



Clinical Audit

# Epidemiology, diagnosis, and management of acute poisoning: A retrospective audit from Kauvery Hospital, Cantonment, Trichy

Johnson. A\*

Group Clinical Pharmacist, Kauvery Hospital, Trichy, Tamil Nadu

\*Correspondence

## Abstract

**Background:** This retrospective analysis presents data from 140 consecutive cases of acute poisoning admitted to Kauvery Hospital, Cantonment (KCN). The study elaborates on poisoning patterns, diagnostic approaches, symptom profiles, antidote use, and management strategies, highlighting agricultural, pharmaceutical, and household toxicology trends. Graphical representations and tabular summaries accompany clinical elaborations of this study.

**Key words:** Epidemiology; Organophosphorus compound (OPC); Demographic profile

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## 1. Introduction

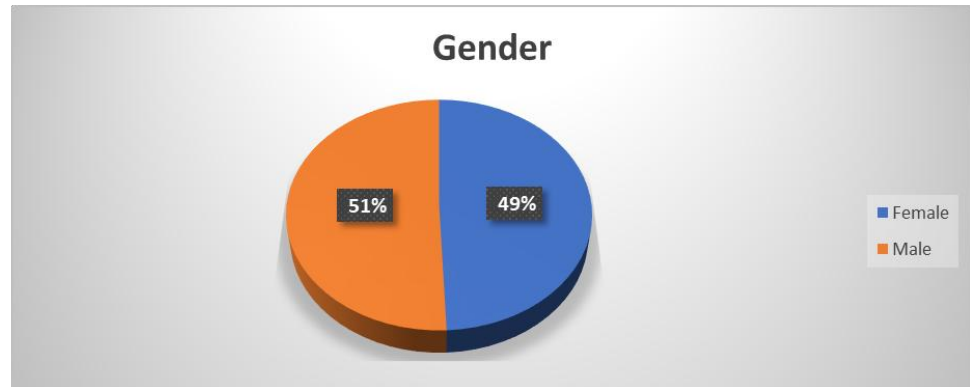
Acute poisoning remains a critical medical emergency in India, marked by diverse toxic agents and variable outcomes. Rural-urban transition, agrochemical availability, and polypharmacy contribute to the case mix in tertiary hospitals. This study aims to provide a comprehensive overview of poisoning cases admitted to KCN, elucidating epidemiology, diagnostic protocols, clinical presentation, antidote deployment, and treatment outcomes.

## 2. Methods

A retrospective review was conducted on 140 acute poisoning cases (from KCN records), capturing demographic, clinical, and therapeutic details. Major categories included herbicide, household chemical, insecticide, organophosphorus compound (OPC), carbamates, Paraquat, plant poisons, Rat killer yellow Phosphorous paste, tablet overdose, and unknown poisonings. Diagnostic, screening, and therapeutic protocols were abstracted from individual case records. The dataset included the types poisoning with outcomes and treatments, which were systematically recorded. The aim of this article is to describe the epidemiology, clinical profile, diagnostic work up, and antidote directed management of these cases.

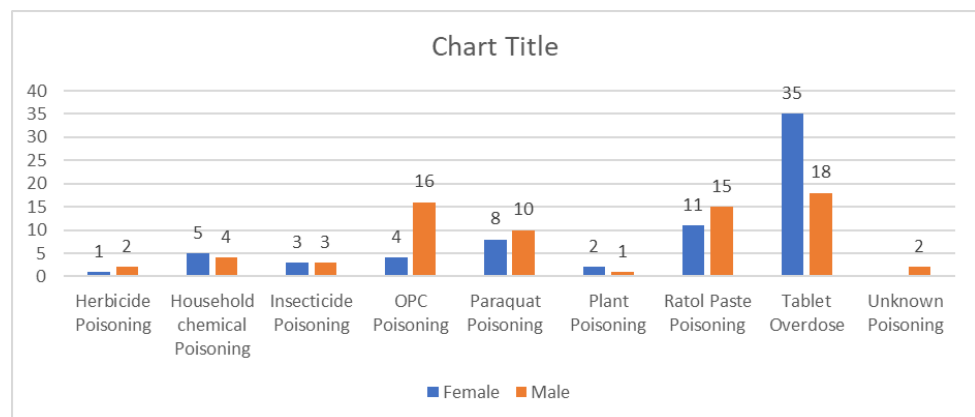
### 3. Results

#### Gender wise distribution



**Fig (1):** Gender wise distribution

Among 140 poisoning cases, 71 (51%) were males and 69 (49%) were females, showing male population slightly higher

