



**ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCE
DEPARTMENT OF EMERGENCY AND SURGICAL NURSING**

**TREATMENT OUTCOME AND ASSOCIATED FACTORS AMONG
PATIENTS ADMITTED WITH ACUTE POISONING IN SELECTED
GOVERNMENTAL HOSPITALS IN ADDIS ABABA, ETHIOPIA, 2024.**

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A research proposal was submitted to the Department of EMCCN and College of Health Science as a partial fulfillment of a requirement of a MSc in EMCCN.

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Abbreviations/Acronyms

AaBET	Addis Ababa Burn, Emergency and Trauma
AAPCC	American Association of Poison Control Center
ALERT	All Africa Leprosy, Tuberculosis and Rehabilitation Center
DALY	Disability Adjusted Life-Years
EDs	Emergency Departments
EFMOH	Ethiopian Federal Ministry of Health
ICU	Intensive Care Unit
PIC	Poison Information Centre
SPHMMC	Saint Paul's Hospital Millennium Medical College
SPSS	Statistical Package for Social Science
TASH	Tikur Anbesa Specialized Hospital
TESS	Toxic Exposure Surveillance System
UAPP	Unintentional Acute Pesticide Poisoning
UK	United Kingdom
WHO	World Health Organization
2, 4-D	2, 4-Dichloro Phenoxy Acetic Acid

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ABSTRACT

Background: Poisoning is one of the public health problems worldwide with a significant impact on developing countries. Acute poisoning is a medical emergency in which the toxic effects occur almost immediately, usually within hours from the time of exposure. In Ethiopia, the burden of acute poisoning is increasing due to changes in lifestyle, availability of chemicals, and social behavior organophosphate, herbicide, and rodenticides are responsible for the highest number of case fatalities. By this time there is no multicenter study done on the outcome and associated factors of acute poisoning cases presenting to the emergency room in Addis Ababa governmental hospitals and this study will fill the gap in this area.

Objectives: This study aims to assess the treatment outcome and associated factors of acute poisoning among patients admitted in Addis Ababa governmental hospitals, Addis Ababa, Ethiopia, from January 2021 to January 2023.

Methods: Institutional-based multicenter retrospective study design was conducted on treatment outcomes and associated factors of acute poisoning cases in Addis Ababa selected governmental hospitals from January 2021 to January 2023 using a simple random sampling technique. Data were collected from the patient's chart analyzed by SPSS version 26. Descriptive statistics like frequencies and cross-tabulation were made for most selected variables. The result was presented by using tables, charts, and graphs.

Result: Data were collected from 371 individuals 220(59.3%) were female, 227(61.2%) were aged 13 – 24, 181(48.7%) were students, (46.6%) of the cases came with referral paper from other health institutions 47(20.3%) were GI decontaminated. Mechanically ventilated ($p=0.002$) with respiratory symptoms($p=0.002$) and organophosphate poisoning($p=0.024$) were significantly risk factors with poor outcome of the patients.

Conclusion: - Organophosphate, intubated and patients with respiratory symptoms had leading cause of death. Therefore, generating community awareness, decreasing easily accessibility of drugs, and designing prevention strategies must be considered to reduce morbidity and mortality related to poisoning.

Keywords: - Treatment, Outcome, Poisoning, Organophosphate.

1. Introduction

1.1 Background

Poison is defined as any chemical that can change or impair the normal physiology of humans through general or local damage to cells or death by its chemical activity. Poisoning occurs by the absorption of chemical, physical, or organic substances into the body through the gastrointestinal tract, skin, mucosa, or respiratory tract or parentally causing damage to the cells, tissue, and organs(1).

Poisoning is a common reason for emergency department visits and hospitalization worldwide with major morbidity and mortality in many countries(2). It is the third most common emergency in pediatrics leading to increased childhood morbidity and mortality(3). If the toxic effects occur immediately, usually within hours from the time of exposure, it is called acute poisoning(2). Chronic poisonings with delayed health effects are often more problematic in the long run(4). Acute poisoning is exposure to poison for less than 24hr and it is the main cause of emergency admission(5). Acute poisoning can result from exposure to various substances including, drugs, chemicals, toxins, and can cause a range of symptoms, from mild to life-threatening, depending on the type and amount of toxic substance being involved(6). It is high in low and middle-income countries, where access to appropriate medical care and antidote may be limited(7). It is important to know the epidemiology of poisoning and changes for healthcare personnel and emergency physicians(1).

According to the World Health Organization (WHO), approximately three million acute cases with 200,000(6.7%) fatality rate annually 90% of them are from developing countries. Pesticide poisons in the workplace are also common in developing countries, due to the unknown dangerous effects of poisonous substances, ignorance, lack of protective clothing, and unsafe practices. Of those pesticide-poisoning patients half a million die every year (8).

The impact of acute poisoning is well-documented in most developed countries. The Toxic Exposure Surveillance System (TESS) data, gathered by the American Association of Poison Control Centers (AAPCC), for instance, offers evidence about poisonous contacts and subsequent health impacts all over the United States and is used to determine emerging hazards, to focus prevention and education programs and to guide clinical research(9).

In the United States of America, 61 Poison Information Centres (PIC) more than 2.4 million people were exposed and 1315 were fatalities with a case fatality rate of 0.05%(10).

Europe and developed countries like the UK had the highest rates of intentional poisoning and the most common poisoning substance is pharmaceutical drugs(11) over the past 10 years, the number of poisoned patients presenting to emergency departments (EDs) has increased, accounting for 5%–10% of an ED's workload(12,13).

In developing countries majority of the are deliberately poisoned themselves where resources and expertise are limited with high morbidity and mortality (14–16). In Africa, there was deliberate self-poisoning with pesticides with 7800 deaths per year, and in Ethiopia, according to hospital-based studies intentional poisoning is common with case fatality rate, ranging from 1.5% to 18.6% and it is the most common clinical emergency (17) and organophosphate, herbicides, and rodenticides are responsible for the highest number of case fatalities. In Ethiopia, the increasing number of acute poisoning is because of the availability of poisoning substances, changes in lifestyle, ignorance, and different social behaviors (5). Different socioeconomic groups, cultural groups, and healthcare facilities have different case fatality rates of acute poisoning(18). In different studies, household detergents and pesticides were the most common causes of poisoning(6,19,20).

