Vol 5 | Issue 1 | January - March | 2025

ORIGINAL ARTICLE

A CROSS-SECTIONAL STUDY ON SOCIODEMOGRAPHIC FACTORS AND MORTALITY IN ACUTE POISONING CASES AT A TERTIARY CARE HOSPITAL IN NAMAKKAL, TAMIL NADU: INSIGHTS FROM 2024.

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ABSTRACT

INTRODUCTION : Acute poisoning remains a critical global concern among low- and middle-income population countries like India. Unauthorized purchase of agricultural pesticides, easy access to toxic substances and socioeconomic stressors contribute to high incidence rates. Poisoning-related morbidity and mortality vary across regions of India. Understanding the incidence, sociodemographic patterns and mortality rates associated with acute poisoning is essential for improving prevention strategies and healthcare interventions. The current research aims to analyze the patterns of incidence, sociodemographic factors and mortality rate among acute poisoning patients in Namakkal District, Tamil Nadu.

METHODS : A prospective observational study was conducted in the emergency unit of a leading healthcare centre in Namakkal, Tamil Nadu over a six-month period from August 2024 to January 2025. The study focused on patients presenting with acute poisoning to assess poisoning patterns and sociodemographic factors.

All patients diagnosed with acute poisoning, regardless of type or intent, were included in the study. Data on poisoning patterns, sociodemographic factors and clinical details were recorded using case collection form. The collected data were entered into Microsoft Excel (Microsoft Corp., 2021) and analyzed using the Statistical Package for Social Sciences (SPSS) to derive meaningful interpretations and statistical outcomes.

RESULTS: More than 70% of the acute poisoning cases reported in this study were in individuals under 50. Major contributors were young students and homemakers. Half of the population were middle- and lower-income people. Family problems, failures, work stress and financial problems such as online scams and gambling were the major reasons for poisoning. The patient survival and death ratio are 24:1, which requires timely intervention and prevention from acute poisoning cases in Tamil Nadu.

CONCLUSION: This study underscores the increasing incidence of intentional acute poisoning, particularly among young women, driven by psychosocial stressors, financial instability, and emerging online risks. The findings emphasize the need for targeted mental health interventions, poisoning prevention programs, and comprehensive public health strategies to mitigate these risks and improve overall well-being.

KEYWORDS : Acute poisoning, incidence, sociodemographic, mortality rate, poisoning incident

INTRODUCTION

Acute poisoning cases remain intimidating in developing nations like India.[1] A report by the World Health Organization (WHO) reveals that 193,460 deaths occur each year worldwide due to unintentional poisoning, with low- and middle-income countries being the major contributors.[2] Intentional acute pesticide poisoning (APP) represents a major community problem, particularly in rural middle-income nations, where it is frequently employed as a means of suicide.[3] The suicide rate in India rose from 9.9 per lakh in 2017 to 12 per lakh in 2021, indicating a concerning upward trend. Economic stressors like poverty and unemployment have a major effect on students and daily wage workers, by raising their risk of mental health issues and substance abuse.[4,5] Tamil Nadu, a state with a strong agricultural sector, faces significant challenges due to widespread pesticide use and an increasing rate of suicides by poisoning.6 Regional data is still hard to come by, particularly at the district level. Although the number of poisoning cases in Namakkal, a district with a significant poultry industry and high agricultural activity, has increased, little is known about the incidence, sociodemographic characteristics and mortality outcomes in this region. Besides its agricultural and industrial significance, Namakkal hosts numerous schools and coaching

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institutes.[7–9] The district attracts a considerable student population, making it a hub for educational activities. This demographic shift has led to increasing stress levels, which may contribute to self-poisoning and suicides, particularly among students dealing with academic pressure.

Despite the educational focus, the intersection of these sociodemographic factors with the rising incidence of acute poisoning remains poorly understood. There are also numerous instances of poisoning cases in the district that are reported in emergency situations, but there is a shortage of information on sociodemographic patterns, causes and mortality results. This study intends to close important knowledge gaps by examining the incidence, sociodemographic characteristics and mortality rates related to acute poisoning in Namakkal. Therefore, there is a pressing need to explore these trends and identify the contributing factors specific to this district. Understanding the incidence, sociodemographic patterns and mortality trends of acute poisoning is essential for designing effective prevention protocols and improving clinical management. The current research seeks to assess the patterns of acute poisoning cases, analyze demographic factors and evaluate mortality rates in Namakkal district, Tamil Nadu.