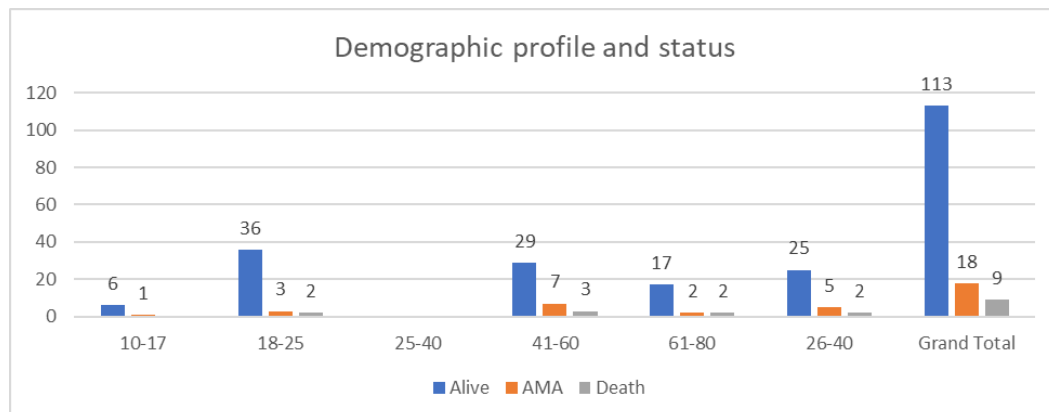


**Fig (2):** Categorized as Diagnosis Vs Gender

OPC and Rat killer yellow phosphorus paste poisoning – highest among males compared with females. These patterns fit with other studies where pesticide and rodenticide exposure are more common in men because of agricultural and outdoor work.

Household chemicals and Tablet overdose, where female counts are similar or little more than males.

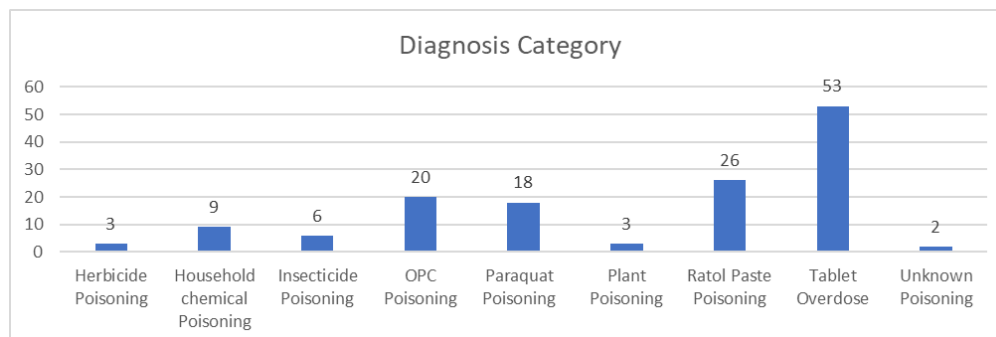
### Demographic profile and status



**Fig (3):** Compared with Status and Age category

The cohort comprised 140 patients, of whom 113 (80.7%) were discharged alive, 18 (12.9%) left against medical advice (AMA), and 9 (6.4%) died during admission. Age distribution showed clustering in young and middle aged adults: 10–17 years (7 cases), 18–25 years (41 cases), 26–40 years (39 cases), 41–60 years (32 cases), and 61–80 years (21 cases), indicating a predominance of poisoning among individuals in productive age groups.