Effective management of acute poisoning requires a multidisciplinary approach involving healthcare providers, toxicologists, and public health officials. Treatment typically involves gastric lavage, activated charcoal, supportive care, a specific antidote when available, and psychosocial intervention. However, the effectiveness of treatment depends on several factors including the type and amount of the toxic substance, the route of exposure, time elapsed since the exposure, age, health condition of the patient, and effectiveness of the treatment being provided. The success of the treatment can range from complete recovery to severe complications or even death in some cases(21).

Knowledge of the severity and nature of poisoning agent is important to take appropriate preventive measures so in Ethiopia lack specific laboratory tests for specific poison, lack of toxicological expertise among health professionals, and lack of poison centers increases the adverse health impacts on poisoned patients(21). There is a limitation in epidemiology and outcomes of clinical management of acute poisoning in emergency department at the hospital

level(22). However, this study aims to assess the outcomes and associated factors of acute poisoning among patients who had been admitted to the emergency ward in the study area.

1.2 Statement of the problem

Poisoning is a significant global public health problem and cases are increasing day to day due to changes in lifestyle and social behavior. Advances in technology and social development have resulted in the availability of most drugs and chemical substances in the community(23). Poison may be defined as any agent that can injure, kill, or impair normal physiological function in humans, producing general or local damage or dysfunction in the body(1). Poisoning is one of the major causes of patient admissions to emergency departments and intensive care units, especially in developing countries(24). The poison causes most organ damage and even causes death. It affects almost all systems in the respiratory system respiratory failure may happen because of inadequate ventilation due to decreased protective reflex function and aspiration of gastric contents this is because of a decreased level of consciousness in the nervous system. Massive aspiration of gastric contents into the lungs with chemical pneumonitis and pulmonary damage is a major cause of death. In cardio ventricular system hypovolemia is due to loss of body fluid and decreased heart contractility and hypervolemia is due to fluid over-resuscitation and abnormal cardiac rhythms due to its chemical effect on heart(25).

The causes of poisoning can be deliberate or accidental. In developing countries deliberate self-poisoning were increased and reached epidemic proportions because of easily accessibility and unrestricted distribution of insecticides and rodenticides to meet social demand of agricultural products(27). Lack of medical facilities and toxicology expertise ensure a high fatality rate(14). Common reasons for victims to be poisoned were labial emotions of mood disorders, breaking relationships, exam failure, conflict with families, losing their businesses, having health-related issues, and poison substances accessibility at marketplaces are the common reasons for increasing intentional poisoning(27).

The exact number of incidences can be higher because most cases of poisoning go unreported(23). In 2016 WHO estimated that 106,683 cases die because of accidental poisoning and 6.3 million were disability-adjusted life years (4) indicating that one person dies every 40 seconds because of suicide commitment globally. From those 20% of suicides globally were due

to self-poisoning of pesticides mostly in rural areas of developing countries(28). The most common cause of suicidal death globally is due to poisoning by chemical agents(8).

It is believed that between 750, 000-3,000,000 Organophosphate poisoning cases occur globally every year. Mortality is higher in developing countries where Organophosphate and pesticides are readily available and may be misused for suicide; they are estimated to cause 300,000 fatalities annually(29).

In Ethiopia, hospital-based studies show that the case fatality rate was in the range of 2.4% to 8.6%. this is because easy accessibility of agricultural chemicals, rapidly growing chemicals, lack of toxicological expertise among health professionals, and lack of poison centers may increase the likelihood of adverse health impacts of acute poisoning to the public(30). This can be minimized by reducing the availability and access to highly toxic pesticides as well as by having a well-organized healthcare system (30) Thus, knowledge about the prevalence of poisoning, its characteristics or nature, and treatment outcome are important to the public, policymakers, emergency physicians, and health practitioners to take prompt and appropriate measures to save lives and reduce morbidity and mortality(29).

Several factors can influence the treatment outcome of poisoning cases, including the type and quantity of toxic substance, the time elapsed since the exposure, the patient's age and underlying health condition, availability of medical resources and expertise, and the quality of care provided. Understanding these factors is crucial for optimizing treatment strategies and improving patient outcome(31).

