ORIGINAL ARTICLE

Pattern and Outcome of Acute Poisoning Cases Admitted at a Tertiary Care Hospital, Bangladesh

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ABSTRACT

Background: Acute poisoning is of about 7.1% of hospital admissions in Bangladesh. According to the WHO, 99% of the fatal poisoning cases occurred in developing countries. The pattern of poisoning & socio demographic parameters varies in times, from one country to another, even among different regions of a country. Objective of this study was to study the clinical profile of patient presenting with acute poisoning; and, to study the outcome of the patient presenting with poisoning.

Methods: This retrospective observational hospital record based study carried out at the Department of Medicine, Shaheed Ziaur Rahman Medical College Hospital, Bogura from 1st March, 2025 to 31th August, 2025. Total 781 cases were included by purposive sampling technique. All the recorded data of poisoning cases age more than 12 years admitted in the medicine units, included in this study. Snake bite, food poisoning, and electrocution, near drowning, drug reaction were excluded from the study.

Results: Within the total 781 patients of both genders were studied, males were slightly more than the females and the male: female ratio was 1.11: 1. Among 781 cases, majority were in the age ranged from 12-30 years, few from 31-40 years and least > 40 years. By occupation, students were most predominantly affected followed by housewife, farmer, day laborers, service holders, unemployed, and business workers. Most participants resided in rural areas, while smaller proportions were from semi-urban and urban areas. Regarding education 2/3rd had secondary & higher secondary education, rest had primary and graduate degree or higher. Most common mode of poisoning was OPC, followed by benzodiazepine, aluminium phosphide, mixed/unknown/others, herpic , parquet , drug/alcohol overdose, insecticide , other household chemical, rat killer, insect bite, other agrochemicals, others rodenticides . Males more often had OPC, benzodiazepines, parquet, and insect bites, whereas females predominated in herpic, drug/alcohol overdose, other household chemicals, and rat killer. 93.3% of patients survived while 6.7% resulted in death. Death was more frequent among males compared to females. Survival was highest in younger groups. Maximum patient died due aluminium phosphide poisoning followed by OPC & others.

Conclusion: The trends of poisoning vary at different parts of the world and may vary even in different regions of the country. In the present study, females had a higher recovery rate compared to males and deaths were more frequent among males. The most common mode of poisoning was OPC but the most death had occurred due to aluminium phosphide poisoning. Overall, comprehensive strategies focusing on prevention, regulation, and timely treatment are vital to reduce the incidence and improve the outcomes and mitigate burden of acute poisoning cases in Bangladesh.

Key words: Poisoning, Death rate, Aluminium Phosphide, OPC, Paraquat, Insecticide, Rat-killer.

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INTRODUCTION

Acute poisoning is common, accounting for about 1% of hospital admissions in the UK[1]. Common important substances involving poisoning in UK are[1]: analgesics: Paracetamol and non-steroidal anti-inflammatory drugs (NSAIDs), antidepressants: selective serotonin re-uptake inhibitors (SSRIs), serotonin nor epinephrine re-uptake inhibitors, tricyclic antidepressants (TCAs) and lithium, cardiovascular agents: β-blockers, calcium channel blockers and cardiac glycosides, Drugs of misuse: anti-depressants, opiates,

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benzodiazepines, stimulants and entactogens (e.g. amphetamines, MDMA, mephedrone, cocaine), hallucinogens e.g. cannabis, synthetic cannabinoid receptor agonists), carbon monoxide, alcohol . But in In South and South-east Asia, Common or otherwise important substances involved are: organophosphorus and carbamate insecticides, aluminium and zinc phosphide, paraquat, oleander, corrosives, snake and insect venoms[1]. Poisoning is a major cause of death in young adults; most deaths occur before patients reach medical attention. Accidental poisoning is also common, especially in children and older people. Criminal poisoning may also occur, including drug-facilitated robbery or sexual assault. In low- and middle-income countries, the frequency of self-harm is more difficult to estimate. Because of their widespread availability and use, household and agricultural products, such as pesticides and herbicides, are common sources of poisoning and have a much higher case fatality. In China and South-east Asia, pesticides account for about 300 000 suicides each year. Snake bite and other forms of envenomation are also important causes of morbidity and mortality internationally. According to the World Health Organization, 99% of the fatal poisoning cases occurred in developing countries[2]. In our country it causes around 3,000,000 episodes and around 2000 death per year. It consumes not only the valuable health service resources but also causes considerable morbidity and mortality[3]. Poisoning is a serious threat in Bangladesh as it comprises around 44% of all deaths among adult females and around 8 to 10% of overall mortality in medical wards of tertiary healthcare settings[4]. Common types of poisoning in this country are organophosphorus poisoning, poisoning with unknown substances especially in commuter (travel-related) poisoning; poisoning with sedatives, aluminium phosphide, corrosive agents, rodenticides, kerosene/petrol and alcohol, and snakebite[4,5]. The pattern of poisoning as well as their sociodemographic parameters varies in times and, from one country to another, even among different regions of a country. This study was carried out to describe the sociodemographic profile, pattern of poisoning and outcome in a tertiary level hospital in Bangladesh. Objectives of this study was to study the clinical profile of patient presenting with acute poisoning; and, to study the outcome of the patient presenting with poisoning.

