

Analysis of the Profile and Outcome of Ingested Poisoning Cases in Pediatric Intensive Care Unit of a Rural Medical College Hospital

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Abstract

Background: One of the common causes of admissions in pediatric intensive care unit is ingestion of harmful substances, which is more common in toddler and preschool age. Recently, with the harmful impact of social media and change in family environments, deliberate consumption of poisoning agents is seen in adolescents.

Objectives: The aim of this study is to analyze the profile and outcome of children admitted with a history of ingestion of poisoning in a rural medical college hospital.

Materials and Methods: Children admitted with a history of consumption of poisoning agents over 1 year from January 2015 to December 2015.

Results: Out of 134 children admitted, majority belongs to toddler age group which amounts to 52.99%. Among 134 children, 71 (52.99%) were male and 63 (47.01%) were female. A total of 25 children had consumed kerosene which is the common agent in our study contributing to 18.65% of the cases. The major etiology is accidental (95.52%). Moreover, 121 children (90.29%) recovered completely and mortality percentage is only 2.23%.

Key words: Accidental, Children, Kerosene, Poisoning, Rural medical college hospital

INTRODUCTION

Poison is any agent of self-injury absorbed into the system through epithelial surfaces. Accidents, poisoning, vehicular trauma, and falls are an important cause of childhood morbidity and mortality. Toddlers are especially predisposed as they are mobile, inquisitive and cannot differentiate between harmful and harmless things. These harmful products are usually familiar, visually appealing in glossy containers, and sometimes even tasty to children.¹

Poisoning in children is predominantly accidental than adults and accounts for 1-6% of bed occupancy in pediatric hospitals

and 3.9% in pediatric intensive care unit in India.²⁻⁴ Recently, among adolescents, poisoning is increasingly self-inflicted.⁵ Poisoning is the second most common cause of injury resulting in the hospitalization of children under the age of 5 years.⁶

High incidence of poisoning in toddlers and preschool children is a direct consequence of developmental stage of the child. As infants start to mobilize easily around 1 year of age, their human instinct leads them into exploring the surroundings and putting the objects into his mouth. By the age of 2½-3 years, the children's motor development makes themselves vulnerable for exposure to potentially noxious things. Incidence of accidental poisoning decreases after 4 years of age as the child gets more selective in choosing objects for mouthing and ingestion.

Male children outnumber female because of their greater activity and tendency of exploration of the environment.

The incidence is also higher among children from lower socioeconomic groups due to poor storage facilities of

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household products and greater accessibility of children to those potentially harmful things.⁷ Incidence is also higher in rural population due to the use of pesticides in agricultural purpose and poor storage facilities of such pesticide.⁷ Incidence of kerosene poisoning is common in rural and slum population because in summer months, there is frequent power cut and also some households may not have electric connection. Due to curiosity and easy accessibility, children often drink kerosene taking it for water. In poor socioeconomic setup, it is not possible to store kerosene in child-proof pack. Household products, rather than pharmaceuticals, are now implicated in the majority of pediatric poisonings.^{2,5,8}

These accidents are preventable because the main reasons for such incidents are a lack of knowledge, awareness, and adult supervision. The cause of pediatric poisonings varies in different age groups, and hence, preventive strategies should be planned accordingly.

The objective of this study is to analyze the pattern and outcome of childhood poisoning under the age of 12 years in a rural medical college hospital in India to characterize the problem of acute pediatric poisoning.

MATERIALS AND METHODS

Study Center

This study was conducted in the pediatric intensive care unit of a rural medical college hospital which is equipped with 2 ventilators, 1 high-flow heated, humidified nasal cannula machine, infusion and syringe pumps, and multipara monitors with 24 h monitoring by one assistant professor, one senior resident, one junior resident, and two staff nurses.

Sampling

This was the retrospective study conducted for 1 year from January 2015 to December 2015. The data were compiled from the information entered in pediatric intensive care unit as admission register, nominal registers, and referral registers. All the children with the history of consumption of harmful or unknown substances were included in the study. All were admitted initially in pediatric intensive care unit for treatment and continuous monitoring. The parameters analyzed were age, sex, agent consumed, etiology, and outcome of the act and treatment. The results were analyzed in tabular columns.

