p-ISSN: 0973-3558, e-ISSN: 0973-3566

Original Research Article

Poisoning Cases in Bangalore South : A Retrospective One-Year Study from a Tertiary Care Poison Information Centre

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How to cite this article : Sylia Sara Thomas, Aishwarya C, Rabiya Shaikh Subhanali, Poisoning Cases in Bangalore South : A Retrospective One-Year Study from a Tertiary Care Poison Information Centre

J Ind. Soc. Toxicolo 2025;21(1):16-22

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Abstract :

Objective: To analyse the epidemiological profile, classes of poisoning agents, and manner of poisoning incidents reported to an early-stage Poison Information Centre (PIC)Bangalore South District, for targeted public health interventions.

Methods: A retrospective descriptive study analysed 197 poisoning cases reported to a tertiary care PIC (September 2023 - September 2024). Data extracted from telephone-based consultation logs included patient demographics, class of poisoning agent, and reported intent. Descriptive statistics (frequencies, percentages) were used. Fatal outcomes documented via follow-up calls.

Results: Among 197 cases, 52.7% were female. Age groups 21–30 years (25.4%) and 11–20 years (24.9%) were most affected. Intent was largely undetermined (47.2%, n=93); however, intentional cases (36.5%, n=72) showed strong female preponderance. Accidental poisonings accounted for 16.2% (n=32). Pesticides predominated (43.7%, n=86), notably Pyrethroids (n=33) and Organophosphates (n=15). Unknown compounds (26.9%, n=53) and pharmaceutical agents (13.7%, n=27) were also significant. Paediatric cases (≤17 years) constituted 29.4% (n=58), mainly involving pesticides (n=18) and unknown substances (n=15). Thirteen fatalities (6.6% CFR) recorded, primarily from pesticides (n=7) and unknown compounds (n=4); an accidental atropine fatality involved a 3-year-old.

Conclusion: This early-stage registry highlights intentional self-poisoning with easily accessible pesticides, particularly among young females, as a significant burden in Bangalore South. High undetermined intent and unknown agents, coupled with paediatric vulnerability to accidental exposures, present critical challenges. Findings emphasize an urgent, multi-faceted public health response: integrating enhanced toxicovigilance, targeted prevention, improved clinical/forensic toxicology, and sustained inter-sectoral collaboration to mitigate this crisis.

Keywords: Poisoning; Epidemiology; Pesticides; Self-Poisoning; Poison Information Centres.

Introduction

A poison is any substance capable of causing illness, injury, or death upon contact, ingestion, inhalation, or absorption, by disrupting normal biological functions.[1,2] Poisoning, both accidental and intentional, has become a major public health concern worldwide, contributing significantly to morbidity and mortality.[3] The toxicity of any substance is dose-dependent; exposures may be acute (single or short-term) or chronic (prolonged over months or years).[4]Poison Information Centres (PICs) play

a vital role in preventing and managing poisoning. Functioning within medical facilities, they provide free, expert telephonic advice to healthcare professionals, emergency responders, and the public. Their scope includes exposures to household chemicals, pharmaceuticals, pesticides, plants, animal bites, food poisoning, alcohol, and industrial agents.[5]

Globally, about 3 million acute intoxication cases occur annually, leading to nearly 640,000 deaths. India carries a disproportionately high burden, with agricultural poisonings responsible for over 90% of related deaths. While developed nations report case fatality rates (CFR) of 1–2%, India's CFR may reach 20–30%. Poisoning is the country's fourth leading cause of death, with 5–6 deaths per lakh population annually.[6]Among toxic agents, pesticides are the leading cause in India due to their widespread agricultural and domestic use.[1] Organophosphorus (OP) compounds, particularly common in Southern India, are easily accessible and frequently implicated in suicidal and accidental poisoning. Urbanization has also increased exposure to diverse household, industrial, and pharmaceutical chemicals, adding to the risk of toxic exposures.[7]

This study analyzes data from a newly established PIC in Bangalore South District, Karnataka. The region's blend of agriculture and industry makes a wide range of toxic substances easily available. By retrospectively assessing the epidemiological profile, types of poisoning agents, and intent behind cases reported to this centre, the study aims to generate evidence for targeted public health interventions and improved clinical management in South Bangalore.