MATERIALS & METHODS

This retrospective observational hospital record based study[6] carried out at the Departments of Medicine of Shaheed Ziaur Rahman Medical College Hospital, Bogura from 1st March, 2025 to 31th August, 2025. Total 781 cases was taken purposively in the specified time period. Confidentiality and privacy maintained throughout the study.

Inclusion criteria:

1. All the recorded data of poisoning cases admitted in the medicine units, of Shaheed Ziaur Rahman Medical College & Hospital, Bogura, were included in this study.
2. Age more than 12 yrs[7]

Exclusion criteria:

1. Snake bite, food poisoning, and electrocution, near drowning, drug reaction

Data analysis:

All the data were appropriately recorded in a computer and then statistical analysis carried out by using SPSS version 26. The test statistics used for analysis of data were descriptive statistics, chi-square test. The level of significance will be 0.05 and p value < 0.05 were considered as significant.

RESULTS

The study was conducted over a time span of 6 months (from March 2025 to August 2025) in the department of Medicine of Shaheed Ziaur Rahman Medical College; Bogura to understand the clinical profile, pattern and outcome of patients presenting with poisoning and intoxication. The study was conducted among 781 patients of both sexes who were more than 12 years of age admitted with the history of poisoning. With informed written consent, their detailed clinical history was taken and physical examinations were done. Food poisoning, snake bite and drug reaction were excluded from study. All the data related to socio demographic status and poisoning were collected in a data sheet. After that, data were analyzed and tabulated systematically.

In this study, among 781 cases 322(41.2%) were in the age ranged from 12-20 years, 251 (32.1%) were from21-30 years, 103(13.2%) were from 31-40 years, 50(6.4%) were 41-50 years, 35(4.5%) were 51-60 years and 20(2.6%) are more than 60 year old. Here minimum and maximum age of the study population was 13 years and 65 years respectively and means age was 27 years. Among the total 781 patients of both genders were studied, males were slightly more than the females (52.8% vs. 47.2%) and the male: female ratio was 1.11: 1. (Table I).

Table I: Age and sex distribution Socio-demographic characteristics of the participants (n=781)

Variables	Frequency N (%)
Age group (years)	
12-20	322 (41.2%)
21-30	251 (32.1%)
31-40	103 (13.2%)
41-50	50 (6.4%)
51-60	35 (4.5%)
>60	20 (2.6%)
Gender	
Male	412 (52.8%)
Female	369 (47.2%)
Age (Mean±SD) years:	27.38 ±12.96
Median Age & (Range) years:	22 (12-80)

Vomiting (190 cases) and heartburn (168 cases) were the most frequent symptoms, followed by abdominal pain (137) and shortness of breath (64). Less common features included unconsciousness (48), diarrhoea (49), shock (44), oral ulcers (35), and chest pain (30). Rare symptoms such as convulsions, cough, reduced urine output, fever, leg swelling, abdominal distension, jaundice, and bleeding tendency were also reported in a few cases.

The majority of participants belonged to the 12–20 and 21–30 year groups, with females slightly outnumbering males in the youngest group and males slightly outnumbering females in the elder group (Fig. 1 & 2)

