Original Article

Mortality and morbidity associated with acute poisoning cases in a tertiary care hospital

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ABSTRACT

Introduction: *Acute poisoning is the greatest cause of morbidity and mortality in Bangladesh, as well as a serious public health issue around the world. There is limited of information on acute poisoning in the studied area.* ***Objective:*** *The goal of this study was to evaluate treatment outcomes, mortality and morbidity risk factors in patients with acute poisoning.* ***Methods & Materials:*** *This is a cross-sectional study conducted in Kurmitola General Hospital, Dhaka, Bangladesh between January 2020 to January 2024. A total of 170 patient's medical records were examined. Of them, 150 patient's medical records had complete information and were used in the final study. All collected data was entered into a Microsoft Excel Worksheet and evaluated with descriptive statistics in SPSS 24.0.* ***Results:*** *Most of participants, 89 (59.3%), were aged 19-37 years. More over half of the participants, 86 (57.3%), were female. Organophosphate was the most common poisoning agent in 62 instances. Acetaminophen was the most common drug poisoning agent found in 10 subjects. Of the 30 patients treated with antidotes, 18 received atropine for organophosphate poisoning. During the study period, 16.7% of poisoning cases resulted in deaths. Self-poisoning participants had a 2.4 times higher risk of poor treatment outcomes compared to those who were poisoned accidently (95% confidence interval: 1.10–5.42). Participants who were poisoned by medications were 2.13 times more likely to experience poor treatment outcomes (95% confidence interval: 1.21-3.32).* ***Conclusion:*** *The majority of cases in our analysis had acute poisoning, which was more prevalent at home and linked to oral organophosphate use. Drug and mode of poisoning were important risk factors for mortality and morbidity, which are linked to inadequate acute poisoning treatment results.*

Keywords: *Acute poisoning, Morbidity, Treatment, Mortality*

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INTRODUCTION

Acute poisoning is a leading cause of emergency department visits, hospitalizations, morbidity, and mortality globally. According to World Health Organization (WHO) estimates for 2016, about 106,683 persons died as a result of unintentional poisoning[1]. A systematic assessment of data from 141 nations found that acute pesticide poisoning causes around 385 million instances and 11,000 fatalities globally, with South Asia leading the way[2]. Another assessment based on data from 108 countries estimated that the global burden of self-poisoning was around 0.17 million deaths per year[3]. The morbidity and fatality rate from poisoning varies by country and kind of agent. Pesticides are the leading cause of poisoning in Bangladesh and underdeveloped countries, due to agriculture-based economy, poverty, dangerous practices, illiteracy, lack of protective clothes, and easy access to very toxic pesticides. Poisoning deaths in advanced nations are primarily caused by cleaning agents, detergents, paracetamol, carbon monoxide, and cosmetics[4]. According to the

Bangladesh Health Authority's annual report[5], poisoning is still one of the top ten health problems in Bangladesh. Poisoning patterns vary among countries and regions due to factors such as topography, poison availability, socioeconomic status, cultural and religious influences. In general, children are more prone to unintentional poisoning, while young people are more likely to commit suicide[6]. Insecticides have been widely available due to industrialization and advancements in agriculture. However, exposure to these compounds can be highly hazardous[7-10]. There is a scarcity of information on acute poisoning in the study area. The purpose of this study was to assess treatment results, mortality, and morbidity risk factors in patients with acute poisoning.

METHODOLOGY

This is a cross-sectional study conducted in Kurmitola General Hospital, Dhaka, Bangladesh between January 2020 to January 2024. A total of 170 patient's medical records were examined. Of them, 150 patient's medical records had complete

information and were used in the final study. The study included all individuals who were hospitalized to the emergency department with acute poisoning. Acute poisoning patients with incomplete medical records were excluded. All collected data was entered into a Microsoft Excel Worksheet and evaluated with descriptive statistics in SPSS 24.0.