Materials and Methods

The present study was conducted as a retrospective, descriptive, record-based analysis of poisoning cases reported to the Poison Information Centre (PIC) attached to a tertiary care hospital in Bangalore South, Karnataka, India. The PIC receives telephonic queries and in-hospital referrals pertaining to suspected or confirmed toxic exposures.The data comprised telephone-based poisoning consultations received at the Poison Information Centre (PIC) between September 2023 and September 2024. A total of 197 poisoning cases were recorded and analyzed.

Inclusion criteria for the study comprised suspected or confirmed poisoning cases across all age groups and both sexes. Cases with insufficient data for primary variables (age, sex, class of poisoning agent, or intent) were excluded from the analysis.During each call, the enquirer was asked for details such as the patient's age, sex, route and manner of exposure, symptoms, any treatment already given, and the specific queries they had. Recommendations were provided after consulting standard toxicology databases and scientific literature. The data were de-identified to ensure patient confidentiality, and only anonymized variables were used for analysis. As the study was retrospective and based on de-identified data, it did not require ethical clearance. As the “time since exposure” variable was unavailable for most cases, it was excluded from analysis. Fatal outcomes were documented based on follow-up calls with the enquirers.

The following variables were included in the dataset: the age and sex of the patient; the class and sub-category of the poison involved; the manner of poisoning (intentional, accidental, or undetermined); and fatal outcomes (from follow-up). Poisoning agents were systematically grouped into five primary classes: pesticides, pharmaceutical agents, household agents, miscellaneous substances, and unknown (where the substance could not be identified). Pesticide cases were further classified based on their functional use (target pest or application) as well as their chemical structure. For pediatric analysis, cases were divided into two age groups: children (≤12 years) and adolescents (13 to 17 years).

Descriptive statistics, including frequencies and percentages, were calculated using Microsoft Excel 365. Graphs and tables were utilized to present the findings, encompassing the age- and gender-wise distribution of poisoning cases, manner of poisoning with gender stratification, distribution of cases and fatalities across poison classes, detailed breakdown of pesticide exposures by both target function and chemical structure, and pediatric poisonings by poison classification and age subgroup.

Results

A total of 197 poisoning cases were reported to the Poison Information Centre and subsequently analysed over the one-year study period (September 2023 to September 2024). The majority were due to oral ingestion of toxic agents. In contrast, a single case involved herbicide exposure via inhalation, representing a less frequently observed route of exposure in the dataset.

Demographic Profile

The demographic analysis revealed a slight female predominance among the reported poisoning cases, with 104 females (52.7%) compared to 93 males (47.2%).

The age distribution of the study population is presented in Figure 1. The highest incidence of poisoning was observed in the 21–30 years age group (n=50, 25.4%), closely followed by the 11–20 years age group (n=49, 24.9%). Together, these two cohorts accounted for approximately half of all reported incidents. Children aged 0–10 years comprised 19 cases (9.6%), while individuals in the 31–40 years category contributed 36 cases (18.3%). The 41–50 and 51–60 years groups accounted for 19 (9.6%) and 11 (5.6%) cases, respectively. Cases involving individuals aged 60 years and above represented the smallest proportion at 13 cases (6.6%).

Manner of Poisoning

The reported intent behind the poisoning incidents was categorized as accidental, intentional, or undetermined, with a stratification by gender is demonstrated in Figure 2. Undetermined intent constituted the largest proportion of cases, accounting for (47.2%) of all poisonings, with a higher frequency among males (26.9%) compared to females (20.3%).

Intentional poisonings were recorded in (36.5%). This category showed a marked female preponderance, with (24.4%) compared to male (12.2%).

Accidental poisonings were reported in (16.2%), showing an equal distribution across both genders, with same (8.1%) cases.