RESULTS

A total of 4331 children were admitted in the pediatric ward during our study of 1 year between January 2015

and December 2015. Among them, 134 had consumed alleged poisoning agents contributing to 3.09% of the total admissions during study duration (Table 1).

Out of 134 children who had been admitted with the alleged history of consumption of either harmful poisoning agents or unknown stuffs in pediatric intensive care unit, increased number was noted in the months of March and December (Table 2).

Table 1: Burden of poisoning cases among total admissions for 1 year

| Period | Total number of admissions | Total number of poisoning cases (%) |
|-------------------------------|----------------------------|-------------------------------------|
| January 2015 to December 2015 | 4331 | 134 (3.09) |

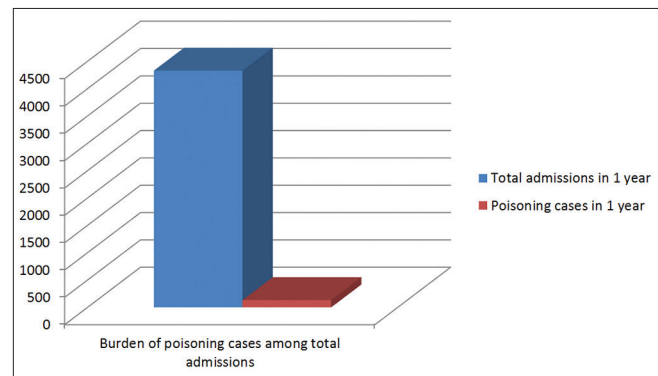
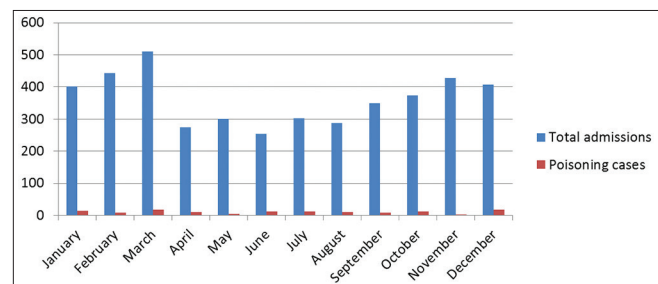


Table 2: Month-wise burden of poisoning cases during the study

| Month | Number of total admissions | Number of poisoning cases |
|-----------|----------------------------|---------------------------|
| January | 401 | 15 |
| February | 442 | 8 |
| March | 510 | 18 |
| April | 274 | 11 |
| May | 300 | 5 |
| June | 254 | 12 |
| July | 302 | 13 |
| August | 288 | 11 |
| September | 350 | 9 |
| October | 374 | 12 |
| November | 428 | 2 |
| December | 408 | 18 |
| Total | 4331 | 134 |



On analyzing the age-wise distribution of cases, we found that majority of the children were toddlers who make 52.99% of the cases. Nearly 7.46% were infants, 14.92% belong to preschool age, and 24.62% were in school age (Table 3).

In our study, 71 males and 63 females had consumed harmful substances contributing to 52.99% and 47.01%, respectively (Table 4).

Among the various agents consumed, majority was kerosene. A total of 25 children had consumed kerosene

Table 3: Age-wise distribution of poisoning cases

| Age group | Age range (years) | n (%) |
|------------|-------------------|------------|
| Infancy | <1 | 10 (7.46) |
| Toddler | 1-3 | 71 (52.99) |
| Preschool | 3-6 | 20 (14.92) |
| School age | 6-12 | 33 (24.62) |