RESULTS

Most of participants, 89(59.3%), were aged 19-37. Of the 86 participants, 57.3% were female. Half of the participants, 76 (50.7%), lived in rural communities. Suicide was the mode of poisoning for 77(51.3%) of the participants. Oral ingestion was the most prevalent method of poisoning, affecting 111 subjects (74%). More than half of the study's 81 participants (54%), obtained poisoning chemicals from their homes. The most common cause of unintentional poisoning was mental illness 41(56.2%) [Table-I]. The majority of participants, 107(71.3%), arrived at the hospital one hour after taking the poisoning agent. Cimetidine, a histamine 2 receptor blocker, was administered in 34% of instances. Approximately 20% of cases were treated with antidotes and regular saline. During the study period, 56.7% of poisoning cases were successfully treated and released, with 25(16.7%) instances resulting in death. Pesticide poisoning was the most common, accounting for 72(48%) cases, followed by home poisoning 54(36.0%). There were 62 cases of pesticide poisoning, in addition to overall poisoning. Food accounted for 14% of household poisonings.

Acetaminophen was the most common medication poisoning agent in 10 subjects. Only one individual experienced poisoning due to a snake bite [Table II]. Of the 30 patients treated with antidotes, 18 were given atropine for organophosphate poisoning [Table III]. Variables having a p-value of less than or equal to 0.25 were included in multivariable logistic regression analysis to account for potential confounding factors on the treatment outcome of acute poisoning. In bivariate analysis, variables such as gender, age, manner of poisoning, source of poisoning, drug poisoning, and time to arrival had p-values less than 0.25. These variables were utilized in a multivariable model. In multivariable logistic regression analysis, mode of poisoning and drug poisoning were substantially related to poor treatment outcomes of acute poisoning. Self-poisoning participants had a 2.4 times higher risk of poor treatment outcomes compared to accidental poisoning. AOR = 2.44 (95% CI: 1.101-5.421; p=0.028). Participants poisoned by medications had a 2.13 times higher likelihood of unsatisfactory treatment outcomes compared to non-poisoning participants. AOR=2.13 (95% CI: 1.21-3.32, p=0.006) [Table IV].

Table – I: Sociodemographic characteristics and mode, route, source, and reason of poisoning for participants (*n*=150)

Characteristics		Total n(%)	Treatment outcome		p value
			Good n(%)	Poor n(%)	
Sex	Female	86 (57.3)	40 (62.5)	24 (37.5)	
	Male	64 (42.7)	45 (52.3)	41 (47.7)	0.21
Age (years)	<18	45 (30)	26 (57.8)	19 (42.2)	
	19–37	89 (59.3)	53 (59.6)	36 (40.4)	0.25
	>38	16 (10.7)	6 (36.5)	10 (62.5)	
Current residence	Urban	74 (49.3)	42 (56.8)	32 (43.2)	
	Rural	76 (50.7)	43 (56.6)	33 (43.4)	0.57
Mode of poisoning	Accidental	73 (48.7)	45 (61.6)	28 (38.4)	
	Suicidal	77 (51.3)	40 (51.9)	37 (48.1)	0.23
Reason for accidental poisoning	Mental disorder	41 (56.2)	31 (75.6)	10 (24.4)	
	Eating food	32 (43.8)	13 (41.9)	18 (58.1)	0.004*
Reason for suicidal poisoning	Family disharmony	31 (40.3)	25 (80.6)	6 (19.4)	
	Marital disharmony	10 (12.9)	6 (60)	4 (40)	
	Exam failure	8 (10.4)	4 (50)	4 (50)	
	Unplanned pregnancy	15 (19.5)	5 (33.3)	10 (66.7)	
	Conflict in work area	13 (16.9)	9 (69.2)	4 (30.8)	
Route of poisoning	Oral	111 (74.0)	65 (58.6)	46 (41.4)	
	Inhalational	38 (25.3)	19 (50)	19 (50)	
	Bite	1 (0.7)	1	0	
Source of poisoning	Home	81 (54.0)	52 (64.2)	29 (35.8)	
	Hotel	33 (22.0)	21 (63.6)	12 (36.4)	0.005*
	Workplace	36 (24.0)	12 (33.3)	24 (66.7)	