The primary objective of this study is to explore the patterns of acute poisoning in Namakkal district, focusing on the incidence, types, sociodemographic factors, mortality rates, time between poison intake and admission in the hospital and the role of educational and occupational risk factors, particularly related to agriculture and academic stress.[6,10]

METHODS

This study was conducted in the emergency care department of a tertiary care hospital located in Namakkal district. This hospital serves as a major healthcare provider to a diverse population in this region, receiving a variety of acute poisoning cases.

A total of 250 patients were included in the study, based on the inclusion criteria. The patients were selected based on their medical records indicating acute poisoning and their willingness to participate. Exclusion criteria included patients with chronic poisoning or long-term exposure to toxins, as well as those with incomplete or missing medical records.

A Cross-sectional study design was employed to monitor cases of acute poisoning. Data were collected over six months, from August 2024 to January 2025. The primary focus was to document the types of poisons, sociodemographic characteristics, the time interval between poisoning and hospital admission, treatment outcomes and the influence of educational and occupational risk factors, particularly those associated with agriculture and academic stress. This study design enabled the collection of real-time data on the management of acute poisoning in a clinical setting.

The data were collected using patient information form, which was used to record the sociodemographic details of the patients, the type of poisoning, the source of the toxin/poison, time between poison intake and admission to the hospital, treatment outcomes and other relevant information. The data were gathered directly from patient medical records and from interaction with patients or their family members after admission. Patients were followed from the time of hospital admission until discharge, enabling real-time documentation of treatment responses and outcomes. The information was then systematically recorded into Microsoft Excel for initial processing. Advanced statistical analysis was conducted using the Statistical Package for Social Sciences (SPSS), enabling the identification of trends and correlations in the data.

The sampling for this study was based on a consecutive sampling method, wherein all acute poisoning cases that met the inclusion criteria were included during the study period. Patients who presented to the emergency care department with acute poisoning and gave written consent to participate were considered for inclusion. This non-random sampling approach allowed for the inclusion of all relevant cases within the specified timeframe, ensuring a comprehensive representation of the acute poisoning cases in the region.

The study was approved by the Institutional Ethics Committee (Ref. no. (TH-IEC)-ECR/1069/Inst/TN/2018/RR-21), ensuring that all ethical guidelines for research involving human subjects were followed, including obtaining informed consent from participants.

RESULTS

The study provides a comprehensive analysis of acute poisoning cases, highlighting critical demographics, socioeconomic factors and clinical aspects.

The distribution by age of acute poisoning patients during the study duration is shown in Figure 2. The majority of the patients were in between 21–30 years, constituting 28% of the total population, subsequently patient age with 31–40 years, which comprised 24%. 11–20 age group represented 12% of the total cases, highlighting the vulnerability of

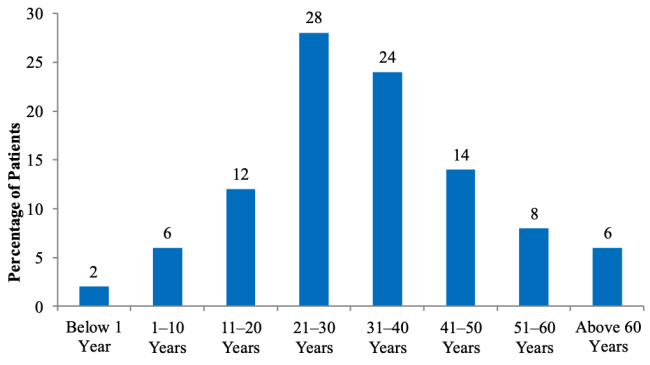
younger adults and adolescents. Middle-aged patients were moderately represented, with 14% of instances involving patients aged 41–50 and 8% involving patients aged 51–60. Like the 61–70 age group, which likewise made up 6% of the total cases, the 1–10 age group made up 6%. Only 2% of the cases are below 1-year age group. This distribution underscores the higher prevalence of acute poisoning among young adults and middle-aged individuals, emphasizing the need for targeted preventive strategies in these age groups.

Based on occupational status, students constituted the largest group, accounting for 32% of the total, followed by homemakers (28%), and business people (16%). Children (1%), farmers (4%), engineers (6%), and others (4%), made up a lesser percentage of patients. These results demonstrate the diverse work backgrounds of the study population's acute poisoning patients.

The socioeconomic status distribution among the 250 acute poisoning patients, classified based on the Modified Kuppuswamy Scale,11 revealed that 43 patients (17%) belonged to the upper class, 57 patients (23%) were from the upper middle class, 82 patients (33%) came from the middle class, 27 patients (10.80%) were upper lower class and 41 (16.40%) were lower class people. This indicates a higher representation of patients from the middle and lower socioeconomic groups in the study population.