1.3. Significance of the study

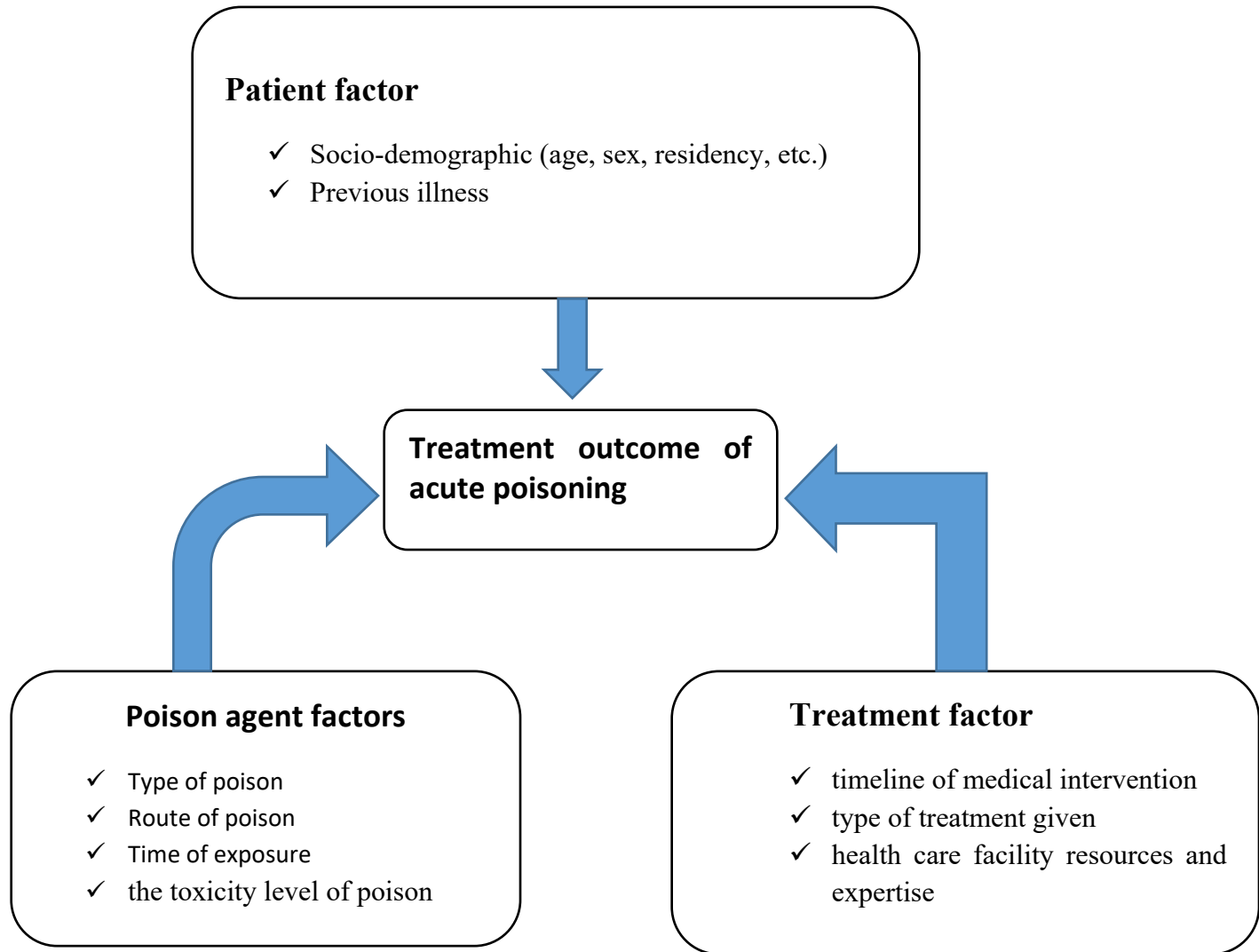
Acute poisoning constitutes one of the main reasons why patients visit emergency departments of hospitals. However, in our country, there is limited study done on the treatment outcome and associated factors of acute poisoning.

This study was to help identify any gap or weakness in the current treatment protocol, which can be addressed to improve patient care. It can also help to inform public health policymakers to improve the overall management of poisoning cases.

The other benefit of studying outcomes and factors associated with acute poisoning is to help develop new and improved treatment options by analyzing the effectiveness of current treatments; researchers can identify areas of improvement to be more effective in treating poisoning. Additionally, by understanding factors that contribute to the poor treatment outcome of poisoning, healthcare providers can develop more personalized treatment plans that are tailored to the individual needs of each patient.

Generally, this study was to help identify treatment outcomes and associated factors of acute poisoning to help raise awareness about the dangers of poisoning and to promote preventive measures such as education campaigns and the implementation of safety regulations, it can also help in improving patient care, reducing mortality rate, and informing public health policymakers.

Conceptual framework



1. Literature review

1.1 Treatment Outcome of Acute Poisoning

Epidemiologic data from WHO shows 2 - 3 million cases of acute poisonings throughout the world from those 1 million are severe poisonings and result 200000 deaths annually(2).

A study done on epidemiology and outcomes of patients admitted to critical care after self-poisoning in the UK showed that 461 (96%) patients were discharged alive, 20 (13 male, 7 female) patients died and 46 (10%) were transferred to a psychiatric hospital. (32).

A retrospective descriptive study in Shenyang China shows that the overall death rate is 1.3% and the rest survived (33).

Another retrospective cross-sectional study done on the Epidemiology and clinical profile of acute poisoning in patients admitted to the intensive care unit of Iran has shown that 19.5% of the cases had poor treatment outcome(34).

In India, a study done on the clinical profile of patients with acute poisoning showed that 18.2% of patients died (35).

In Bangalore study done on the patterns of poisoning and Outcome of acute poisoning showed 99% of the patients were discharged alive with an average duration of hospital stay of 5 days (36).

Another hospital-based quantitative study in Nepal has shown most of the patients with poisoning have required intensive care unit admission. The majority of these patients have shown systemic effects of poisoning. The majority of the patients have recovered and were discharged to home but, 3.8% of the acute poisoning cases have died(37).

Similarly, a cross-sectional study done in Zambia showed the overall mortality rate of acute poisoning was 2.6% (38).

In Tanzania, of total poisoning cases, 90.2% had good treatment outcomes, and the rest 9.85% died (39).

In South Africa, a hospital-based cross-sectional study showed that the case fatality rate of acute poisoning was 2.4% (40).

A cross-sectional study on the profile and outcome of acute poisoning cases done in toxicological treatment and control centers in Egypt from January 2017 to the end of December 2021 shows that 4% of the total cases have died while the rest have recovered (41).

Similarly in Gondar Comprehensive Specialized Hospital, a prospective follow-up study shows 17.6 % had poor treatment outcomes (5).

In a cross-sectional study done in eastern Ethiopia, 150 patients' medical records were reviewed and 16.7% case fatality rate was observed and the rest had good treatment outcomes (22).

Another hospital-based study done in western Ethiopia shows out of 211 poisoning cases 7.1% had died (18).

A retrospective cross-sectional study done in Mettu referral hospital in west Oromia suggests majority of the patients have survived(42).

A similar study at Jimma University on 103 acute poisoning cases showed most cases of acute poisoning were improved and discharged and the case fatality rate of acute poisoning was found to be 5.8%(43).