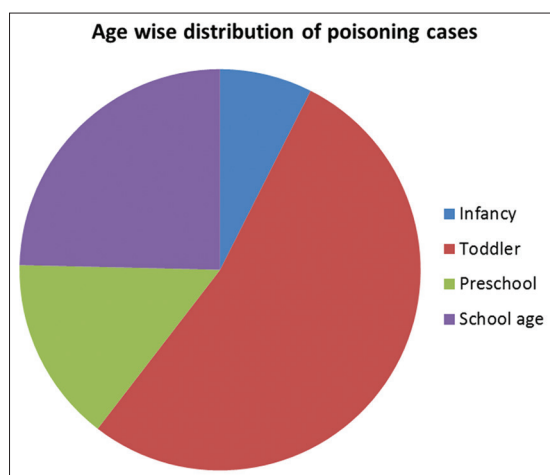
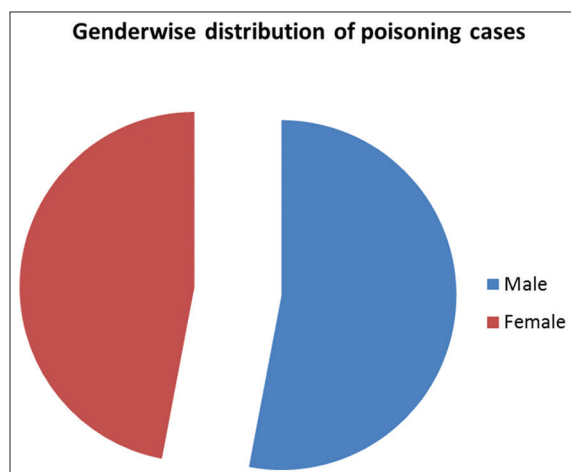


Table 4: Gender-wise distribution of poisoning cases

| Total cases | Male (%) | Female (%) |
|-------------|------------|------------|
| 134 | 71 (52.99) | 63 (47.01) |



that makes 18.65% of the poisoning burden and toddlers were the major victims. The next common agents consumed were organophosphorus compounds, thinner, and ant killer agents contributing 11.19%, 10.44%, and 9.70% of the total poisoning cases, respectively (Tables 5 and 6).

Coming to the etiology behind the consumption of the listed substances, mostly it is accidental consumption amounting to 95.52% of cases. Totally 3 children who belong to early adolescent groups had consumed with suicidal intent, and of 3 children, one among them an infant, one in preschool age, and one in school age had been given the poison by mother with homicidal intent. Agents used for suicide were organophosphorus compound, lice killer, and rat killer paste. Among the homicidal cases, 2 were given aluminum phosphide and 1 was given organophosphorus compound. Suicidal and homicidal etiology each contributes to 2.23% of the poisoning cases (Table 7).

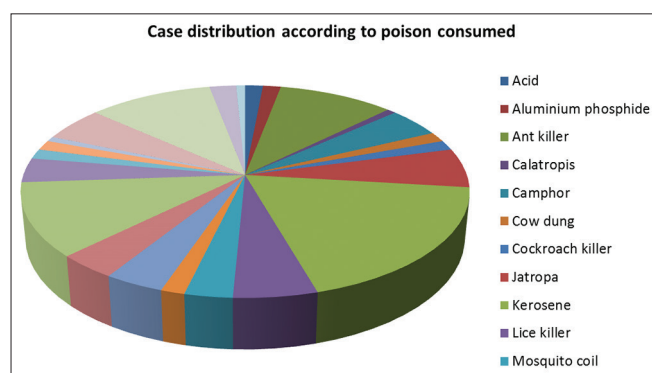
There were 3 children (2.23%) who unfortunately died due to poisoning. Among the 3, two had been given aluminum phosphide by the mother and they stayed only for 3 h. Another one was a 5-year-old female child who had accidentally consumed a very potent organophosphorus compound. A total of 9 cases (6.71%) absconded and final outcome could not be documented with certainty. Totally 121 children (90.29) had been discharged successfully after treatment and a careful observation period of 1 week. One child who had accidentally consumed acid had been