Age wise distribution of the reported acute poisoning cases are shown in Figure:1

Figure 1: Age wise distribution of acute poisoning cases reported in a tertiary care hospital, Namakkal, Tamil Nadu, 2024 (N=250)



The acute poisoning cases were due to several reasons, with family problems being one of the significant contributors. A total of 90 patients were reported to have been affected by poisoning due to family-related issues. This was followed by a significant number of cases resulting from failures, with 70 patients experiencing acute poisoning linked to personal or relationship setbacks. Work stress was identified as 13.6 % of cases (34 patients), while financial problems were responsible for 14.4% of cases (36 patients). Out of 36 patients affected by financial problems, 23 were linked to acute poisoning due to fraudulent trading schemes and online rummy apps.

Accidental poisoning was the cause in 8% of cases (20 patients), making it the least frequent reason. Out of the total 250 patients, 32% (80 patients) were students. Among these, 43.75% (35 students) were affected by relationship issues, 37.5% (30 students) by stress, 12.5% (10 students) by family-related issues and 6.25% (5 students) by financial problems.

These numbers reflect a broad range of stressors and challenges that can drive individuals to resort to such extreme measures, underscoring the importance of addressing mental and emotional well-being in communities.

Table:1 Sociodemographic characteristics of acute poisoning cases reported in a tertiary care hospital, Namakkal, Tamil Nadu, 2024 (N=250)

Sociodemographic characteristics	n	%
Socioeconomic status		
Upper class	43	17
Upper middle class	57	23
Middle class	82	33
Upper lower class	27	10
lower class	41	16
Occupation status		
Student	80	32
Homemaker	70	28
Business	40	16
Child	25	1
Farmer	10	4
Engineer	15	6
Others	10	4
Reason for poisoning		
Accidental	20	8
Family problem	90	36
Work stress	34	14
Financial problem	36	14
Relationship Issues	70	28
Poisoning intention		
Unintentional poisoning	20	8
Intentional poisoning	230	92

Overall, the data (table 2) shows a high survival rate, particularly for ant-killer powder and yellow cow dung, while organophosphate poisoning had the highest mortality rate, with 7 deaths.

Table 2: Survival of patients with different types of poisoning reported in a tertiary care hospital, Namakkal, Tamil Nadu, 2024 (N=250)

S. No	Types of poisoning	No of patients consumed	No of patients survived
1	Ant-killer powder	100 (40%)	100(100%)
2	Organophosphates	50 (20%)	43 (86%)
3	Yellow cow dung	50 (20%)	50 (100%)
4	Oleander seed poisoning	50 (20%)	47 (94%)
Total		**250**	**240 (96%)**

The poisoning incidents shows that out of the total cases, 20 patients (8%) were admitted due to unintentional poisoning, while 230 patients (92%) were admitted due to intentional poisoning.

Vomiting was the predominant symptom, observed in 94.8% of cases, trailed by palpitations at 77.6% and giddiness (71.2%) Other notable symptoms included diarrhoea (33.6%) and dehydrated (34.4%) Less common symptoms included confusion (7.2%) and bronchospasm (6.4%). Overall, this symptom profile highlights the varied physiological effects of poisoning in the acute poisoning cases.

Table 3: Distribution of major symptom characteristics among acute poisoning cases reported in a tertiary care hospital, Namakkal, Tamil Nadu, 2024 (N=250)

S. No	Symptom characteristics	n	%
1	Vomiting	237	94.8
2	Palpitation	194	77.6
3	Giddiness	178	71.2
4	Chest pain	87	34.8
5	Dehydration	86	34.4
6	Diarrhoea	84	33.6
7	Throat pain	72	28.8
8	Epigastric pain	53	21.2
9	Bradycardia	51	20.4
10	Salivation	42	16.8
11	Sweating	40	16.0
12	Dizziness	38	15.2
13	Headache	34	13.6
14	Loss of appetite	32	12.8
15	Lacrimation	23	9.20
16	Tachycardia	23	9.20
17	Bronchorrhea	18	7.20
18	Confusion	18	7.20
19	Bronchospasm	16	6.40

The study in this tertiary care hospital reveals that a total of 250 patients were admitted. Among them, 240 patients survived, with a survival ratio of 24:1 (alive to death), while 10 patients unfortunately died. The study identifies four types of poisoning, with organophosphate poisoning exhibiting a 4% mortality rate, marking it as particularly lethal. The widespread use of organophosphates in agriculture highlights the urgent need for measures regarding their safe handling and usage.

The majority of participants (32%) were admitted more than 120 minutes after poisoning, with a survival rate of 97%. A smaller proportion (16.4%) was admitted within 90-120 minutes, achieving a 99% survival rate. A significant proportion (36.4%) was admitted within 30-90 minutes, with 100% survival. Only a small percentage (15.2%) was admitted within the first 30 minutes, also with 100% survival. These findings suggest that earlier admission to the hospital are with higher survival rates, while delayed admission showed decrease in survival outcomes.