In another study done on patients admitted to Adama Hospital Medical College in 211 cases of pharmaceutical and chemical poisoning showed a 4(1.37%) case fatality rate and the majority of the patients(98.63%) were improved and discharged to home(23).

A cross-sectional study done in St Peter Hospital found that most of the patients came 4-8 hours of their exposure. The overall mortality rate was 7.4%, while the recovery rate was 89.9% (31).

In Tikur Anbessa Specialized Hospital from a total of 116 cases, 8.6% of the patients have died and the rest of them have improved (19).

A cross-sectional study done in AeBET hospital found that Organophosphate poisoning was the most common poison 32.6% of all poisoned patients came before 2hrs and the rest came after 2 hrs of their exposure to the poisoning agent. The overall mortality was 10.2% (22).

2.2 Factors associated with poisoning outcome

A ten-year retrospective study done in Turkey on the trend in acute poisoning and factors affecting the hazardous outcome suggested that being directly transferred without medical intervention, late arrival to the hospital and, the type of poison have significant associations with poor treatment outcomes of poisoning(44).

A study in Shenyang China shows that Being female, in the 40–59 age group, living in urban areas, suicide attempts, and types of poison were significant associations with poor treatment outcome(32).

The Epidemiology and clinical profile of acute poisoning in patients admitted to the intensive care unit of Iran has shown that the type of poisoning has a significant association with poor treatment outcome(34).

A study done in India suggested that type of poisoning, time elapsed from the exposure to the hospital, and whether or not they have received pre-referral care(first aid) had significant factors for poor treatment outcomes (35).

A study done in Bangalore shows that delay in hospital admission was found to be a factor associated with poor treatment outcomes of poisoning(36).

A hospital-based quantitative study in Nepal had shown pesticide poisoning is associated with most hospitalization cases and more than half (59.9%) arrived within 1 and 3 hrs (37).

A study done in Zambia shows that being male and type of poison(mainly pesticides and drugs) are found to be statistically associated with poor outcomes of poisoning(38).

A study done in Tanzania shows socio-demographic characteristics and intentional self-poisoning are among the factors identified to have an association with poor treatment outcome(38).

In South Africa cross-sectional study shows that types of poison mainly carbon monoxide and organophosphate poisoning, and being female were significant factors for poor treatment outcomes (40).

Cross-sectional study done in a toxicological treatment and control center in Egypt shows the type of poison was found to be significantly associated with the outcome of these patients(41).

In Gondar Comprehensive Specialized Hospital a prospective follow-up study shows that the total death reported type of poisoning and having a known medical co-morbid illness were with unfavorable outcomes(5).

Debre Tabor General Hospital, the mortality among males was higher than the mortality among females, and rodenticide (rat poison) was the most common poison associated with death. The mortality rate was found to be low in patients who underwent gastric lavage compared to those who did not. Half of the patients were discharged from the emergency department with good outcomes and the rest were admitted to the ward(45).

A retrospective hospital-based study done in Bahir Dar Felege Hiwot intensive care unit showed aluminum phosphide is the leading cause of death and nearly two-thirds of poisoning cases have died(46).

In a cross-sectional study done in eastern Ethiopia route of poisoning and pharmaceutical poisoning were risk factors for poor treatment outcomes of acute poisoning(22).

Another hospital-based study done in western Ethiopia type of poisoning and time elapsed from exposure to the arrival of hospitals are found to have a significant association of poor outcomes(18).

A retrospective cross-sectional study done in Mettu Referral Hospital Southwest Oromia shows that factors such as age, place of residence, type of substance taken, and time elapsed since the exposure to arrival to the hospital are significant predictors(42).

A cross-sectional study done in St Peter's Hospital found that the presence of comorbidity and the type of poison were significant predictors of treatment outcome of acute poisoning(31).

A retrospective study in Tikur Anbessa Specialized Hospital shows Organophosphate poisoning, sodium hypochlorite, and being female are among the factors that are found to have a significant association with the case fatality rate(19).

A cross-sectional study done in AeBET hospital found that 2,4-D poisoning and aluminum phosphide poisoning was responsible for 60% of deaths(21).

3. Objectives

3.1 General Objective

To assess the treatment outcome and associated factors of acute poisoning cases among adult patients admitted to emergency departments at Addis Ababa governmental hospitals Addis Ababa, Ethiopia, from January 2021 – January 2023.

3.2 specific objectives

To determine the treatment outcome of acute poisoning cases among adult patients admitted to emergency departments at Addis Ababa governmental hospitals, Addis Ababa, Ethiopia from January 2021 to January 2023.

To assess factors associated with treatment outcome of acute poisoning cases among adult patients admitted to the emergency department at Addis Ababa governmental hospitals, Addis Ababa, Ethiopia, from January 2021 to January 2023.

4. Methods

4.1. Study area and period

The study was conducted on patients with acute poisoning who visited selected governmental hospitals in Addis Ababa from January 2021 to January 2023. Those selected hospitals are Tikur Anbesa Specialized Hospital (TASH), St. Paul's Hospital Millennium Medical College (SPHMMC), and St. Peter Specialized Hospital. SPHMMC is one of the major federal hospitals under the EFMOH found in Addis Ababa, the capital of Ethiopia. It has 426 beds and serves 200,000 patients annually, and has a catchment of 5,000,000 populations. On the other side, AaBET is an affiliate Hospital of SPHMMC and it was opened by the FMOH in August 2015 with the mission of managing burn, emergency cases, and trauma. Annually, the hospital serves 5,000 to 7,000 patients with a total of 250 beds. St Peter Specialized Hospital which is most known as being TB center receives patients from northern parts of Ethiopia. St Peter's Specialized Hospital is the only hospital in the country that has an isolated toxicology ward and ICU and TASH offers diagnosis and treatment for approximately 370,000-400,000 patients a year. The hospital has 800 beds. The emergency department sees around 80,000 patients a year.