Table 5: Case distribution according to consumed poison

| Agent | Infant | Toddler | Preschool age | School age | Total age |
|--------------------|--------|---------|---------------|------------|-----------|
| Acid | | | 2 | | 2 |
| Aluminum phosphide | | | 1 | 1 | 2 |
| Ant killer | 3 | 4 | 1 | 5 | 13 |
| Calotropis | | 1 | | | 1 |
| Camphor | 2 | 3 | 1 | | 6 |
| Cow dung | | 1 | 1 | | 2 |
| Cockroach killer | | 2 | | | 2 |
| Jatropha | | 1 | 1 | 6 | 8 |
| Kerosene | | 19 | 3 | 3 | 25 |
| Lice killer | | 4 | 1 | 2 | 7 |
| Mosquito coil | 1 | 3 | | | 4 |
| Mosquito repellent | 1 | 1 | | | 2 |
| Mushroom | | | 2 | 3 | 5 |
| Oleander | | | | 5 | 5 |
| Organophosphorus | 1 | 6 | 4 | 4 | 15 |
| Rat killer | 1 | 2 | | 2 | 5 |
| Shrub leaf | | 2 | | | 2 |
| Soap oil | 1 | 1 | | | 2 |
| Sulfur | | 1 | | | 1 |
| Tablets | | 6 | | 1 | 7 |
| Thinner | | 10 | 3 | 1 | 14 |
| Unknown | | 3 | | | 3 |
| Varnish | | 1 | | | 1 |
| Total | 10 | 71 | 20 | 33 | 134 |

Table 6: Case distribution according to poison consumed

| Agent | Total (%) |
|--------------------|------------|
| Acid | 2 (1.49) |
| Aluminum phosphide | 2 (1.49) |
| Ant killer | 13 (9.70) |
| Calotropis | 1 (0.74) |
| Camphor | 6 (4.47) |
| Cow dung | 2 (1.49) |
| Cockroach killer | 2 (1.49) |
| Jatropha | 8 (5.97) |
| Kerosene | 25 (18.65) |
| Lice killer | 7 (5.22) |
| Mosquito coil | 4 (2.98) |
| Mosquito repellent | 2 (1.49) |
| Mushroom | 5 (3.73) |
| Oleander | 5 (3.73) |
| Organophosphorus | 15 (11.19) |
| Rat killer | 5 (3.73) |
| Shrub leaf | 2 (1.49) |
| Soap oil | 2 (1.49) |
| Sulfur | 1 (0.74) |
| Tablets | 7 (5.22) |
| Thinner | 14 (10.44) |
| Unknown | 3 (2.23) |
| Varnish | 1 (0.74) |
| Total | 134 |



referred to higher tertiary care center as she had developed strictures after initial stabilization and symptomatic treatment (Table 8).

DISCUSSION

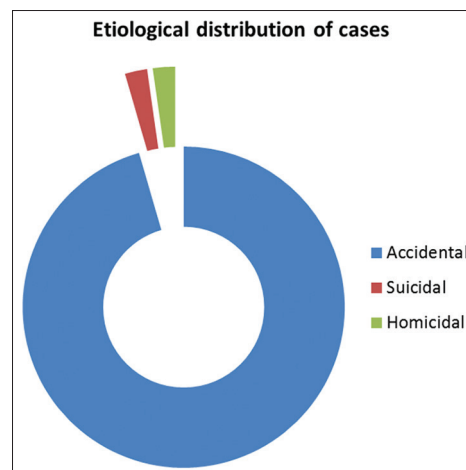
In our study, the burden of poisoning cases was 3.09% among the total admissions during 1 year.

Mandal *et al.* had reported 89 cases of poisoning during 1 year, constituting 1% of all pediatrics admission.⁹ Jadhav *et al.*, in her study of pediatric poison profile during a period of 18 months, had reported 50 cases of poisoning among 3700 admissions.¹⁰ This shows the burden of poisoning is more in rural medical college hospitals like ours.

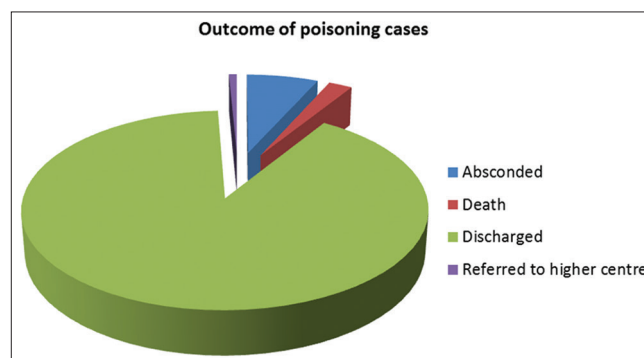
In our study, males ($n = 71$, 52.99%) outnumbered females ($n = 63$, 47.01%).