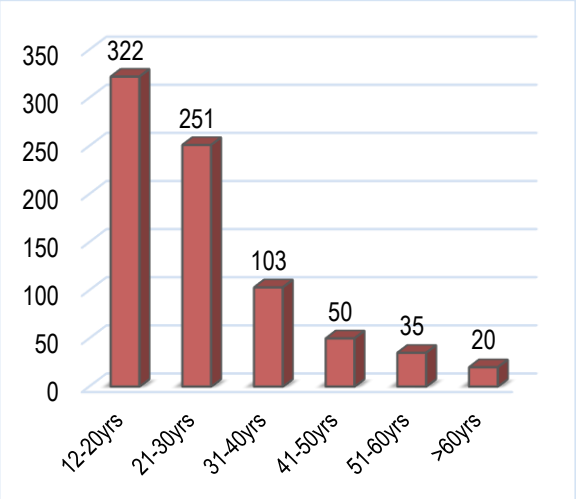

Figure 1: Age category of patients

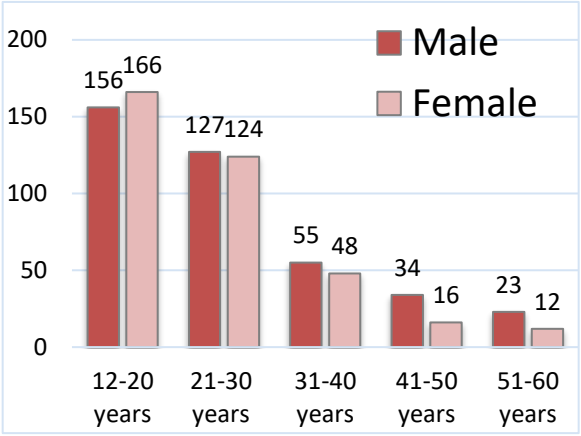

Figure 2: Age range and Gender-Wise Distribution of Participants.

By occupation, students were most predominantly affected (40.6%) followed by housewife (27.9%), farmer (16.4%) followed by day laborers (8.3%), service holders (4.2%), unemployed (1.5%), and business workers (1.0%). (Figure-3)

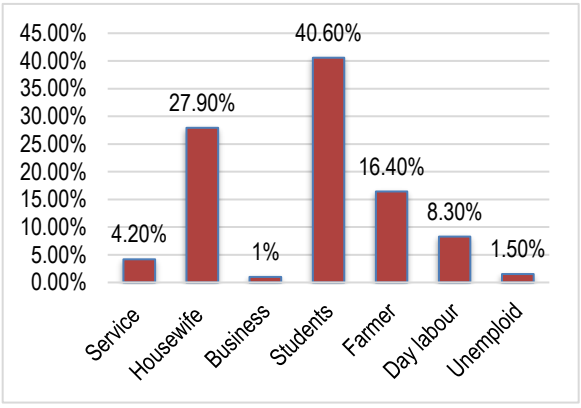

Figure 3: Distribution of occupational status of the participants (n=781)

Regarding residence, most participants resided in rural areas (63.8%), while smaller proportions were from semi-urban (20.7%) and urban areas (15.5%). (Figure - 4)

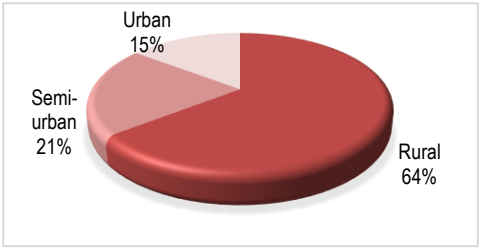

Figure 4: Residential distribution of the participants (n=781)

Regarding education, 36.84% had secondary education, 33.33% had higher secondary education, 14.04% had primary education, and 15.79% had a graduate degree or higher. (Figure 5)

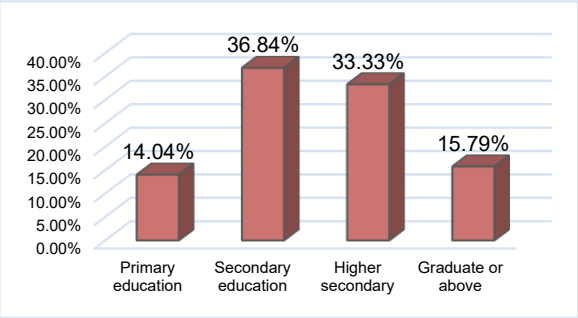

Figure 5: Educational status of the participants (n=781)

Most common mode of poisoning was OPC(23.3%), followed by Benzodiazepine (16.9%), Aluminium phosphide(13.4), Mixed/unknown/others (7.8%), Herpic (8.1%), Paraquat (6%), Drug/alcohol overdose(6.1%) , Insecticide(5.6%) , Other household chemical (3.7%), Rat killer (3.1%), Insect bite(4.7%), Other agrochemicals (0.5%) Others rodenticides (0.6%). (Table II & Figure 6)

Table II: Distribution of poisoning types among participants (n=781)

Types of Poisoning	Frequency N (%)
OPC	182 (23.3%)
Benzodiazepine	132 (16.9)
Aluminium Phosphide (Gas Tab)	105 (13.4%)
Herpic	63 (8.1%)
Mixed/Unknown/Others	61 (7.8%)
Drug/Alcohol overdose	48 (6.1%)
Paraquat	47 (6.0%)
Insecticide	44 (5.6%)
Insect bite	37 (4.7%)
Other household chemicals	29 (3.7%)
Rat killer	24 (3.1%)
Other rodenticides	5 (0.6%)
Other agrochemicals	4 (0.5%)

