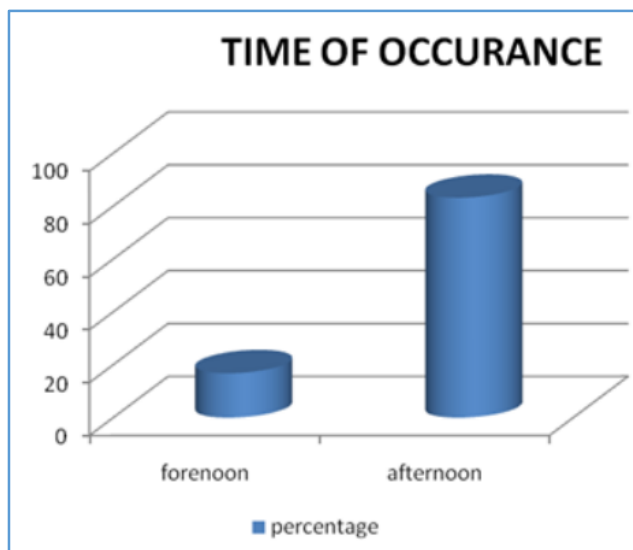
This study showed poisoning was more in the age group of 12-36 months (65.8%) followed by 37-72 months (27.7%) and >73 months (4.5%) and < 11 months (1.9%). Thus, the incidence is more in children < 6 years. Children of less than six years are most prone for poisoning. Peak age group is one to three years. Gupta et al also noted that most vulnerable group was under six years.

	Number	Percentage
< 11 months	3	1.9
12 - 36	102	65.8
37 - 72	43	27.7
> 73	7	4.5
<b>Total</b>	<b>155</b>	<b>100</b>

*Table 2. Distribution of Study Subjects based on Age*

**Distribution of Study Subjects based on Time of Occurrence of Poisoning**

Study showed time of occurrence to be more in the afternoon hours (83.2%), while only 16.8% of cases occurred in forenoon. Study done by Mahmood found the same finding.



*Figure 1. Distribution of Study Subjects based on Time of Occurrence of Poisoning*

**Distribution of Study Subjects based on Site of Occurrence of Poisoning**

In this study site of poisoning was mostly at home (97.4%), while only (2.6%) occurred in neighbourhood houses. Gupta in his study came to the same inference.

Site	Number	Percentage
Home	151	97.4
Neighbourhood	4	2.6
<b>Total</b>	<b>155</b>	<b>100</b>

*Table 3. Distribution of Study Subjects based on Site of Occurrence of Poisoning*

**Distribution of Study Subjects based on Month of Occurrence of Poisoning**

Distribution of case, month wise showed that 16.1% of cases occurred in the month of June followed by March month 15.5% of total poisoning cases. Our study showed increased incidents in summer. Children are more active and mostly confined to their home in summer. Study by Buhariwala, Sharma showed increased incidence in summer and winter.

	Number	Percentage
January	9	5
February	5	9.7
March	24	15.5
April	9	5
May	13	8.4
June	25	16.1
July	4	2
August	9	5.8
September	5	3.2
October	15	9.7
November	14	9
December	13	8
<b>Total</b>	<b>155</b>	<b>100</b>

*Table 4. Distribution of Study Subjects based on Month of Occurrence of Poisoning*

**Distribution of Study Subjects based on Social Class**

Of the social class, poisoning was highest in upper lower class of 49% followed by lower middle case of 29.7%. Only 2.6% in upper class. Poisoning is most in upper lower class than in higher class. Mahmood study showed increased incidence in poor class of population. Lower class incidence of poisoning was nil in this study, so not included.

	Number	Percentage
Upper class	4	2.6
Upper middle class	29	18.7
Lower middle class	46	29.7
Upper lower class	76	49
<b>Total</b>	<b>155</b>	<b>100</b>

*Table 5. Distribution of Study Subjects based on Social Class*

**Distribution of Study Subjects based on Type of Poisoning**

Accidental poisoning was most common, constituted 98.7% as compared to suicide and homicidal of 1% each. Our studies showed accidental poisoning is the most common type of poisoning. Gupta SK et al<sup>8</sup> also had the same finding in his

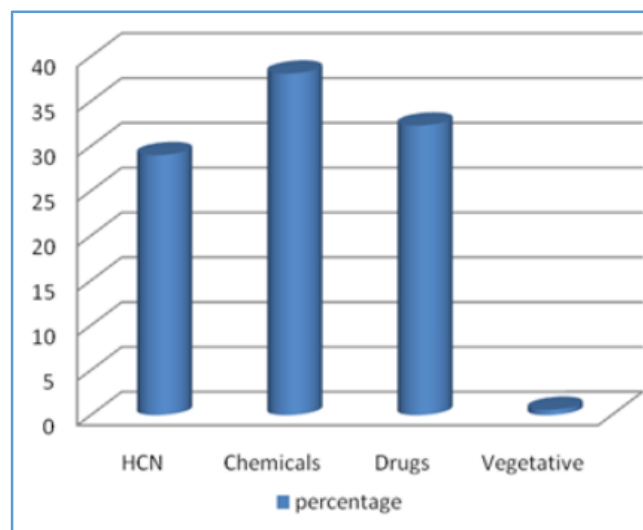
study. Suicide was attempted by a child of 8 years after quarrelling with her brother. Homicidal attempt was on 4 months old baby by its mother due to some family problem at home.