4.2. Study Design

Institutional-based multicenter retrospective study design were conducted in selected governmental hospitals of Addis Ababa from January 1, 2021, to January 1, 2023.

4.3. Population

4.3.1. Source population

The source population includes all acute poisoning patients visiting the emergency wing of TASH, SPHMMC, AaBET, and St Peter Hospital.

4.3.2. Study population

The study population includes all acute poisoning patients who visited the emergency department of TASH, St Peter, SPHMMC, and AaBET hospital due to acute poisoning from January 1, 2021, to January 1, 2023.

4.3.3. Sampling unit

The sampling units include adult patients who were acutely poisoned and presented to the emergency wing of TASH, St Peter, SPHMMC, and AaBET Hospital during the study period.

4.3.4. Inclusion and exclusion criteria

Inclusion criteria

All adult Patients who were acutely poisoned and presented to the emergency wing of TASH, St Peter, SPHMMC, and AaBET Hospital during the study period from January 1, 2021, to January 1, 2023, with complete medical records was included in the study.

Exclusion criteria

All adult patients whose medical records were found to be incomplete and chronic poisoning patients was not included in the study.

4.4. Sample size determination and sampling technique

4.4.1. Sample size determination

Medical records of patients who fulfill the inclusion criteria during the study period was included in the study and the minimum sample size were determined by using a single population proportion formula;

We used the confidence interval 95% $Z_{\alpha/2}$ of 95%=1.96, p -value was taken from a study done in western Ethiopia, p -value 32.5% ($p=0.325\%$) and $D=5\%$ then,

$$n = \frac{(Z_{\alpha/2})^2 p \times q}{d^2}$$

$$n = \frac{(1.96)^2 \times (0.325)(0.675)}{(0.05)^2} = 338$$

Variables	Confidence level	Margin of error	P	Q	Sample size
Poor treatment					

outcome(death)		95%	5%	10.2%	89.8%	141
Type of poison(organophosphate)		95%	5%	32.7%	67.3%	338
Mode of poisoning(suicidal)		95%	5%	31.6%	68.4%	332

From previous studies, 10.2% of cases had poor treatment outcomes (22).

32.7% of poor treatment outcomes of poisoning are associated with organophosphate poisoning(18).

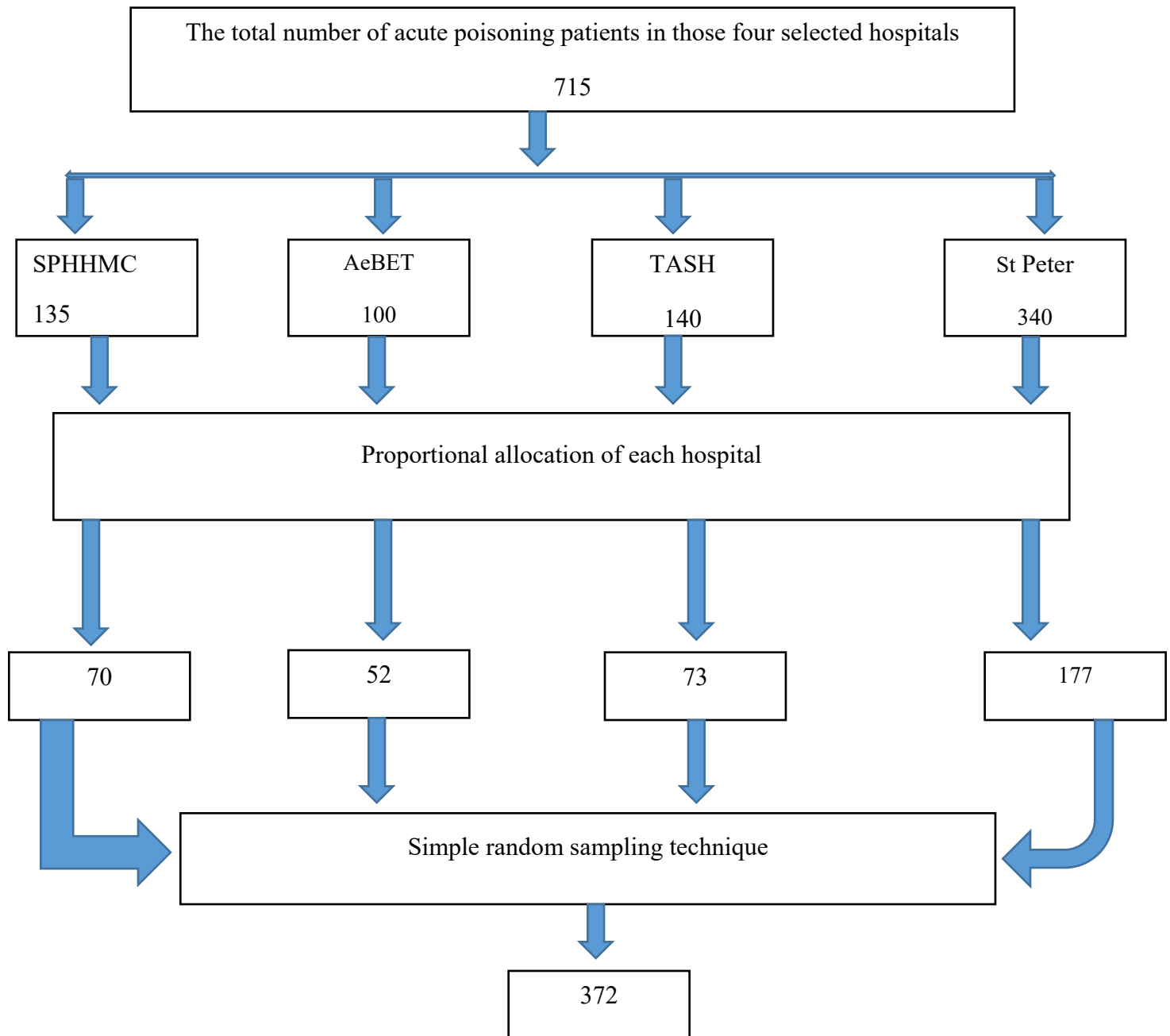
31.6% of poor treatment outcomes of poisoning are associated with intentional poisoning(18).