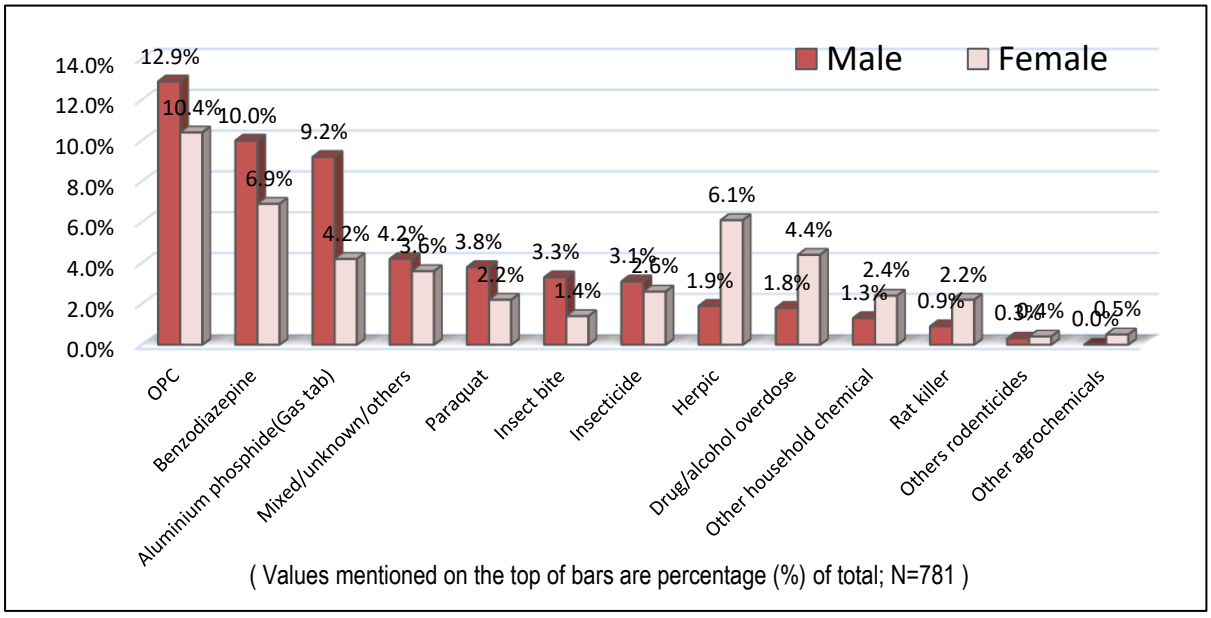

Figure 6: Gender distribution and poisoning type (P <[c]0.001[s])

Of the total patient, the highest participation was recorded in July (28.4%), followed by May (21.4%) and June (19.1%). March (15.5%) and April (15.6%) showed the lowest. (Figure 7)

In 88.3% cases symptom onset occurs within 1 hour of poisoning, in 11.3% cases within 1-12 hours of poisoning and in 0.4% cases symptom onset occurs after 12 hours of poisoning.

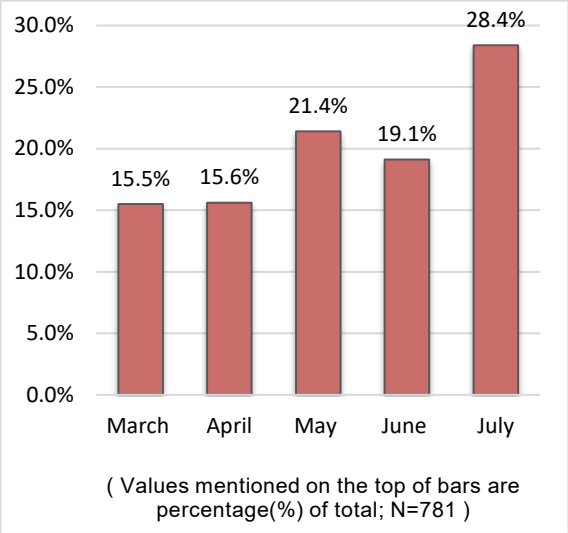

Figure 7: Monthly distribution of the participants (n=781)

Majority of the patient (95.5%) presented to the hospital within 12 hour of poisoning, 1.7% presented within12-24 hour and 2.8% presented to the hospital after 24 hour of poisoning.(Table III)