Table 7: Etiological distribution of cases

| Etiology | Accidental (%) | Suicidal (%) | Homicidal (%) |
|-----------------|----------------|--------------|---------------|
| Number of cases | 128 (95.52) | 3 (2.23) | 3 (2.23) |

**Table 8: Outcome of poisoning cases**

| Outcome | Number of cases |
|---------------------------|-----------------|
| Absconded | 9 (6.71) |
| Death | 3 (2.23) |
| Discharged | 121 (90.29) |
| Referred to higher center | 1 (0.74) |
| Total | 134 |



Devaranavadagi *et al.* had reported a slight female preponderance that out of 38 cases of poisoning, 16 (42%) are male, and 22 (58%) are female.¹¹ Jadhav *et al.* states that according to her study, incidence of poisoning was more common in males (72%), almost 3 times those in females (28%). Statistically, also, this association was found to be significant ($P = 0.003$).¹⁰ In Mandal *et al.* study, 57 cases were male (64.00%; $n = 89$) and 32 were female (38.00%; $n = 89$).⁹

Analysis according to the age of the children involved, our study shows that majority are toddlers ($n = 71$, 52.99%) between 1 and 3 years of age. This fact is supported by Madal *et al.* who reported that out of 89 cases, 62 (69.66%) were between 1 and 3 years.⁹ Jadhav *et al.* had observed

that a maximum number of children (84%) belonged to group 1-5 years age followed by 14% in the age group 5-10 years.¹⁰ Roy *et al.* had reported that 146 children out of 195 admitted during 1 year due to poisoning were below 5 years of age.¹²

In our study the common agent consumed is Kerosene, being consumed by 25 children (18.65%).

Roy *et al.* reported that the most common form of poisoning was due to ingestion of medicine ($n = 34$, 17%). Thyroxine was the most common medicine (21%) consumed, followed by phenytoin ($n = 7$, 15%) and benzodiazepines ($n = 5$, 12%).¹² In our study, only 7 had been admitted with consumption of tablets that makes 5.22%. In Jadhav *et al.*'s study, hydrocarbon poisoning (kerosene) was the most common type of poisoning accounting for 32% of total cases followed by insecticide poisoning in 10% of cases correlating with our study results.¹⁰ In the report by Mandal *et al.*, 39 (43.8%) cases out of 89 were organophosphorus poisoning and 22 (24.7%) cases were due to ingestion of hydrocarbon product.⁹

In our study, 95.52% ($n = 128$) had consumed the harmful substances accidentally. In Mandal *et al.*'s study, all poisoning cases ($n = 89$) were accidental in nature by substances within easy reach of the children.⁹ Jadhav *et al.* stated that most of the cases (94%) were due to accidental ingestion of the concerned agent.¹⁰ According to analysis by Aggarwal *et al.*, all poisoning episodes were either suicidal (38, 46.9%) or accidental (43, 53.1%) and none were homicidal.⁶

In our study, the mortality percentage was 2.23 and majority was discharged successfully. Roy *et al.* study revealed that out of 195, about 79% ($n = 154$) of the children with poisoning were discharged and 19% of children ($n = 37$) left the hospital without any intimation. Death occurred in four (2%) cases ($n = 4$) – mostly due to the ingestion of unknown substance.¹² Mandal *et al.* study reported that number of death was 6 (6.67%) and that of survival was 83 (93.25%) giving a $P = <0.0001$ which is statistically very significant.⁹ Devaranavadagi *et al.*¹¹ had documented that out of 38 cases of poisoning, 2 cases (5.2%) died both due to aluminum phosphide poisoning similar to that in our study, where 2 among the 3 deaths were due to aluminum phosphide stressing the vigorous killing potency of the agent.

CONCLUSION

Accidental poisoning is common among toddlers, and suicidal poisoning is rising among the early adolescents. Lack of parental care, influence of social media, and peer pressure can be attributed to this emerging rise of suicides among adolescents. Unconditional parental love and proper moral classes by teachers can prevent this. Parents should be educated through newspapers, advertisements, and media about the accidental exposure and curious instincts of toddlers and also measure to prevent the accidental poisoning among toddlers. Moreover, for medical professionals, it should be remembered that high index of suspicion is required for identification of poisoning. A history of poison ingestion should be thought and sought whenever any hyperacute onset of symptoms occurs in an apparently healthy child.

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