Therefore, we take a large number of sample size 338 and by adding 10% for the incomplete medical record the sample size for this study will be 372.

4.4.2. Sampling technique

A total of 372 poisoned cases who presented to the selected hospitals during the mentioned study period were included. The number of patients from each hospital was selected based on proportional allocation and a simple random sampling technique was used from each hospital to get each individual.

Sampling techniques



4.5. Variables

4.5.1. Dependent variable(s)

Treatment outcome of poisoning

4.5.2. Independent variables

Age

Sex

Place of residence

Type of poisoning substance

Route of poisoning

Presence of comorbidities

Time elapsed from poisoning to hospital arrival

Clinical presentations

The status of patients when coming to the hospital

Treatment given for acute poisoning

4.6. Operational Definition

Poor treatment outcome: In this study, poor treatment outcome of poisoning is interpreted as the occurrence of death, organ failure, or organ damage(21).

Good treatment outcome: A good treatment outcome of poisoning is if they completely recover from poisoning and return to normal function(21).

4.7. Data collection tool and techniques

A data abstraction format adapted from other literature was used to record the necessary information from patient's medical records(21,22). The data abstraction format was prepared in English language and it include variables like socio-demographic data (sex, age, residence of patients), associated factors (route of poisoning, type of poisoning, the status of patients when coming to the hospital, reason of patients for taking the poison, time of arrival to the emergency of the hospital, source of poisoning agents, treatment given for the acute poisoning) and treatment outcome. The medical records of acutely poisoned patients were captured by taking medical record numbers from the registration manual of the emergency department. After selecting the medical record numbers of poisoning cases, the medical records were obtained from the medical record room.

4.8. Data quality control and management

The data collection tool was pretested on 5% of acute poisoning patients to check the quality of the tool. The pretest was done in Yekatit 12 Hospital and those patients who was included in the pretesting was not included in the actual data collection. Data quality was assured by checking the completeness of the format.

4.9. Data analysis

The structured data collection tool was prepared to be used by Android phones, with the ODK/Kobo collect application, the data collected with the ODK app were transferred to SPSS version 26 for analysis. Tabular presentations were used for socio-demographic variables and findings. A binary logistic regression statistical test was used to analyze associations or differences of outcome variables with the different independent variables. Results are claimed to be significant if the p-value is less than or equal to 0.05.

4.10. Ethical and Legal Consideration

Ethical approval and permission were obtained from SPHMMC, AaBET, St Peter Hospital, and TASH. Confidentiality of patients was maintained at all levels of the study as the data abstraction format lacked patient identifiers.

4.11. Dissemination plan of results

The findings of the study were presented and submitted to Addis Ababa University College of Health Sciences Department of Emergency and Surgical Nursing as partial fulfillment for the award of MSc in EMCCN. Furthermore, the manuscript attempt was made to be published in different scientific journals.

5. Results

Socio-demographic results

A total of 372 patient's medical records were reviewed. Among these, 371 patient's medical records had complete information and were included in the final analysis with a response rate of 99.73%. The majority of participants 227 (61.2%) were in the age group of 13–24 years. The mean age of the study participants was 24.82 years (Range: 15 - 70 years and SD = 8.554 years). Two hundred twenty (59.3%) were females. Regarding their marital status, 264 (71.2%) were single followed by 99 (26.7%) were married. Regarding their education level 238(64.2%) were secondary school followed by 77(20.8) were college and above. About occupation status majority 181(48.7%) was student followed by 105(28.3%) self-employees.

Table 1: Socio-demographic characteristics of poisoned patients admitted at Emergency department of selected hospitals in Addis Ababa, Ethiopia, 2024 (n= 372).

Variables	Category	Frequency	Percentage
Age	13 – 24	227	61.2
	25 – 34	92	24.8
	35 – 44	42	11.3
	≥ 45	10	2.7
Sex	Male	151	40.7
	Female	220	59.3

Marital status	Single	264	71.2
	Married	99	26.7
	Widowed	4	1.1
	Divorced	4	1.1
Residency	Urban	302	81.4
	Rural	69	18.6
Educational level	Cannot read and write	14	3.8
	Primary school	42	11.3
	Secondary school	238	64.2
	College and above	77	20.8
Occupation	Governmental employee	20	5.4
	Self-employee	105	28.3
	Unemployed	24	6.5
	Student	181	48.7
	Housewife	24	6.5
	Merchant	10	2.7
	Farmer	7	1.9

One hundred seventy-three (46.6%) of the cases came with referral paper from other health institutions from those referred patients 102(44%) were resuscitated by fluid, 47(20.3%) were GI decontaminated, 42(18.5%) were antidote given and 40(17.2%) were given other interventions.

Most of the patients 343(92.5%) come greater than 2hr. The majority of the patients present (complains) 267(72%) GI symptoms followed by 76(20.5%) mental status changes.

The common agents of poisoning in decreasing order were: pharmaceutical drugs 208(56.1%), home detergents 45(12.1%), rodenticides 56(15.1%), organophosphates 44(11.9%), and herbal remedies 18(4.9%). In this study, 305(82.5%) patients were acutely poisoned intentionally (deliberate self-harm), while 64 (17.3%) of the cases accounted for accidentally exposed acute poisoning. The oral route (ingestion) is the most common route of exposure 310(83.6%) followed by inhalation 58(15.6%). There were only 21 patients (5.7%) with a history of past comorbid illness from those 10 (2.6%) were cases of hypertension, 8(2.1%) cases of cardiac illness, 8(2.1%) cases of epilepsy, 2(0.5%) cases of diabetes 1(0.3%) case of CKD and 3 (0.8%) with other types of chronic illnesses. There were 76(20.5%) patients with a history of past psychiatric illness and all of them were also on treatment. Twenty-two (5.9%) patients were mechanically ventilated from those ventilated patients 16 (4.3%) were with the indication of respiratory failure and the rest 6 (1.6%) were for airway protection. Eleven (3%) patients were taken home remedies.