Table III: Distribution of patient by symptom onset and presentation to the hospital, Data presented as frequency and percentage over the columns

Time of symptom onset after poisoning		
<1 hour	690	88.3%
1-12 hrs	88	11.3%
>12 hours	3	0.4%
Time of hospital presentation after poisoning		
<12 hrs	746	95.5%
12-24 hrs	13	1.7%
>24 hrs	22	2.8%

Table IV: Distribution of poisoning types by occupation (n=781)

Poison types	**Occupation**						
	Service (n=33) n (%)	**Housewife (n=218) n (%)**	**Business (n=8) n (%)**	**Student (n=317) n (%)**	**Farmer (n=128) n (%)**	**Unemployed (n=12) n (%)**	**Day laborer (n=65) n (%)**
OPC	5 (2.7)	52 (28.6)	0 (0.0)	66 (36.3)	39 (21.4)	0 (0.0)	20 (11.0)
Aluminium phosphide	6 (5.7)	25 (23.8)	3 (2.9)	27 (25.7)	31 (29.5)	4 (3.8)	9 (8.6)
Other argochemicals	0 (0.0)	4 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Insecticide	1 (2.3)	12 (27.3)	2 (4.5)	14 (31.8)	13 (29.5)	1 (2.3)	1 (2.3)
Paraquat	5 (10.6)	11 (23.4)	0 (0.0)	16 (34.0)	9 (19.1)	1 (2.1)	5 (10.6)
Herpic	0 (0.0)	22 (34.9)	0 (0.0)	36 (57.1)	3 (4.8)	0 (0.0)	2 (3.2)
Other household chemicals	4 (13.8)	9 (31.0)	0 (0.0)	15 (51.7)	1 (3.4)	0 (0.0)	0 (0.0)
Rat killer	0 (0.0)	10 (41.7)	0 (0.0)	9 (37.5)	1 (4.2)	1 (4.2)	3 (12.5)
Other rodenticides	0 (0.0)	1 (20.0)	0 (0.0)	3 (60.0)	0 (0.0)	0 (0.0)	1 (20.0)
Benzodiazepine	7 (5.3)	34 (25.8)	1 (0.8)	72 (54.5)	7 (5.3)	3 (2.3)	8 (6.1)
Drugs/alcohol overdose	1 (2.1)	10 (20.8)	0 (0.0)	33 (68.8)	1 (2.1)	1 (2.1)	2 (4.2)
Insect bite	0 (0.0)	11 (29.7)	0 (0.0)	4 (10.8)	16 (43.2)	0 (0.0)	6 (16.2)
Mixed/unknown/others	4 (6.6)	17 (27.9)	2 (3.3)	22 (36.1)	7 (11.5)	1 (1.6)	8 (13.1)

$p <^{c} 0.001^{s}$

Poisoning type varied significantly by occupation (χ^2, $p < 0.001$). Students were the most affected group, contributing the highest proportions of OPC, benzodiazepines, drug/alcohol overdose, and herbicide ("herpic") cases. Housewives were strongly represented in OPC, aluminium phosphide, and herbicide poisonings. Farmers showed a notable burden of aluminium phosphide and insect-bite cases. Day laborers contributed smaller but diverse proportions, while service holders and unemployed had relatively fewer cases. Business workers were rarely involved, with only isolated cases of aluminium phosphide and insecticide poisoning. Mixed/unknown exposures were distributed across all occupational categories. (Table IV, in previous Page)

Outcome of the study:

The majority of patients survived (N=729, 93.3%), while 6.7% expired (N=52) resulted in death. Survival was high in both sexes, but mortality differed significantly by gender (χ^2, $p = 0.006$). Deaths were more frequent among males (71.2%) compared to females (28.8%). (Table V)

Table V: Outcome of Poisoned Patients by Gender (n=781)

Sex	Survived n (%)	Death n (%)	p-value
Male (n=412)	375 (51.4%)	37 (71.2%)	
Female (n=369)	354 (48.6%)	15 (28.8%)	**<[c]0.006[s]**
Total (n=781)	729 (100%)	52 (100%)	

Total 52 deaths occurred. Of these, maximum patient died due to Aluminium phosphide poisoning (61.5 %) and second most common death occurred due to OPC poisoning (21.2%).No patient died due to herpic, other rodenticide, Benzodiazepine, Drugs/alcohol overdose.(Figure- 8)