Classes of Poisoning Agents Involved

The distribution of poisoning cases across broad classes of poisoning agents is summarized in Table 1. Pesticides were the most frequently implicated agents, accounting for 86 cases (43.7%) of all reported incidents. Unknown compounds represented a significant proportion with 53 cases (26.9%), followed by Pharmaceutical Agents in 27 cases (13.7%). Household Agents were involved in 18 cases (9.1%), and Miscellaneous substances constituted the smallest class with 13 cases (6.6%).

Broad category of Pesticides and their subtypes

A detailed breakdown of agrochemical poisoning cases is presented in Table 3, categorized by broad groups and their specific subtypes.

Insecticides were the most frequently reported category, with pyrethroids involved in 33 cases, organophosphates in 15 cases, and miscellaneous insecticides in 3 cases. Rodenticides accounted for 16 cases, including 9 cases of elemental phosphorus (e.g., Ratol paste in combination with Lakshman Rekha) and 7 cases of metal phosphides (e.g., aluminum phosphide and zinc phosphide). Herbicides were involved in 10 cases, comprising 3 cases of glyphosate, 5 cases of paraquat dichloride and 2 cases of unspecified herbicide.

Unspecified agrochemicals, where the specific agent could not be identified, were recorded in 10 cases. Additionally, a distinct category labelled traditional/mixed substances included 2 cases of poisoning due to a mercury-containing Ayurvedic tablet.

Pharmaceutical Agents

Of the 197 total poisoning calls received by the Poison Information Center, a significant portion involved pharmaceutical drugs and other non-agrochemical substances. As detailed in Table 4, these agents were categorized based on their toxicological classification.

The most frequently implicated category was Metabolic & Endocrine Agents, accounting for 7 cases. Variants of Thyroxine supplements were the primary substance in 5 of these instances.

The next most common category was NSAIDs & Analgesics, with a total of 6 reported cases; 4 involved Paracetamol and 2 involved combinations of Aceclofenac and Paracetamol

Agents affecting the Central Nervous System (CNS) were also prominent, with three cases involving Antiepileptics such as Carbamazepine, Levipil, and Phenobarbitone. Additionally, there were two cases of CNS Depressants, specifically Alprazolam. It was noted that Phenobarbitone was present in both CNS categories, reflecting its pharmacological action.

Other categories included Antihistamines, Anticholinergics, Migraine & Vertigo Drugs, Alcohol Dependence Therapy agents, and Vitamin Supplements, each accounted for a single incident. Finally, exposures to veterinary products, mixed substances, or incomplete reports made up the remaining cases.

Pediatric Poisoning Profile

Among the 197 poisoning cases, 58 cases (29.4%) occurred in the pediatric population. This group was further sub-divided into 37 adolescents (13–17 years) and 21 children (≤12 years). The distribution of poisoning cases within these pediatric age groups by the class of substance is summarized in Figure 3.

Pesticides were the most frequently involved agents in the pediatric group, accounting for 18 cases (13 among adolescents, 5 among children). Unknown substances were the second most common, with 15 cases (13 adolescent, 2 child). Pharmaceutical agents were implicated in 11 cases (7 adolescents, 4 children).

Miscellaneous agents were reported in 10 cases (3 adolescents, 7 children), while Household agents were the least frequent, with 4 cases (1 adolescent, 3 children). Overall, adolescents accounted for a higher number of poisoning cases across all categories compared to younger children.

Fatal Outcomes

During the one-year study period, 13 fatal poisoning cases were recorded, representing an overall case fatality rate of 6.6% (13/197 cases). The distribution of these fatalities across broad classes of poisoning agents is integrated into figure 4. Pesticides were associated with the highest number of fatalities, accounting for 7 deaths. Unknown compounds were implicated in 4 deaths, while Household Agents and Pharmaceutical Agents each accounted for 1 fatality. No fatalities were recorded for miscellaneous substances.

The specific agents involved in these 13 fatal cases are detailed in Table 2. Organophosphates (3 cases), Aluminium Phosphide (2 cases), and Paraquat (2 cases) were the most frequently identified lethal agents. A concerning number of fatalities (4 cases) were attributed to unknown compounds.

