

Original Research Article

How safe are our children in our own homes? accidental ingestion in children: a 6 year retrospective study from a tertiary care centre

Sujay Kumar Earan, Revathi Krishnakumar*, Sivaraman Sangili,
Arulkumaran Arunagirinathan, Duvvur Preethika Reddy, Uma Maheshwari R.

Department of Pediatrics, Sri Manakula Vinayagar Medical College and Hospital, Puducherry, India

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*Correspondence:

Dr. Revathi Krishnakumar,

E-mail: revathikrishnakumar.1990@gmail.com

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ABSTRACT

Background: According to the World Health statistics, in 2016 more than 100000 deaths were caused due to unintentional poisonings. Children are vulnerable due to their smaller body surface area, an inherent behaviour of negation, curiosity in exploring their surroundings, their initial phallic stage where they tend to put any objects they come across into their mouth.

Methods: This study is a hospital based retrospective observational study where the records of all the children admitted due to poisoning, accidental or intentional from June 2012 to November 2018 were reviewed. All the children admitted due to food poisoning and idiosyncratic drug reactions were excluded from the study.

Results: A total of 203 cases of accidental ingestion were admitted during the study period, of which the majority of the patients were male children. The age group varied from 5 months to 14 years. Majority of the accidental ingestions were due to kerosene (108), followed by insecticides (25) and cleaning agents (20).

Conclusions: Poisoning in young children is unintentional and accidental; hence the introduction of safe child resistant containers should be encouraged in storing harmful chemicals. Knowledge about the chemicals, awareness about their hazardous effects and education of the care givers about safe storage would be the first step in the prevention of accidental ingestion. Establishment of a reporting system from all the health care centres and establishment of poison information system at all the levels is the need of the hour.

Keywords: Kerosene, Pediatric, Poisoning, Prevention

INTRODUCTION

Poison is defined by WHO as a substance that could cause harm to a living being, which could either be a result of bodily contact e.g., caustic, or due to absorption following ingestion, inhalation, or injection.¹ According to the World Health statistics, more than 100,000 deaths in 2016 were due to unintentional poisonings. In the same year, WHO data states that unintentional poisoning in children less than 5 years caused more than 23,000 deaths.^{2,3} Children are especially vulnerable to hazardous household chemicals. Their smaller body surface area, inherent negation behaviour, curiosity to explore their

surroundings, their initial phallic stage where they tend to put any objects they can find in their mouths, all these reasons require caregivers to be wary. Unsupervised and unattended children are most prone to the risk of accidental ingestion of toxic chemicals kept in the house. Acute poisoning from pesticides could often be fatal to children.

The aetiology of poisoning and the type of agents vary not only with geographical area, but also with time. As new chemicals and products are discovered every day, they are introduced into markets for a variety of purposes. The type and severity of poisoning also depend on

different factors, namely accessibility of the substance to the children, education, socioeconomic status, and even prevailing local customs and beliefs.⁴

METHODS

The study was conducted in the Department of Pediatrics at Sri Manakula Vinayagar Medical College and Hospital, Puducherry, South India, which is a teaching institute and a tertiary care centre that caters to the population of surrounding rural and semi urban areas. This was a hospital based retrospective observational study.

Inclusion criteria

- All children aged between 1 month and 14 years, admitted due to poisoning, accidental or intentional, from June 2012 to November 2018.

Exclusion criteria

- All the children admitted due to food poisoning and idiosyncratic drug reactions were excluded from the study.

The case records of all the children satisfying the eligibility criteria were reviewed and data was collected.

Statistical analysis

Age of the child, sex, socio-demographic details, and type of poisoning, storage of the involved substance, clinical features and complications were noted.

Data entry was done by using Epi info software (7.2.0). Statistical analysis was done by using SPSS version 24.0 for describing the variables. Descriptive analysis was done for the variables. The children were categorised into four groups: 0-1 year, 1-5 years, 6-10 years and 10-14 years. Mean and standard deviation was calculated for

quantitative variables like age and duration of hospital stay.