Table 2: Type of poison and associated factors of poisoned patients admitted at Emergency department of selected hospitals in Addis Ababa, Ethiopia, 2024 (n= 372).

Variables	Category	Frequency	Percentage
Referral	Referred	173	46.6
	Not referred	198	53.4
Intervention during referral	GI decontamination	47	20.3
	Fluid resuscitation	102	44.0
	Antidote given	42	18.5
	Others*	40	17.2
Duration of time between poison	≥ 2	343	92.5
	< 2	28	7.5

exposure to ER arrival			
Main complaint and presentation	Mental status change	76	20.5
	GI symptoms	267	72.0
	Respiratory symptoms	26	7.0
	Asymptomatic	2	0.5
Type of poisoning	Organophosphate	44	11.9
	Rodenticides	45	12.1
	Pharmaceutical drugs	208	56.1
	Herbal remedies	18	4.9
	Home detergent	56	15.1
Source of poisoning	Workplace	6	1.6
	Home	365	98.4
Intent of poisoning	Accidental exposure	64	17.3
	Deliberate to self-harm	305	82.2
	Recreational		
	Deliberately given by other	1	0.3
		1	0.3
Route of poisoning	Ingestion	310	83.6
	Inhalation	58	15.6
	Skin contact	2	0.5

	Injection	1	0.3
Previously known comorbidity	Hypertension	10	2.6
	DM	2	0.5
	Cardiac illness	8	2.1
	CKD	1	0.3
	Epilepsy	8	2.1
	Others**	3	0.8
	No	350	91.6
Previously known psychiatric	Yes	76	20.5
	No	295	79.5
Mechanical ventilated	Yes	22	5.9
	No	349	94.1
Indication for MV	Airway protection	6	1.6
	Respiratory failure	16	4.3

Poison outcome and factors affecting the outcome

Out of 371 poisoning cases, 355 (95.7%) were discharged alive and the remaining 16 (4.3%) died of poisoning they encountered. Ten (2.6%) patients developed organ damage from those, 5(1.3%) were renal organ damage and 5(1.3%) were respiratory organ damage.

Figure 1: - Outcomes of poisoned patients.

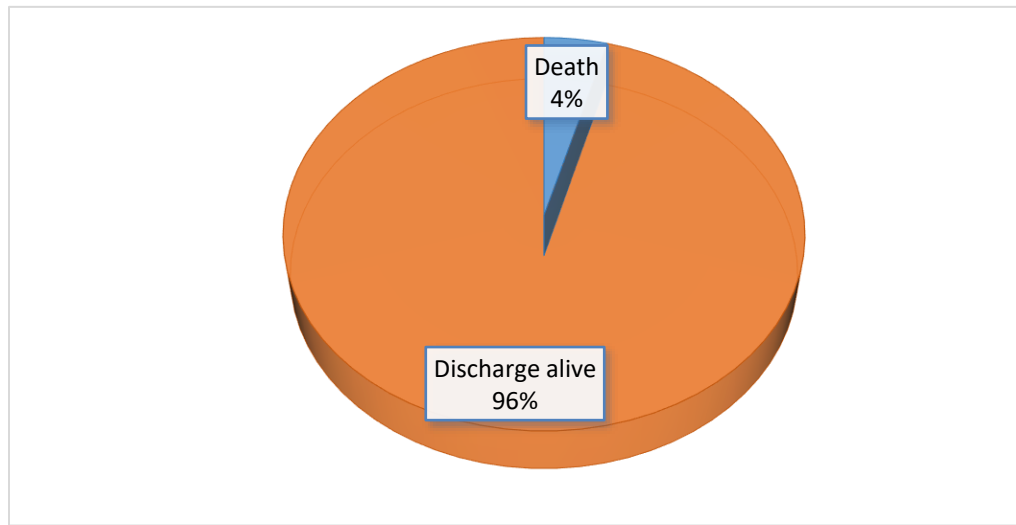


Figure 2: - Relation of type of poisoning with their outcomes.

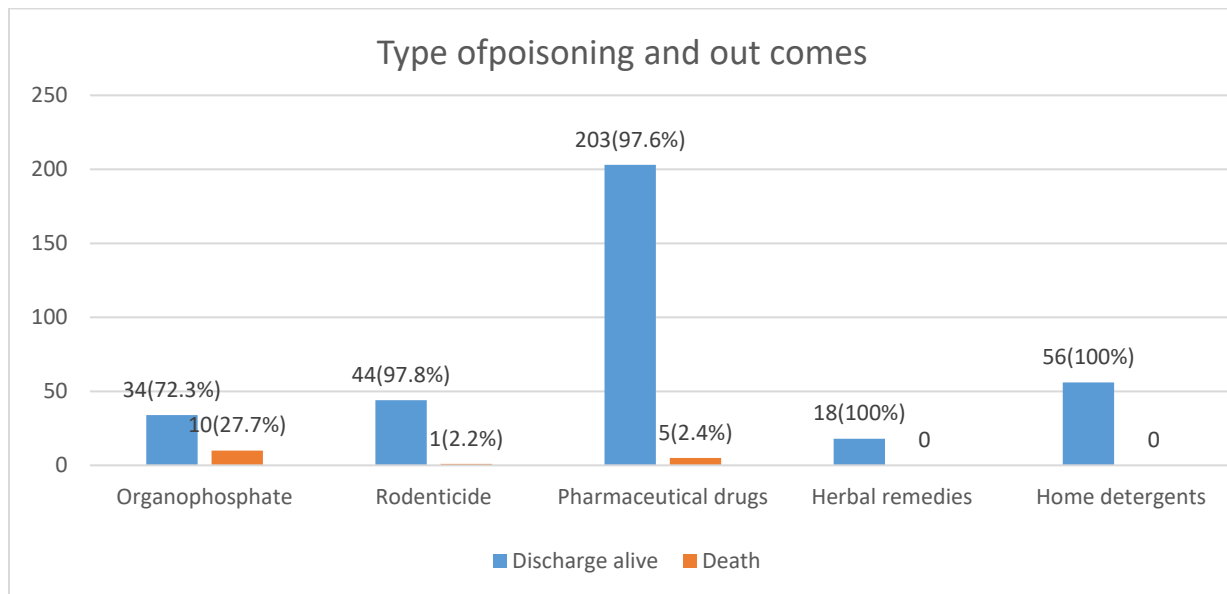


Figure 3:- Relation of main complaint (presentation) of poisoned patients and their outcomes.