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Table – II: Type of poisoning agent, time to arrival, status, hospital stay, and treatment of participants (*n*=150)

Characteristics		Total n(%)	Treatment outcome		p value
			Good n(%)	Poor n(%)	
Pesticide poisoning	Organophosphate	62 (41.3)	39 (62.9)	23 (37.1)	
	Zinc phosphide	9 (6.0)	4 (44.4)	5 (55.6)	
	Benzene	1 (0.7)	1		
Household poisoning	Kerosene oil	2 (1.3)	0	2	
	Food	21 (14.0)	18 (85.7)	3 (14.3)	
	Carbon monoxide	12 (8.0)	8 (66.7)	4 (33.3)	
	Alcohol	3 (2.0)	3	0	
	Cleaning substance	16 (10.7)	10 (62.5)	6 (37.5)	
Type of drug poisoning	Misoprostol	1 (0.7)	0	1	
	Chlorpromazine and diazepam	6 (4.0)	4	2	
	Acetaminophen	10 (6.7)	8 (80)	2 (20)	
	Aspirin	1 (0.7)	1	0	
	Promethazine	1 (0.7)	1	0	
	Haloperidol	4 (2.7)	0	4	
Animal poisoning	Snake bite	1 (0.7)	0	1	
Time to arrival (h)	<1	43 (28.7)	24 (55.8)	19(44.2)	**0.89**
	⩾1	107 (71.3)	61 (57)	46 (43)	
Status at admission	Conscious	83 (55.3)	71 (85.5)	12 (14.5)	**0.0***
	Unconscious	67 (44.7)	14 (20.9)		
Length of hospital stay (day)	<1	30 (20.0)	21 (70)	53(79.1)	0.09
	>1	120 (80.0)	64 (53.3)	9 (30)	
Treatment given	Gastric lavage	16 (10.7)	11 (68.8)	56(46.7)	
	Antidotes	30 (20.0)	21 (70)	5 (31.2)	
	Histamine 2 receptor blocker	51 (34.0)	24 (47.1)	9 (30)	
	Antiemetics	1 (0.7)	1	27(52.9)	
	Normal saline	31 (20.7)	16 (51.6)	15(48.4)	
	Intranasal oxygen	21 (14.0)	12 (57.1)	9 (42.9)	

Table – III: Use of antidote in participants (*n*=150)

Poisoning (n)	Antidote(n)
Organophosphate (62)	Atropine (18)
Carbon monoxide (12)	Oxygen (7)
Acetaminophen (10)	N-acetylcysteine (4)
Diazepam (2)	Flumazenil (1)

Table – IV: Multivariable analysis of factors associated with poor treatment outcome of (*n*=150)

Variables		Treatment outcome		Crude odds ratio (95% CI)	AOR (95% CI)	p value
		Good (%)	Poor (%)			
Sex	Female	40(62.5)	24 (37.5)	1	1	1
	Male	45(52.3)	41 (47.7)	1.31 (0.62–1.8)	0.34	
Age (years)	<18	26(57.8)	19 (42.2)	1	1	1
	19–37	53(59.6)	36 (40.4)	0.93 (0.4–1.9)	0.81 (0.3–1.2)	0.22
	>38	6(36.5)	10 (62.5)	2.28 (0.7–7.4)	2.14 (0.4–6.3)	0.31
Mode of poisoning	Accidental	45(61.6)	28 (38.4)	1	1	1
	Suicidal	40(51.9)	37 (48.1)	1.49 (0.78–2.8)	2.44 (1.1–5.4)	0.028*
Source of poisoning	Home	52(64.2)	29 (35.8)	1	1	1
	Hotel	21(63.6)	12(36.4)	1.02 (0.4–2.4)	0.8 (0.24–1.8)	0.45
	Workplace	12(33.3)	24 (66.7)	3.58 (1.6–5.2)	2.45 (0.94–4.3)	0.08
Drug poisoning	No	76(59.8)	51 (40.2)	1	1	1
	Yes	9 (39.1)	14 (60.9)	2.32 (1.3–4.7)	2.13 (1.21-3.32)	0.006*
Time to arrival (h)	<1	24(55.8)	19 (44.2)	1	1	1
	⩾1	61 (57)	46 (43)	0.95 (0.46-1.94)	1.2 (0.82–1.96)	0.092