RESULTS

During the study period a total of 203 cases of poisoning were admitted. Male preponderance was noted in present study, 118 male and 85 female children were admitted due to various poisoning during the study period.

While majority of the poisoning were admitted due to accidental poisoning (197), 6 cases were admitted due to intentional poisoning by the children.

The distribution of different type of poisoning has been depicted in Figure 1, majority of the cases were admitted due to kerosene poisoning 108 (53.2%) which was followed by insecticides 25 (12.3%) and poisoning involving household cleaning agents 20 (9.8%). 39 cases were admitted due to poisoning involving other agents, namely camphor ingestion, disc battery ingestion (2 cases), paint thinner, nail enamel remover solution and other solutions used in beauty products.

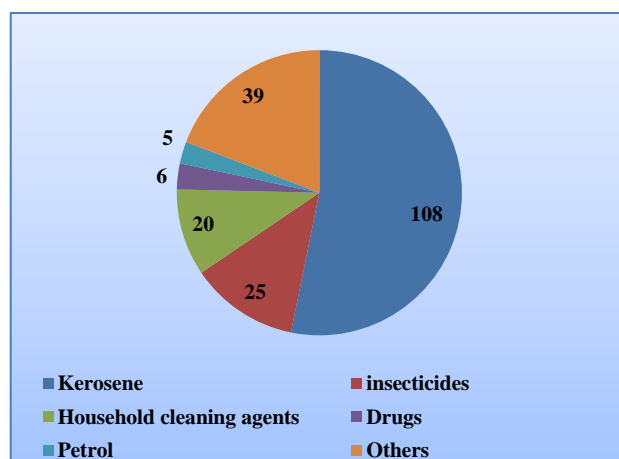


Figure 1: Distribution of type of poisoning.

Table 1: Distribution of children based on age and type of poisoning.

Age	Kerosene	Insecticides	Household cleaning agents	Drugs	Petrol	Others
0-1 year	40	10	3	2	1	11
1-5 years	54	9	16	3	4	17
6-10 years	11	3	1	1	0	6
>10 years	3	3	0	0	0	5

Table 2: Association between poisoning and duration of stay.

Duration	Kerosene	Insecticide	Household cleaning agents	Drugs	Petrol	Others
0-1 day	1	2	1	1	0	1
1-2 days	7	2	1	2	0	7
2-7 days	95	21	17	3	5	28
>7days	5	0	1	0	0	3

Table 3: Distribution of poisoning based on season.

Season	Kerosene	Insecticide	Household cleaning agents	Drugs	Petrol	Others
Summer (March to June)	47	9	5	5	4	15
Rainy (July to October)	33	7	7	1	0	14
Winter (November to February)	28	9	8	0	1	10

The age group of the children admitted were ranging from 5 months to 14 years, the mean age being 35.26 months. Maximum number of children were admitted in the age group of 1-5 years 103 (50.7%), followed by infants i.e. 0-1 year 67 cases (33%). Table 1 describes the distribution of children according to age group and the type of poisoning.

While 6 of the children who were admitted were discharged within 24 hours after a period of observation as they were asymptomatic and hemodynamic ally stable, 9 children were critically ill requiring intensive care monitoring and took more than 7 days to recover. Most of the children required 2-7 days of admission to stabilise. The mean duration of stay was 4.8 days with a standard deviation of ± 1.85 days. Table 2 describes the duration of stay for different types of poisoning.

Table 3 depicts the trend of various poisonings based on season. No significant variation was noted in present study based on different seasons. While more number of cases i.e. 85 (41.8%) were admitted during summer (March to June), 62 (30.5%) and 56 (27.5%) cases were admitted in the rainy season (July to October) and winter season (November to February) respectively.