Type	Number	Percent
Accidental	153	98.7
Suicidal	1	0.6
Homicidal	1	0.6
<b>Total</b>	<b>155</b>	<b>100</b>

**Table 6. Distribution of Study Subjects based on Type of Poisoning**

**Distribution of Study Subjects based on Poison Used**

The various poisons used included hydrocarbon household chemical, drugs and plant (vegetative) poisoning, household chemicals constituted 38.1% followed by drugs. 32.3%. In this study, household chemicals was commonly used followed by hydrocarbons. Gupta et al<sup>7</sup> study showed hydrocarbon like kerosene as commonly used poison for accidental ingestion.



**Figure 2. Distribution of Study Subject based on Poison Used**

**Distribution of Study Subjects based on Hydrocarbon (HCN) used for Poisoning**

In this study, of the hydrocarbon kerosene poisoning was most commonly used 95.6% as compared to others which include petrol and diesel (4.4%). Gupta et al<sup>7</sup> and Kurshid et al<sup>9</sup> showed kerosene as mostly used poison for ingestion.

	Number	Percentage
Kerosene	43	95.6
Others HCN	2	4.4
<b>Total</b>	<b>45</b>	<b>100</b>

**Table 7. Distribution of Study Subjects based on Hydrocarbon (HCN) used for Poisoning**

**Distribution of Study Subjects based on Household Chemical Used**

In this study, of the household chemicals naphthalene balls constitute the highest (19%) followed by turpentine oil (18%) organophosphorous cases (4.4%). Gupta et al studies showed pyrethroid as commonly used chemical.

	Number	Percent
Organophosphorous	4	6.6
Turpentine	11	18.0
Dettol	1	1.6
Dish washer	2	3.3
Floor cleaner	2	3.3
Soap detergent	1	1.6
Naphthalene	12	19.7
Paint	2	3.3
Bleaching powder	1	1.6
HCL cleaner	1	1.6
Cloth stain remover	7	11.5
Liquid mosquito repellent	5	8.2
Camphor	2	3.3
Eucalyptus oil	4	6.6
KMnO <sub>4</sub>	2	3.3
Lime	1	1.6
Cockroach chalk	1	1.6
Rat poison	2	3.3
<b>Total</b>	<b>59</b>	<b>100</b>

**Table 8. Distribution of Study Subjects based on Household Chemical Used**

**Distribution of Study Subjects based on Drugs Used for Poisoning**

This study shows that of the drugs used for poisoning, paracetamol was most commonly used (24.5%) followed by Phenytoin (12.2%), Risperidone (10.2%), Thyronorm (8.2%), salbutamol (6.1%), Mefenamic acid (4.1%) and iron (4.1%). Gupta et al in his study states anticonvulsant and thyroid hormones as most frequently used drugs.

	Number	Percentage
Phenytoin	6	12.2
Iron	2	4.1
Cyproheptadine	1	2.0
Salbutamol	3	6.1
Calamine	2	4.1
Paracetamol	12	24.5
Metformin	2	4.1
Thyronorm	4	8.2
Ayurvedic medicine	1	2.0
Risperidone	5	10.2
Olanzapine	1	2.0
Clonidine	1	2.0
Lorazepam	2	4.1
Septran	1	2.0
Mefenamic acid	2	4.1
Gamma benzene hexachloride	1	2.0
Carbamazepine	2	4.1
Digoxin	1	2.0
<b>Total</b>	<b>50</b>	<b>100</b>

**Table 9. Distribution of Study Subjects based on Drugs used for Poisoning**

Of the vegetative poison used was nutmeg, which was grown in their yard and frequently used as spice and for abdominal ailment.

**Distribution of Study Subjects based on Complication following Poisoning**

Complication that followed after ingestion of poison it was found that 92.3% had no complication, while 7.7% has complication. Of the 6 cases of phenytoin ingestion 5 cases had

complication of ataxia (83%), of the 43 kerosene ingestion cases 1 case developed pneumonitis (2.3%) and 2 cases had aspiration pneumonia (4.6%). A total of 6.9% of the kerosene poisoning developed complication. Seizure developed in one case of mefenamic acid ingestion (50%) of the two cases. Of the four thyronorm poisoning cases, one case developed sinus tachycardia (25%). Of the five risperidone cases, one developed oculogyric crisis (20%). Of the four organophosphorous poisoning, one death occurred (25%).

	Number	Percentage
No complication	143	92.3
Ataxia	5	3.2
Chemical pneumonitis	1	0.6
Aspiration pneumonia	2	1.3
Seizure	1	0.6
Oculogyric crisis	1	0.6
Sinus tachycardia	1	0.6
Death	1	0.6

**Table 10. Distribution of Study Subjects based on Complication following Poisoning**

#### Distribution of Study Subjects based on Anaemia

Haemoglobin concentration was also noted. It was founded that 51.6% of the patients were anaemic. Poisoning is more commonly seen in anaemic children due to pica in them. Studies have shown pica is seen in children with anaemia.