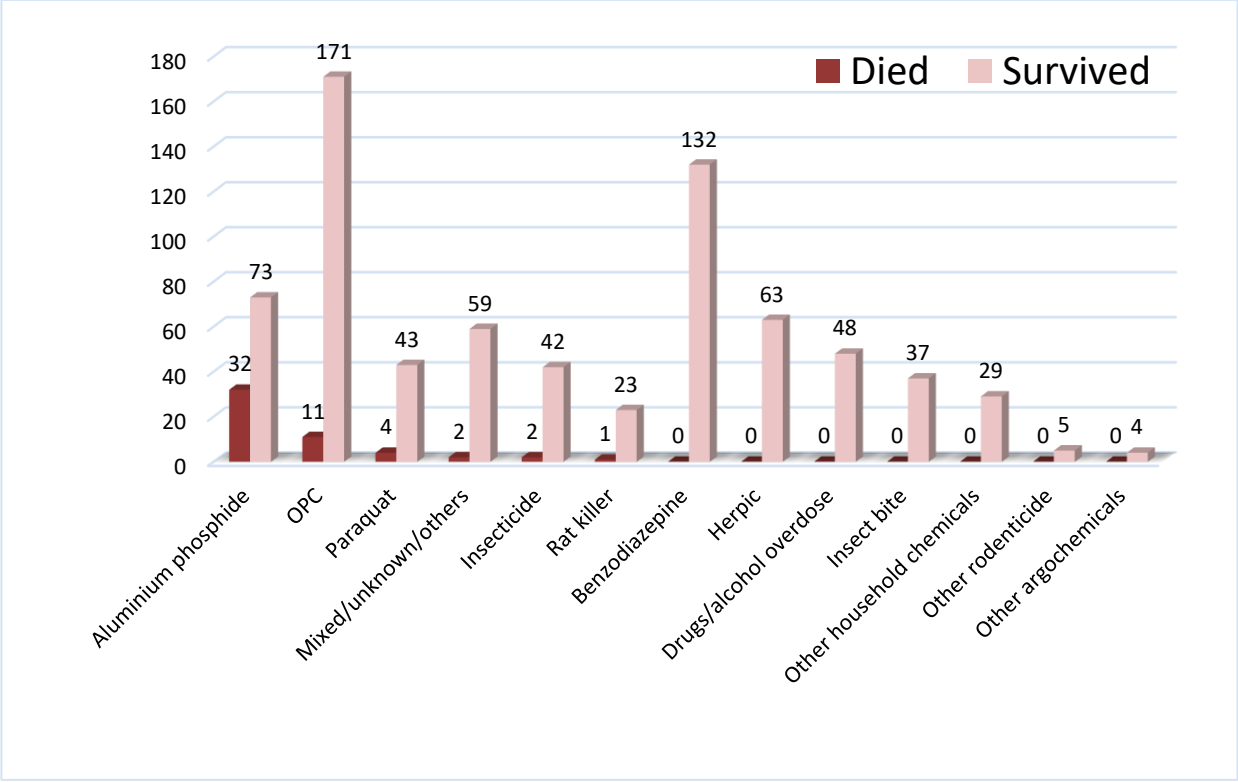

Figure 8: Outcome of Poisoned Patients by types of poisoning (n=781, actual number on the top of bars

Survival was highest in younger groups, while mortality differed significantly ($p < 0.001$), peaking in ages 21–30 (38.5%) and also notable in 12–20 and 31–40 years (17.3% each). (Figure 9)

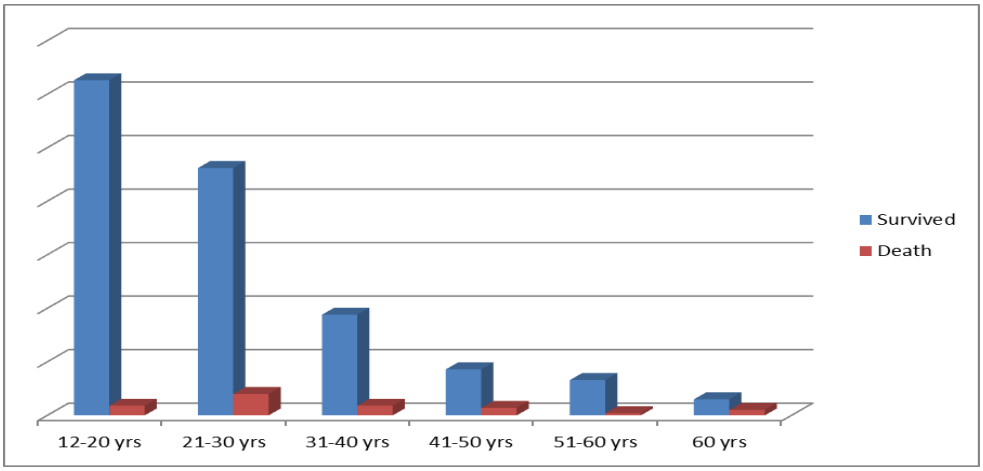

Figure 9: Outcome of poisoned patients by age group (n=781)