Discussion

This retrospective study provides the first epidemiological profile of poisoning cases reported to a newly established Poison Information Centre (PIC) in Bangalore South. The findings highlight demographic patterns, toxic agents involved, and intent behind exposures, reflecting broader national and global concerns.[1,6]

Demographics and Intent

Young adults aged 11–30 years were most affected, consistent with other Indian and LMIC studies.[8,9] A slight overall female predominance (52.7%) and the higher rate of intentional poisoning among females (24.4% vs. 12.2% in males) suggest important gender-related vulnerabilities, often linked to psychosocial stressors such as domestic violence, marital discord, and untreated mental health conditions.[10,11] Intentional poisonings (36.5%) exceeded accidental exposures, underscoring the ongoing burden of deliberate self-harm in India.[12] Nearly half of cases were of "undetermined" intent (47.2%), a limitation of telephonic reporting and medico-legal records that hinders prevention planning.

Agents Involved

Pesticides dominated (43.7%), reflecting the agrarian nature of the region and national trends.[1,9] High-risk compounds such as pyrethroids, organophosphates, aluminium phosphide, and paraquat were prominent and responsible for most fatalities.[13–16] Their

lethality, coupled with poor regulation, continues to fuel India's high poisoning case fatality rates.

The toxic mechanisms of these pesticides, though well known (e.g., acetylcholinesterase inhibition by organophosphates, phosphine toxicity from aluminium phosphide, oxidative stress from paraquat), emphasize the need for tighter controls and better antidote access. [17–19]A substantial proportion of cases involved unknown compounds (26.9%), including four fatalities. Unidentified agents delay antidote use and worsen outcomes, reflecting both gaps in caller information and limited access to toxicological diagnostics in resource-constrained settings. [20,21] Pharmaceutical agents (13.7%) also contributed significantly, led by thyroxine supplements, paracetamol, and antiepileptics. Easy household availability explains many of these exposures, some accidental and others intentional.[22,23] An accidental atropine fatality in a 3-year-old highlighted the vulnerability of children to even small doses of potent drugs. Household products such as phenol, acids, and solvents added further risk, consistent with national reports.[7]

Pediatric Profile

Children and adolescents comprised nearly one-third of cases. Adolescents were more likely to be involved in intentional poisonings, while younger children suffered accidental exposures to household agents and pesticides. This stresses the need for secure storage and caregiver awareness programs.[24]

Public Health Implications

The study's findings underline the urgent need for multi-sectoral measures: restricting access to highly hazardous pesticides, strengthening toxicovigilance, and integrating PIC data into broader surveillance systems. [25,26] Equally important are community-based mental health services and addressing socio-economic vulnerabilities that drive self-poisoning. [27,28]

Limitations

Data were drawn from early-phase PIC call logs and medico-legal records, which may lack completeness and contribute to "unknown" or "undetermined" categories. Clinical details such as treatment and long-term outcomes were unavailable. Underreporting of poisoning cases in India also means the true burden is likely higher. Nonetheless, these data provide valuable baseline insights for Bangalore South and can inform prevention and clinical practice.

Conclusion

The findings from this early-stage Poison Information Centre registry provide a crucial baseline understanding of poisoning epidemiology in Bangalore South. They unequivocally highlight the significant burden of intentional self-poisoning, predominantly involving easily accessible pesticides, particularly among young females. The persistent challenge posed by unidentified toxic agents and the profound vulnerability of the pediatric population to accidental exposures are also critical concerns demanding immediate attention. The detailed patterns observed, supported by the understanding of the mechanisms of action of key agents, underscore the urgent need for a robust, multi-faceted public health response. This response must integrate enhanced toxicovigilance with targeted prevention strategies, improved clinical and forensic toxicology capacities, and sustained inter-sectoral collaboration to mitigate this preventable public health crisis.