DISCUSSION

Suicide and drug poisoning were linked to poor treatment results for acute poisoning. Of the 150 individuals admitted with acute poisoning, 56.7% recovered and 16.7% died. The study indicated that acute poisoning was most common among those aged 19-37 years. Other research found comparable findings[11,12]. Individuals may experience heightened stress due to various social, economic, and occupational pressures[13]. The current study found that acute poisoning was more prevalent in females (57.3%) compared to males, which is consistent with previous findings[14]. Rural societies have sociocultural traits, poor social standing, and a lack of economic freedom. Suicidal ideation may occur among women[15]. Similar to previous research in Eastern Nepal, Kenya, and Gondar, the most common cause of poisoning was organophosphate[16,17]. This could be owing to the toxic agent's widespread use in agriculture and a lack of awareness about its safe use in homes[18]. Unlike the current study, studies conducted in Debretabor General Hospital, Addis Abeba, South Africa, and Uganda found that rat poisoning, medication poisoning, and domestic chemical poisoning were responsible for the greatest number of cases, respectively[14,19]. This disparity could be attributed to differences in the availability of poisoning agents as well as the agricultural community's dominance. This study found that more than half of poisoning victims were suicidal, consistent with findings from prior studies in Karnataka, Jimma University Specialized Hospital, Nepal, and Ondukoz Mayis University Hospital[20,21]. In the current study, stomach lavage was performed in 10.7% of poisoning cases, which is lower than in previous studies conducted in India (80%), Debre tabor (48.3%), and Jimma (81%)[22,23]. The lower utilization of gastric lavage in the current study could be attributed to the delayed arrival of poisoned patients at the hospital. In addition, 29.0% of instances of organophosphate poisoning were treated with atropine, which differs from research conducted in India[23]. This variance could be attributed to variations in the availability of atropine. In this study, 16.7% of patients with acute poisoning died. This study's death rate was lower than those reported in Birjand (19.5%), Debretabor General Hospital (18.6%), and Tehran (17.7%), but higher than studies in Andhra Pradesh (8.47%), Bengal (15.03%), Maharashtra, Wellega (7.1%), and Tikur Anbessa Specialized Teaching Hospital (8.6%)[14,19]. The disparity could be attributed to factors such as antidote availability, poison kind, dose, and time between poison intake and medical intervention. Similar to a study conducted at Desse Referral Hospital, this analysis discovered no documented deaths due to benzene, alcohol, aspirin, or promethazine intoxication[22]. This could be attributed to an early presentation to the hospital and proper treatment. In this study, more than half of the cases (56.7%) were successfully treated and discharged. The findings were consistent with earlier research conducted in Jimma, Adama, Nepal, and West Bengal[24,25]. In the current study, a lower proportion of partially recovered patients were recorded than in a previous study conducted in Birjand[26]. Variations in case management practices may explain this disparity. This study found a link between suicidal behaviour and poor treatment

outcomes for acute poisoning. The findings contradict previous studies conducted in Turkey, Ethiopia, and Eastern Nepal, which found no link between manner of poisoning and poor treatment outcomes for acute poisoning[11,26]. The study found that participants who were poisoned by medicines were 2.13 times more likely to experience poor treatment outcomes compared to those who were not poisoned. To reduce the number of severe acute poisoning cases, it is recommended to improve drug use and provide patient counselling[14].

Limitation of the Study:

This was a single-centre study with a small sample size; therefore, the results may not be representative of the actual circumstance.

Conclusion and recommendation:

The majority of cases in our analysis had acute poisoning, which was more prevalent at home and linked to oral organophosphate use. Drug and mode of poisoning were important risk factors for mortality and morbidity, which are linked to inadequate acute poisoning treatment results.

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