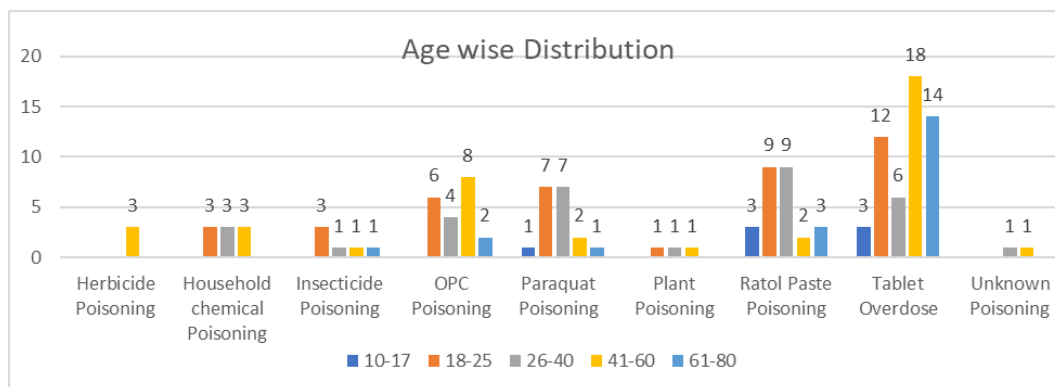
### Diagnosis



**Fig (4):** Diagnosis category

The major diagnostic categories and their total case counts were: herbicide poisoning (3), household chemical poisoning (9), insecticide poisoning (6), OPC poisoning (20), paraquat poisoning (18), plant poisoning (3), Rat killer paste poisoning (26), tablet overdose (53), and unknown poisoning (2). Tablet overdose constituted the largest subgroup (37.9%), followed by Rat killer paste (18.6%), OPC (14.3%), and paraquat (12.9%), highlighting the dual burden of agricultural and pharmaceutical toxicology in this setting.

### Age distribution by diagnosis



**Fig (5):** Age wise Distribution

Graphical representation of diagnosis versus age shows that:

OPC poisoning and paraquat poisoning were most frequent in the 41–60 and 18-25-year age groups, reflecting occupational exposure among agricultural workers and intentional self-harm in adults.

Tablet overdose and Rat killer paste poisoning predominantly affected 41-60 and 26–40-year age groups, correlating with intentional self-harm in young adults.

Pediatric and elderly cases were relatively fewer but were seen across plant, household chemical, and unknown poisonings, indicating accidental exposures at the extremes of age.

#### 4. Diagnostic evaluation and screening

All patients underwent initial triage based assessment including airway, breathing, circulation, disability, and exposure (ABCDE) with focused history regarding substance, dose, route, and time of ingestion. Laboratory investigations typically comprised complete blood count, renal and liver function tests, serum electrolytes, arterial blood gas (ABG), and electrocardiography, with toxin specific tests (e.g., serum cholinesterase levels in OPC poisoning, methemoglobin levels where indicated) obtained when available. In paraquat and rat killer paste poisoning, renal function, liver function, and ABG monitoring were emphasized due to risk of multisystem organ failure. Urine sodium dithionite test was performed to confirm paraquat poisoning and to assess the severity of exposure. Tablet overdose cases were screened with ECG for conduction abnormalities, serum drug levels when available, and mental status examination for co morbid psychiatric illness. Imaging such as chest radiography and focused ultrasonography was performed based on clinical suspicion of aspiration, pulmonary oedema, or internal complications, particularly in paraquat and OPC toxicity.

#### 5. Treatment protocols by diagnosis

A structured diagnosis versus treatment table was used to standardize management across the cohort. Initial measures included stabilization of vital parameters, gastric decontamination (activated charcoal or gastric lavage, when indicated and within recommended time frame), and supportive care with oxygen, IV fluids, and vasopressors as required.