DISCUSSION

In accordance with other studies, authors also found that boys were more prone to accidental poisoning compared to girls.⁴⁻⁶ The youngest children are the ones who are at most risk.⁷ As per the Annual report of the National Poison Data System (NPDS) of all the poisonings that occur in children 50% of them are observed in children less than 6 years.⁸ In present study 83% of the poisonings occurred in children less than 5 years.

Many studies reported that even age of the child has a bearing on the type of poisoning.⁹ Younger children are prone to poisoning due to non-pharmacological common household substances, which are most commonly stored in easily accessible containers on the and kept on the floor.¹⁰ Poisoning due to pharmacological agents are commonly observed in older children and adolescents.

The type of agents responsible for poisoning differs from one geographical region to the other. The most common agents responsible for poisoning in developed countries are cosmetics, cleaning agents, medications used as analgesics and antipyretics. The common agents responsible for poisoning in developing countries are

kerosene, pesticides and paraffin.¹¹ This could be explained by the fact that in the developing countries there is a lack of regulation in their supply and their easy availability.¹²

Most accidental ingestion cases were due to household products used in our everyday life. Among all the substances of accidental ingestion, kerosene was reported to be the most commonly involved agent.^{13,14} Kerosene is a hydrocarbon compound, most commonly used as a cooking fuel in rural areas. It is also used in lamps wherever there no or inadequate supply of electricity. In most of the cases it was stored in containers that are easily and commonly found at home such as empty mineral water bottles and soft drinks bottles. Young children mistake it for either water or soft drinks and consume it accidentally. Aspiration of kerosene predominantly causes respiratory complications. Symptoms appear within 30 minutes of aspiration and can increase in the next 48 hours. It would take 2 days to 2 weeks for the symptoms to subside.

Of 108 cases who were admitted due to kerosene poisoning 95 of them required a hospital stay of 2-7 days due to the severity of symptoms. Hence kerosene poisoning which is more commonly seen in developing countries is one of the preventable causes of mortality and morbidity.^{15,16} In rural areas and farms pesticides containing toxic chemicals are used extensively for protection of crops. Insecticides and rodenticides are also used to control pests at home. Low socioeconomic status, limited or no education, lack of parental knowledge about the dangers of the stored substance, unsafe and negligent storage in easily accessible places, and unsafe disposal of the highly toxic chemicals are the main reasons for acute poisoning among children.

The symptoms of ingestion of these toxic substances vary from being asymptomatic to burning sensation, irritation, nausea, vomiting, and difficulty in breathing and altered sensorium. All efforts must be made by caretakers to identify the substance-more often than not, the substance ingested can be identified. Once the ingested substance is identified, its constituents and dosage per kilogram of body weight should be noted. This helps in assessing the severity of the condition, as well as in the management.

More than 70% of the children belong to a low socio-economic background. Although the mode varies, accidental poisoning is present at all levels of socio-economic strata. The reason for decreased incidence in

families from middle and high socio-economic status may be due to comparatively better surroundings, cleaner living conditions, better knowledge and understanding of the hazardous chemicals and safer storage practices.

Most accidental ingestion cases are due to improper storage practices. It is observed that insecticides, cleaning products, and kerosene were stored in open shelves, or on the floor where they are easily accessible to children. They are rarely stored in locked cabinets which are the best practice.

Poisoning in young children is unintentional and accidental. This is why child safe containers only should be used for strong harmful chemicals. Knowledge about chemicals, awareness about their hazardous effects and education of caregivers about safe storage and preventive measures would be the first step in the prevention of accidental ingestion. There should be regular and strong campaigns to raise awareness about this small yet significant topic. Assessing the compliance of caregivers is equally important in addressing the issue.

A study by Singhi et al reported admissions of 217 children due to poisoning from a tertiary care centre in north India during 1980 to 1989, for more than 8 years.⁴ Even today, after nearly 3 decades, the situation can be said to have worsened. At best, it has remained the same. Some other reasons for this increase in numbers may be a higher rate of reporting and seeking medical help from the parents, a trend of change in behaviour of the children, an increase in the number of chemical agents used in a common Indian household and their easy accessibility to the children.