DISCUSSION

Our study found that a greater percentage of females (58.8%) were affected by poisoning compared to males (41.2%), a trend consistent with other studies from South India, such as S. Suganthi et al. (2021), who reported 55.7% of cases involved females, attributing this to the social and emotional challenges faced by women in patriarchal societies.[12] The most affected age group was 21–30 years (28%), lower than the 46.8% reported by R. Swaminathan Veerasamy et al. (2020) in the same age group, emphasizing the vulnerability of young adults (72% below 40 years) due to academic, professional, and familial pressures, a finding echoed by studies from S. Suganthi, Bhuyyar Chandrashekhar, and Vijay V et al.[12–15] In terms of socioeconomic and occupational factors, students (32%) and homemakers (28%) were the most affected, with over 60.2% of patients belonging to the middle or lower-middle class, aligning with Mamta Gehlot et al., who highlighted financial struggles as a significant contributor to poisoning cases in low-income populations.[16] Psychosocial stressors were the predominant causative factors, with family problems (36%), personal failures (28%), and financial difficulties (14.4%) being the leading triggers, and suicidal intent (230 cases, 92%) was significantly more prevalent than accidental poisoning (20 cases, 8%), exceeding the findings of Vivek Gopinathan and K. Padmakumar in Kerala, where suicidal cases accounted for 74.73% and accidental cases 14.83%.[17] Financial instability, worsened by easy access to online gambling platforms like

rummy, increases impulsive decision-making and destructive financial habits, emphasizing the urgent need for mental health interventions. Regarding poisoning agents, ant killer powder was the most commonly ingested substance (100 cases, 100% survival), indicating its widespread accessibility and relatively low fatality, whereas organophosphorus compounds showed a higher mortality rate (14%), a trend consistent with Roberts D et al., who reported 10,000 to 20,000 hospital admissions for organophosphorus poisoning annually. Similarly, oleander poisoning resulted in a 6% mortality rate, highlighting its high toxicity and the necessity for rapid intervention.[18] The variation in outcomes underscores the importance of public awareness campaigns to restrict access to highly toxic substances and educate on household toxin risks. Clinically, vomiting (94.8%), dizziness (71.2%), and palpitations (77.6%) were the most common symptoms, aligning with Cahfer G et al.'s findings in Turkey, where tachycardia (34.7%), vomiting (32.4%), and loss of consciousness (24.7%) were predominant in poisoning cases, reinforcing the need for prompt symptom recognition to enable timely medical intervention.[19] Time to hospital admission significantly influenced patient outcomes, with 19.6% of cases arriving within one hour, 51.2% within 2–3 hours, and 29.2% after more than three hours, mirroring Lalit Kumar Rajbanshi et al.'s findings that survival rates were significantly higher in patients admitted within two hours of poisoning, highlighting the need for faster pre-hospital care, improved transportation and increased public awareness.20 The overall mortality ratio of 24:1 reflects the effectiveness of first aid and hospital care, including the administration of antidotes like atropine for organophosphorus poisoning; however, fatalities associated with organophosphorus (7 deaths) and oleander poisoning (3 deaths) underscore the limitations of existing treatment protocols, particularly in resource-limited settings. Studies like R. C. Dart et al. stress the necessity for enhanced healthcare professional training in poisoning management and improved availability of advanced antidotes in rural and semi-urban hospitals to mitigate poisoning-related mortality.[21]

CONCLUSION

This study provides valuable insights into the trends, sociodemographic characteristics and mortality rates associated with acute poisoning incidents at a tertiary care facility. Our research reveals that poisoning is more common among young women, with psychosocial stresses such as personal struggles, family issues, exam pressure, fear of the future and financial difficulties as significant contributing factors. The rising incidence of suicidal ideation underscores the critical need for focused interventions aimed at students and professionals, especially those grappling with prolonged stress and emotional turmoil. In recent years, the widespread availability of online gambling platforms has contributed to financial instability, further aggravating mental health challenges.

Additionally, the growing fraudulent online trading schemes has led to substantial financial losses, intensifying feelings of despair and hopelessness and in some cases, triggering suicidal thoughts. These factors collectively highlight the importance of implementing comprehensive public health initiatives, including enhanced access to mental health services, educational programs on poisoning prevention and therapeutic support for emotional well-being.

FINANCIAL SUPPORT & SPONSORSHIP

None

CONFLICTS OF INTEREST

None

ACKNOWLEDGMENT

We would like to acknowledge our family and institution for their constant encourage and support during this work.

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