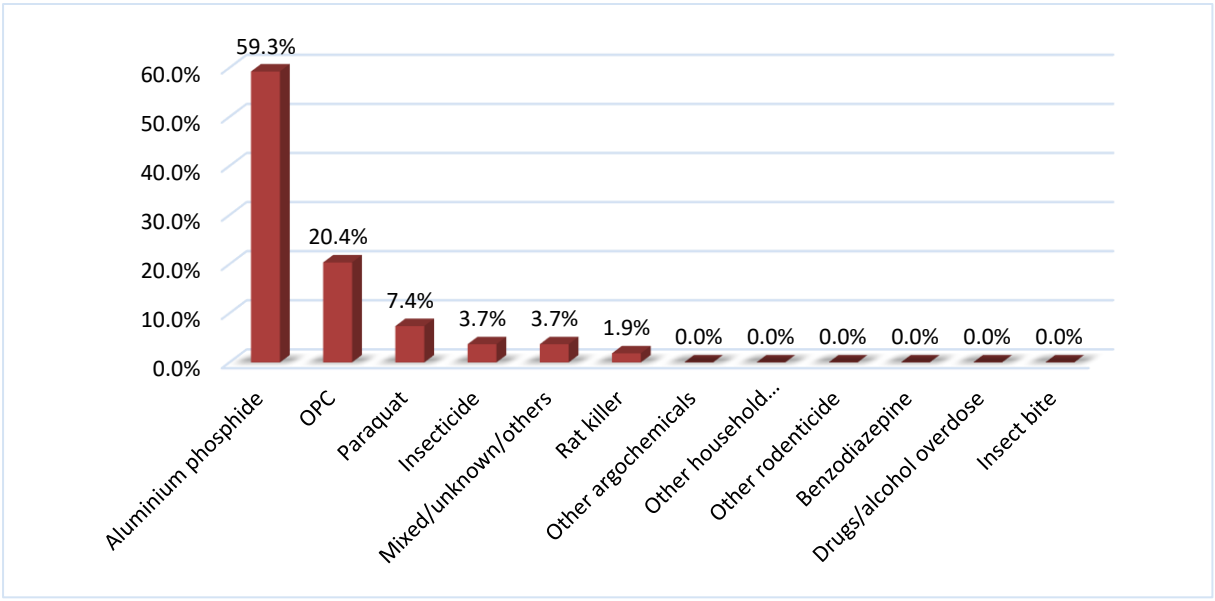

Figure 10: Name of poisoning and death by percentages (n=54). Aluminium phosphide was in the highest position, second was OPC and paraquat was in third position. Though benzodiazepine was in 2nd highest position by incidence (Figure-8), death due to this was zero '0'.

DISCUSSION

Key observations:

Most common poison: Organophosphates (OPC), benzodiazepine, aluminium phosphide and were the most commonly reported poisons in this study.

Age differences: The majority of participants were young, with 41.2% in the 12–20 years age group and 32.1% in the 21–30 years group.

Male to female ratio: Male was slightly more affected than female. In the younger age, females were more affected than male and in the later age group; males were more affected than female.

Mode of poisoning and occupation: Students and housewives were the most affected group than other occupation.

Clinical features: Vomiting and heartburn were the most frequent symptoms, followed by abdominal pain, shortness of breath and others.

Survival rates: The overall recovery rate was 93.3%, with a death rate of 6.7%. Females had a higher recovery rate compared to males and deaths were more frequent among males compared to females.

The most common mode of poisoning was OPC but the most death had occurred due to aluminium phosphide poisoning.

The majority of participants were young, with 41.2% in the 12–20 years age group and 32.1% in the 21–30 years group. The mean age was 27.38 ± 12.96 years, with a median of 22 (range: 12–80 years). In this age group persons are more emotional and active, that may predispose such event. This result is consistent with two studies in Bangladesh[8]. In this study, number of male (52.8%) was slightly more than female (47.2%). and male to female ratio was 1.11: 1. But two Bangladeshi study done by MAR Howlader[8] and AKMM Hossain[9] shows male was more in number. Another study of Bangladesh shows similar result[10]. A study done at DMCH[11] revealed male to female ratio was almost equal (1: 0.9). These are consistent with our study. However, some other studies have shown that males are marginally higher compared to females and marginally more among females in others[12]. This high proportion of poisoning among males might be due to change in the lifestyle and cultural patterns in this area. So, it may depend on time, place, person, circumstances etc.