Mothers and caregivers should be regularly counselled at birth and on routine follow-up in the outpatient clinics regarding safe storage of various chemicals at home. This should become a part of routine practice at all health care centres. Health education programmes in rural areas and also via media should be undertaken.

CONCLUSION

Present study reveals a pattern of poisoning based on the patients visiting the hospital for admissions and care which represents the tip of the iceberg. However, it should be noted that most of the poisoning that occur in communities ranging from very mild and negligible symptoms and fatal ones go unreported especially from the rural areas. Community surveillance is necessary to include these unreported cases, to assess the burden due to poisoning and to note any specific pattern of poisoning according to demographic area. Establishment of a reporting system from all the health care centres and establishment of poison information system at all the levels is the need of the hour. This would help in undertaking preventive measures and to review the health policies accordingly.

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REFERENCES

1. World Health Organization, Poisons. World Health Organization. World Health Organization; 2017. Available at: <http://www.searo.who.int/india/topics/poisons/en/>.
2. GH0 | World Health Statistics data visualizations dashboard | Unintentional poisoning. World Health Organization. World Health Organization. Available at: <http://apps.who.int/gho/data/node.sdg.3-9-viz-3?lang=en>.
3. 10 facts on children's environmental health. World Health Organization. 2018. Available at: https://www.who.int/features/factfiles/children_environmental_health/en/
4. Singh S, Singhi S, Sood NK, Kumar L, Walia BN. Changing pattern of childhood poisoning (1970-1989): experience of a large north Indian hospital. Indian Pediatr. 1995;32:331.
5. Singh A, Choudhary SR. Accidental poisoning in children. Indian Pediatr. 1996;33:39-40.
6. Paswan W, Singh BB. Analysis the clinical profile of children admitted with kerosene poisoning in a tertiary care medical college hospital. Cough. 2017;86:82.
7. Azab SM, Hirshon JM, Hayes BD, El-Setouhy M, Smith GS, Sakr ML, et al. Epidemiology of acute poisoning in children presenting to the poisoning treatment center at Ain Shams University in Cairo, Egypt, 2009-2013. Clinical Toxicol. 2016;54(1):20-6.
8. Mowry JB, Spyker DA, Cantilena LR Jr, Bailey JE, Ford M. 2012 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 30th Annual Report. Clin Toxicol (Phila). 2013;51(10):949-1229.
9. Schmertmann M, Williamson A, Black D. Unintentional poisoning in young children: does developmental stage predict the type of substance accessed and ingested? Child Care Health Dev. 2014;40(1):50-9.
10. Bentur Y, Obchinnikov ND, Cahana A, Kovler N, Bloom-Krasik A, Lavon O, et al. Pediatric poisonings in Israel: National Poison Center data. Isr Med Assoc J. 2010;12(9):554-9.
11. Meyer S, Eddleston M, Bailey B, Desel H, Gottschling S, Gortner L. Unintentional household

- poisoning in children. *Klin Padiatr*. 2007;219(5):254-70.
12. Eddleston M, Karalliedde L, Buckley N, Fernando R, Hutchinson G, Isbister G, et al. Pesticide poisoning in the developing world-a minimum pesticides list. *Lancet*. 2002;360(9340):1163-7.
 13. Babar MI, Bhait RA, Cheema ME. Kerosene oil poisoning in children. *J Coll Physic Surg Pak*. 2002;12:472-6.
 14. Abbas SK, Tikmani SS, Siddiqui NT. Accidental poisoning in children. *Mercury*. 2012;3:7-10.
 15. Tshiamo W. Paraffin (kerosene) poisoning in under-five children: A problem of developing countries. *Int J Nurs Pract*. 2009;15(3):140-4.
 16. Meyer S, Eddleston M, Bailey B, Desel H, Gottschling S, Gortner L. Unintentional household poisoning in children. *Klinische Pädiatrie*. 2007;219(05):254-70.

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