References

1. Mittal C, Singh S, Kumar-MPet al. Toxicoepidemiology of poisoning exhibited in Indian population from 2010 to 2020: a systematic review and meta-analysis. BMJ Open. 2021;11:e045182.
2. Mahajan H, Sharma G. Retrospective study of poisoning cases at a tertiary care hospital in Western Uttar Pradesh. Int. J. Med. Sci. Public Health. 2016;5(1):7-10.
3. Panda BB, Hansda MK, Mishra K, Samantsinghar P. Study of Poisoning Cases in an Indian Tertiary Care Teaching Hospital. J Indian Acad Forensic Med. 2015;37(2):165-8.
4. Sharma A, Pandit V. Importance of Poison Information Center and Role of a Pharmacist in Management of Poisoning. Indian J Pharm Technol Res. 2014;5(1):905-9.
5. Gilbert S, Mohapatra A, Bobst S, editors. Information Resources in Toxicology: Volume-1: Background, Resources, and Tools. 5th ed.

Wexler P, editor-in-chief. San Diego: Academic Press; 2020. ISBN: 978-0128137246.
6. Kumar R, Sheikh NA, Bashar MA, Vasudeva A, Kumar A, Yadav A, Gupta SK. Epidemio-toxicological profile of fatal poisoning cases autopsied at a tertiary care centre of North India. J Family Med Prim Care. 2023 Apr;12(4):701-7.
7. Peshin SS, Gupta YK. Poisoning due to household products: A ten years retrospective analysis of telephone calls to the National Poisons Information Centre, All India Institute of Medical Sciences, New Delhi, India. J Forensic Leg Med. 2018;58:143-8.
8. Gupta S, Narula M, Bhalla A, Dagar P. Socio-demographic profile of acute poisoning cases presenting to a tertiary care centre in Northern India. J Clin Diagn Res. 2016;10(9):FC01-FC04.
9. Singh S, Singh D, Wig N, et al. Suicidal poisoning in adults in Chandigarh, India: an epidemiological study. J Toxicol Clin Toxicol. 1998;36(7):659-63.
10. Patel V, Chatterji S, Chisholm D, et al. Mental health, disease, and poverty in India. Lancet. 2008;372(9642):1001-8.
11. Gururaj G, Isaac MK. Suicides in India: an approach to the problem. Natl Med J India. 2001;14(1):30-3.
12. Das S, Mondal S, Roy S, Chakraborty S. A Study on the Epidemiology of Acute Poisoning in a Tertiary Care Hospital of Eastern India. J Indian Acad Forensic Med. 2020;42(4):254-8.
13. Mohan J, Singh G, Singh S, Aggarwal A, Sharma S. Trends in acute poisoning in a tertiary care hospital in North India: A retrospective study. Indian J Crit Care Med. 2020;24(11):1038-42.
14. Gunasekaran K, Rajaram P. Acute organophosphorus poisoning in children: a tertiary care hospital experience. J Clin Diagn Res. 2017;11(6):SC01-SC04.
15. Aggarwal A, Bhalla A. Current perspectives on pesticide poisoning in India. J Assoc Physicians India. 2015;63(9):62-6.
16. Konar J, Das S. Pesticide poisoning in India: a growing threat. J Family Med Prim Care. 2019;8(5):1611-3.
17. Pillay VV. Textbook of Forensic Medicine & Toxicology. 20th ed. Paras Medical Publisher; 2023.
18. Nelson LS, Howland M, Lewin NA, et al., editors. Goldfrank's Toxicologic Emergencies. 11th ed. McGraw-Hill Education; 2019.
19. Klaassen CD. Casarett& Doull's Toxicology: The Basic Science of Poisons. 9th ed. McGraw-Hill Education; 2019.
20. Balakrishnan R, Thangavelu A. Challenges in managing unidentified poisoning cases in rural India. J Indian Med Assoc. 2010;108(4):230-2.
21. Dhooria S, Dargan PI, Bhatia V, et al. The challenges of toxicology in developing countries. Clin Toxicol (Phila). 2018;56(1):1-10.
22. Sharma S, Sharma V, Singh M, et al. A retrospective study of drug poisoning in a tertiary care hospital of North India. J Forensic Sci Med. 2019;5(2):98-102.
23. Palatty BU, Thomas PV, Shetty V, et al. Accidental poisoning in children less than 5 years: a 10 year data from a tertiary care hospital in Southern India. J Clin Diagn Res. 2014;8(12):FC01-FC03.
24. Garg P, Sharma V, Garg R. Poison information centres: current status and challenges. J Clin Diagn Res. 2013;7(11):2657-61.
25. Suchita S, Gupta YK. Indian poison centres: Current status and future directions. Indian J Pharmacol. 2015;47(1):1-3.
26. Aggarwal R, Goel P, Pathak MK, et al. Role of multi-sectoral approach in prevention and management of acute poisoning. J Clin Diagn Res. 2017;11(10):OC01-OC04.
27. Chisholm D, Sekhar K. The mental health gap in India: an agenda for action. Lancet Glob Health. 2017;5(3):e241-e242.
28. Kumar A, Prakash S. Current scenario of acute poisoning in India: An update. Toxicol Int. 2018;25(1):1-7.