In this study, majority of the poisoning cases presented between 12-20 year age group. Similar findings were observed in an Indian study[12]. Also a recent Bangladeshi study found the similar result[13].The reason for the high rate of poisoning in young adults was partially explained by their vulnerability to stressful life situations and immaturity to cope up with the situation; thus, they would be easily emotional to decide suicide. Besides, in this age group, there was a high valence of adjustment disorder that might predispose them to commit suicide. Moreover, people in this age group probably face failure or frustration in love or job or exams, inability to fulfill the parents' expectations. It is interesting that in case of early age, females are more affected and in the later ages males are more affected. Students and housewives were the most affected groups, likely due to academic pressures and household responsibilities. Additionally, a higher proportion of patients were from rural areas, indicating limited access to mental health services and social support. Most patients had secondary or higher secondary education, reflecting the general educational attainment of young adults in the area.

In the current study, the most common poisoning was due to organophosphate, followed by Benzodiazepine, Aluminium phosphide and others. OPC, which is the common chemical that has been in use as pesticides by farmers and are highly available or accessible for farming purposes in Bangladesh[14]. This can be minimized by reducing the availability and access to highly toxic pesticides as well as by increasing knowledge of the farmers or users of this chemical about its health risk, storage, and necessary risk reduction measures during spray of the chemical. In several national and international studies, revealed that OPC is the main mode of poisoning[8,14,15]. Males more often had OPC, benzodiazepines, paraquat, insect bites while females predominated in herpic, other household chemicals drug/alcohol overdose and rat killer. Other agrochemicals occurred only among females.

Of the total patient, the highest participation was recorded in July, followed by May and June. March and April showed the lowest and nearly equal frequencies. Similar pattern of month wise patient admission profile was seen in a health bulletin published by DGHS[16] in 2023.

Most patients (88.3%) developed symptoms within 1 hour of poisoning. It indicates the highly toxicity of those agrochemicals. More than 95% of patients came to the hospital within 12 hours of symptom onset. It reflects our health infrastructural development and health service status.

The overall recovery rate was 93.3%, with a death rate of 6.7%, pointing to a significant mortality risk in acute poisoning cases. Survival was high in both sexes, but mortality differed significantly by gender (χ^2, $p = 0.006$). Females had a higher recovery rate compared to males and deaths were more frequent among males compared to females .It may be due to the earlier presentation or differences in the types of poison ingested. Also due to the well-known fact that the self-harm is more common in women and younger age, but completed suicide is more common in men and elder people[17].The important fact is that the most mode of

poisoning is OPC but the most death had occurred due to aluminium phosphide poisoning. So our policy makers should take necessary steps to restrict use and prevent misuse of these toxicants. Survival was highest in younger groups, while mortality differed significantly ($p < 0.001$), peaking in ages 21–30 (38.5%) and also notable in 12–20 and 31–40 years (17.3% each). It indicates age-related variations in resilience and health status.

Conclusion

Acute poisoning is an important medical emergency. The trends of poisoning vary at different parts of the world and may vary even in different regions of the country depending upon socioeconomic and cultural factors. The appropriate management of poisoning at emergency needs accurate assessment and immediate treatment.

The majority of poisonings were OPC followed by, aluminium phosphide, benzodiazepine, parquet and others. The high mortality rate, particularly from aluminium phosphide, underscores the need for stringent regulatory measures and public awareness campaigns to control access to these toxic substances. Mental health interventions and targeted support for marital and familial issues are crucial, given the high incidence of suicidal poisonings. Prompt medical intervention and better healthcare access are essential for improving survival rates. Overall, comprehensive strategies focusing on prevention, regulation, and timely treatment are vital to reduce the incidence and improve the outcomes and mitigate burden of acute poisoning cases in Bangladesh.

Limitations

The study conducted in a single medical college hospital, the findings may not reflect the broader population in Bangladesh. Additionally, the study did not account for potential confounding factors like pre-existing medical conditions, the exact quantity of poison ingested, and treatment specifics.

Scopes

This study establishes a foundation for future research on the epidemiology of acute poisoning in Bangladesh. Future research should involve larger, multicenter studies for better generalizability and longitudinal studies to assess long-term outcomes for survivors. Additionally, it should evaluate the effectiveness of intervention strategies, particularly focusing on mental health support and poison education to prevent incidents and improve patient outcomes.

AUTHORS STATEMENTS:

Ethical clearance: The study protocol was approved by the Institutional Review Board (IRB) of Shaheed Ziaur Rahman Medical College & Hospital, Bogura.

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