## 6. Management Strategies

Table: Diagnosis vs Treatment

**Table 1:** Diagnosis and antidote/treatment strategies at KCN, Kauvery Hospital.

Diagnosis	Key Antidote/Treatment
Herbicide Poisoning	Activated charcoal, supportive care
Household Chemical	Supportive therapy*
Insecticide Poisoning	Inj. NAC infusion (liver support)
OPC Poisoning	Inj. Atropine 0.6 mg IV, Inj. Pralidoxime 0.5 mg IV, Inj. Glycopyrrolate 0.5 mg IV ( all at appropriate intervals)
Paraquat Poisoning	Hemoperfusion, Inj. NAC infusion, cyclophosphamide, silymarin, strict oxygen titration
Plant Poisoning	Gastric lavage, symptomatic therapy, Temporary pacemaker for Heart blocks
Rat killer yellow phosphorous Paste Poisoning	Inj. NAC infusion, Earlier Plasmapheresis, liver supportive agents, ICU monitoring
Tablet Overdose	Flumazenil 0.2 mg IV (benzodiazepine), Inj.NAC (paracetamol), Glucagon (beta blockers and calcium channel blockers)
Unknown Poisoning	Supportive, empirical NAC

\*Supportive: Pantoprazole, Ondansetron, Vitamins, Sodium bicarbonate, nor- Adrenaline

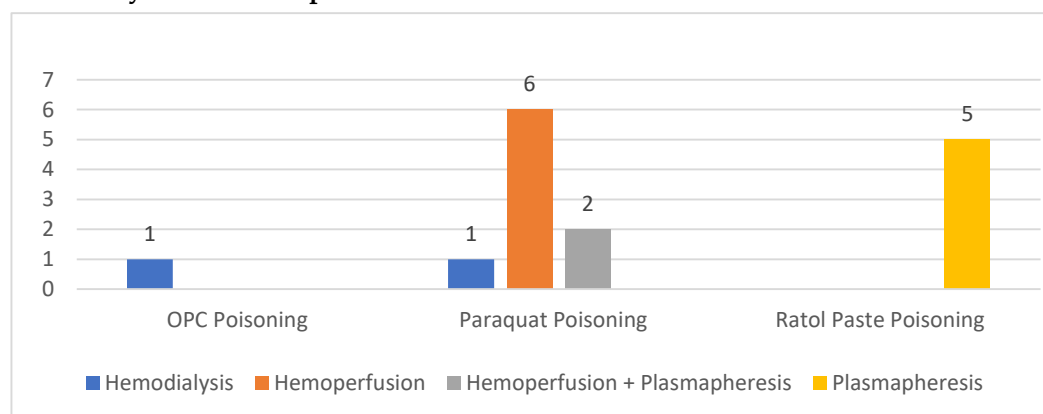
## 7. Symptom-based Treatment Highlights

- **OPC poisoning:** Atropine and Glycopyrrolate titrated to clinical endpoint (dry chest, normalized HR) and cholinergic symptoms; Inj.Pralidoxime as an antidote. Early intubation for respiratory failure.
- **Paraquat:** Paraquat poisoning (18 cases) demonstrated a high potential for morbidity and mortality, primarily due to severe oxidative lung injury and subsequent multiorgan failure. Management included N-acetylcysteine infusion, cyclophosphamide, and silymarin syrup aimed at mitigating pulmonary and hepatic injury and reducing oxidative stress. Oxygen therapy was administered cautiously to avoid exacerbating pulmonary toxicity. Despite protocolized and aggressive supportive care, mortality remained high. Paraquat poisoning continues to be associated with poor clinical outcomes, as reflected by the mortality observed in this case series.
- **Tablet overdose:** Tablet overdose constituted the largest category (53 cases). Management was toxin-specific. Flumazenil was reserved exclusively for confirmed benzodiazepine toxicity. Paracetamol poisoning was treated with N-acetylcysteine according to the standard nomogram. Cardiotoxic overdoses, particularly verapamil and propranolol, were managed with aggressive fluid resuscitation, insulin-

glucose therapy, and vasopressor support as indicated. The spectrum of ingested agents included benzodiazepines, paracetamol, cardiovascular drugs (verapamil, propranolol), psychiatric medications (fluoxetine), antihistamines (chlorpheniramine, cetirizine), antiepileptics, and other miscellaneous drugs.