List of Tables and Figures

Table 1: Distribution of poisoning cases by poison class

Poison Category	Number of Cases	Percentage (%)
Unknown compounds	53	26.9
Pesticides	86	43.7
Pharmaceutical agents	27	13.7
Household agents	18	9.1
Miscellaneous	13	6.6

Table 2: Distribution of fatal poisoning cases

Unknown	4
Aluminium Phosphide	2
OP	3
Paraquat	2
Phenyl	1
Atropine	1

Table 3: Detailed breakdown of pesticide-related poisoning by toxicological subtype and examples of agents involved.

Broad Category	Toxicological Subtype	Examples	Frequency
Insecticides	Organophosphates	Chlorpyrifos, Dimethoate, Nuvan, Pirimiphos methyl	15
	Pyrethroids	Deltamethrin, Cypermethrin, Transfluthrin, Lakshman Rekha	33
	Miscellaneous Insecticides	Amitraz, DDT, Emamectin benzoate	3
Rodenticides	Elemental Phosphorus	Ratol paste, combinations with Lakshman Rekha	9
	Metal Phosphides	Aluminium Phosphide, Zinc Phosphide	7
Herbicides	Organophosphonates	Glyphosate, Glypnosal	3
	Bipyridyl Compounds	Paraquat dichloride	5
	Unspecified Herbicide	General herbicide exposures	2
Fungicides	Dithiocarbamates	Kavach powder	1
	Unspecified Fungicide	Fungicide (unnamed)	1
Fertilizers & Related	Nitrogen/Phosphorus-based	Nano Urea, Diammonium Phosphate	2
	Miscellaneous Adjuvants	Gibberellic Acid, Agri-82 (spray adjuvant)	2
	Unspecified Product	Green Max	1
Traditional / Mixed	Mercury-containing Ayurvedic Tab	Zandu Mugdha Raja tablets	2

Table 4: Pharmaceutical and other non-agrochemical poisoning cases (n=27), categorized by toxicological class and representative agents.

Toxicological Category	Substances Included	Frequency
CNS Depressants – Benzodiazepines & Barbiturates	Alprazolam, Phenobarbitone	2
CNS Drugs – Antiepileptics	Carbamazepine, Levipil, Phenobarbitone	3
Cardiovascular Drugs	Amlong, Nikoran	2
Metabolic & Endocrine Agents	Thyronorm / Thyroxine variants (5), Glycomet-GP2, Metformin (2)	7
NSAIDs & Analgesics	Aceclofenac + Paracetamol (2), Paracetamol (4)	6
Antihistamines	Xyzal	1
Anticholinergics	Atropine	1
Migraine & Vertigo Drugs	Sibelium (Flunarizine)	1
Alcohol Dependence Therapy	Disulfiram	1
Vitamin Supplements	Neuronbion Forte	1
Veterinary or Mixed Substances	Veterinary Tablet (unspecified), Quetigress + Insect Repellent	2
Others / Mixed or Incomplete	Levoxy + Disodium Citrate	1

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