Anaemia	Number	Percentage
Anaemia	81	52.3
Not anaemic	74	47.7
<b>Total</b>	<b>155</b>	<b>100</b>

**Table 11. Distribution of Study Subjects based on Anaemia**

#### DISCUSSION

Childhood poisoning is a global problem. It is a significant cause of morbidity and mortality in paediatric patients in our country. It is responsible for 0.33% to 7.6% of total admissions in paediatric wards at various hospitals across India. It is very likely that this reporting is an underestimate of the actual magnitude of this problem, as many cases go unreported.<sup>10</sup> The spectrum of poisoning varied considerably from place to place, depending on age, sex, socioeconomic status and demography.

This study was conducted in Department of Paediatric ICH, Kottayam. All cases of poisoning admitted from July 2014 to June 2015 was evaluated. The cases were examined at the time of admission, closely monitored and managed. The following points were taken into account: - Age, sex, time of occurrence, date of occurrence, site of occurrence, type of poisoning, poison used, socioeconomic status, haemoglobin level and complication. Was kerosene kept in original container or was it kept in soft drink bottles? All cases of poisoning were admitted, observed for a minimum of 24 hours. In all cases gastric lavage was done except in petroleum product, liquid mosquito repellent and acid ingestion. Detailed physical examination of vital and systemic examination was done. Detailed instruction regarding proper storage of poisonous items for prevention of further episodes was given to the parents. High incidence of poisoning in children is similar to many other reports in literature with variation in agent consume.<sup>11,12,13,14</sup> Available literature were reviewed before

commencement of the study. Study analysis done during one year period showed a total cases of 155.

#### Incidence of Poisoning

A total of 9393 children were admitted in the institution during the period from July 2014 to June 2015, of these 155 were childhood poisoning cases. Of the 155 cases 153 cases were accidental poisoning, one suicidal and one homicidal cases. It gives an incidence of 1.65% of poisoning cases. For overall admission, 98.7% constitute accidental cases.

Therein, wide variation in incidence of poisoning in other parts of our country. Sathpathy et al<sup>14</sup> reported only 0.33% accidental poisoning, while Suresh Kumar Gupta et al reported 36.6% of poisoning cases and accidental poisoning was 79.7%.<sup>14,7</sup> Suicidal poisoning was rarely reported in India. Suicidal poisoning in my study accounts to 0.6%. It was due to quarrel between an 8 years old girl and her brother.

Bhat NK et al<sup>15</sup> studies indicate 80.9% suicidal in age group > 12 years. Gupta SK<sup>7</sup> noted 20.2% intentional attempts in the > 12 years of age.<sup>7,9</sup> Western studies also shows wide variation in incidence rate. But there is an increasing trend, even though regional poison control centres can significantly reduce admissions. These studies are hospital based. So it is only a tip of iceberg. Children with no minimal symptoms may not be brought to the hospital by the parents.

#### Summary

With the objective to find out the clinical and sociodemographic feature of poisoning, this study was conducted in children. In this study of the 9393 admissions, 155 cases was due to poisoning who fulfilled the inclusion and exclusion criteria. Poisoning is common in children below six years of age, peak incidents in age group of 12 - 36 months. Male: Female ratio is 1.76: 1 of poisoning cases. Site of occurrence is mostly at their own residence. Time of occurrence is mostly in the afternoon when children are more active and playful. Incidence is more in the month of March and June. Of the type of poisoning, accidental poisoning is most common. Of the poison, household chemical is most common followed by hydrocarbon poisoning. Kerosene is the most common hydrocarbon used due to easy availability. In the household chemicals, naphthalene balls were mostly consumed. Paracetamol was commonly used as a poisoning. Suicidal attempt in this study was by using paracetamol. Homicidal attempt was done using insecticide. In upper lower class, incidence of poisoning is more than higher class. 7.7% of the poisoning cases had complication. Correlation of haemoglobin concentration and poisoning incidence showed poisoning is more in children with anaemia.

#### CONCLUSION

A new year heralds new beginning in many different ways. Likewise, the wish which should unite everyone in child injury prevention should step up to prevent the needless suffering and loss of young lives due to poisoning. Knowing how to prevent leading causes of child injury like poisoning is a step towards this goal.

The purpose of this study was to determine the pattern and frequency of various agents involved in poisoning in child, hospital outcome and sociodemographic relevance. Efforts should be made to educate the parents, society to keep toxic household items including drugs safely. The death rate from

poisoning overall has decreased, but the 1% of death due to medication is increasing.<sup>16</sup>

#### Limitations of the Study

1. Children are brought from different areas, so area specific poisoning cannot be determined.
2. Children reached our hospital after attending some local hospital, where stomach wash was already given. So, the complete clinical presentation could not be determined.
3. Level of poison in the blood could not be determined in all cases.

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