- **Rat killer Yellow phosphorous paste:** Rat killer paste ingestion (rodenticide poisoning), commonly containing yellow phosphorus or zinc phosphide, accounted for 26 cases. Management primarily focused on early initiation of N-acetylcysteine (NAC) infusion, early plasmapheresis, and administration of silymarin and other hepatoprotective agents, along with close biochemical and clinical monitoring for the development of acute hepatic failure. Supportive care remained the cornerstone of management, given the absence of a specific antidote
- **Plant poisoning:** Plant poisoning cases were relatively few (3 cases), involving ingestion of locally available toxic plants—Yellow oleander seeds (2 cases) and *Abrus precatorius* seeds (1 case). Management included gastric decontamination, temporary pacemaker for yellow oleander, symptom-based supportive care (antiemetics, antispasmodics, and fluid therapy), and targeted treatment of cardiac or neurological manifestations when present, in accordance with national treatment guidelines.
- **Unknown poisoning:** Patients with unidentified toxic exposure presented predominantly with uncomplicated clinical features. Management consisted of empirical antioxidant therapy, close clinical and biochemical monitoring, and comprehensive supportive care.
- **Herbicide and household chemical poisoning:** Herbicide poisoning cases received activated charcoal and supportive therapy, including fluid resuscitation and oxygen support; no specific antidote is available for many herbicides, so early decontamination and monitoring for pulmonary and renal injury were crucial. Household chemical poisoning (e.g., cleaning agents, corrosives) was primarily managed with supportive care, avoidance of induced emesis in corrosive ingestion, pain control, and endoscopic evaluation when indicated.

### Hemodialysis and Hemoperfusion



**Fig (6):** Use of hemodialysis and hemoperfusion by poison type.

Selective use of hemodialysis, hemoperfusion, and plasmapheresis was reserved for severe paraquat, OPC, rat killer paste. These interventions were employed for refractory acidosis, renal failure, or severe systemic toxicity not responsive to standard care.

## 8. Discussion

The present study demonstrates a slight male predominance among poisoning cases, consistent with previously reported epidemiological trends. Outcome analysis revealed that survival varied significantly depending on the type of poison ingested. Tablet overdose and rat killer paste poisoning constituted the largest proportion of cases and survivors, with 51 and 22 patients surviving respectively. However, these groups also accounted for a notable number of against medical advice (AMA) discharges and a minority of deaths, highlighting the critical importance of psychiatric assessment, counselling, and structured follow-up in this subgroup. Organophosphorus compound (OPC) poisoning accounted for 20 cases, of which 18 patients survived, 2 left AMA, and no deaths were recorded. This favourable outcome likely reflects the benefits of early presentation, prompt atropine–oxime therapy, and intensive supportive care, underscoring the effectiveness of established treatment protocols when instituted early. Paraquat poisoning demonstrated disproportionately poorer outcomes. Among 18 cases, only 7 patients survived, while 6 left AMA and 5 succumbed to the illness. This high mortality is consistent with the well-documented lethality of paraquat due to severe oxidative lung injury and multiorgan failure, despite aggressive and protocol-based management. Notably, the survival of 7 patients in this group suggests that early diagnosis, tailored therapeutic strategies, and prompt intensive care interventions may contribute to improved outcomes in select cases. Cases of unknown poisoning and household chemical exposure exhibited heterogeneous outcomes, largely influenced by the nature of the agent involved and delays in presentation to the hospital. Overall, among the total study population of 140 patients, 9 deaths were recorded. The majority of fatalities were attributed to paraquat poisoning (6 cases), followed by rat killer paste (2 cases) and Calcium channel blocker (1 case). These findings reiterate the high fatality associated with certain poisons, particularly paraquat, and emphasize the need for preventive strategies, multidisciplinary management to improve patient outcomes.

## 9. Conclusion

Acute poisoning cases at KCN highlight the effectiveness of standardized diagnostic approaches, timely administration of targeted antidotes, and the use of advanced extracorporeal therapies in managing severe intoxications. The emergence of toxin-specific filters demonstrates promising potential in enhancing poisoning management by facilitating improved toxin clearance and better clinical outcomes. These evolving modalities, when applied judiciously, can significantly strengthen overall patient care. This study underscores the importance of protocol-driven management strategies and periodic, systematic data audits to further optimize clinical outcomes and to inform evidence-based public health interventions.

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