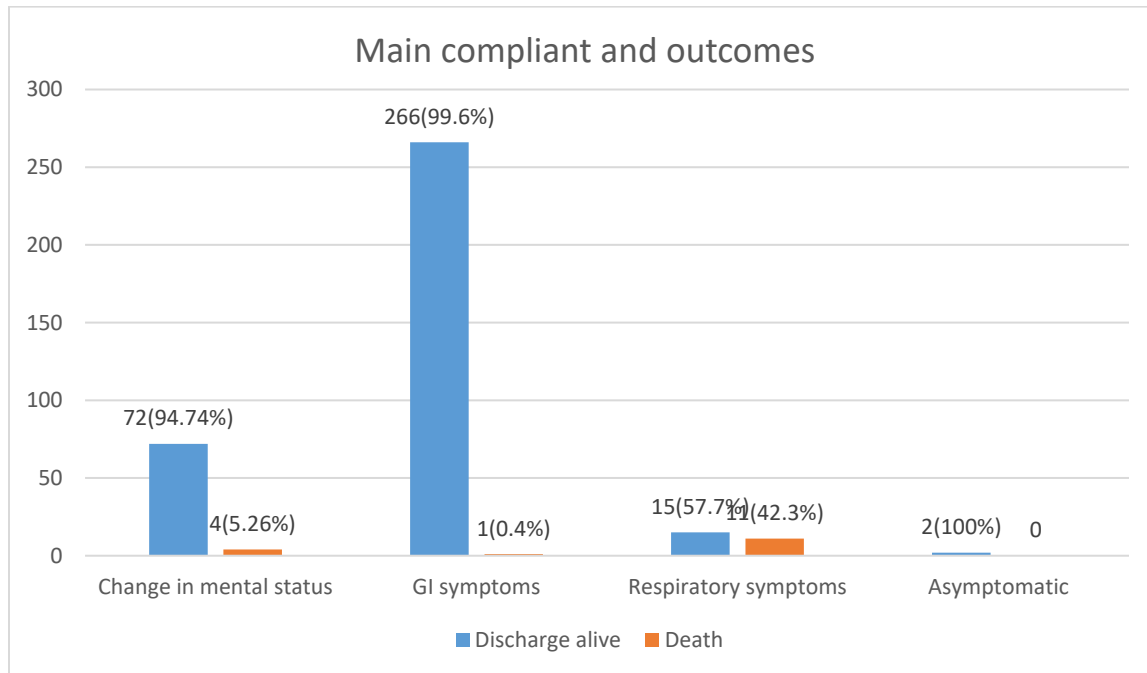
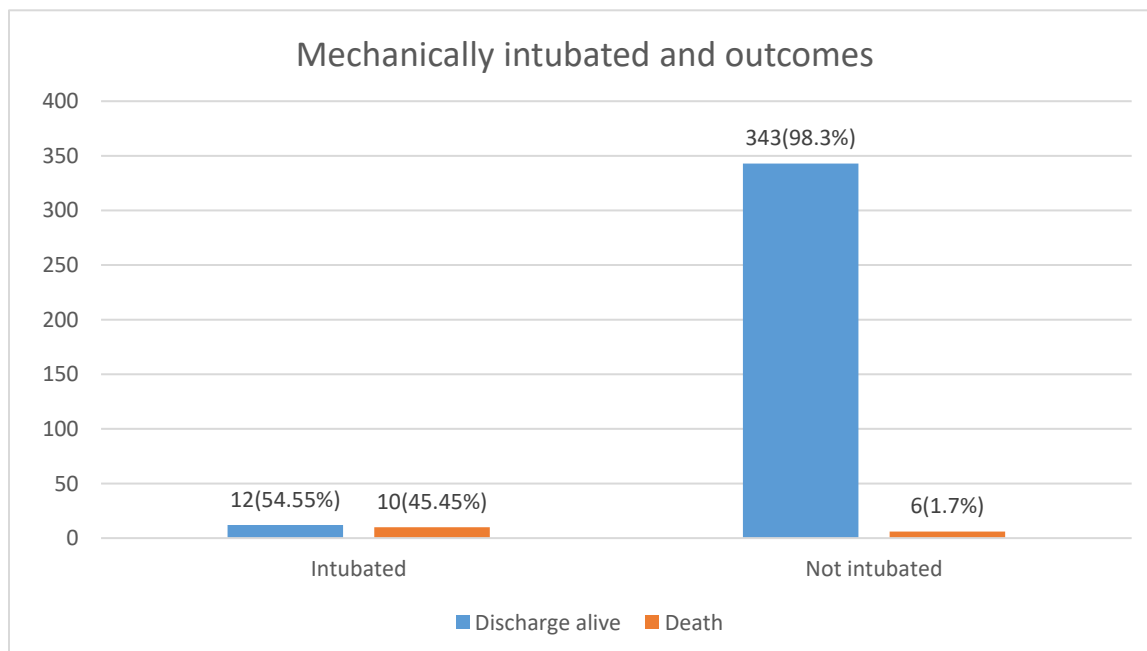


Figure 4: - Relation of mechanically ventilated patients with their outcome.



Factors associated with poor treatment outcome of acute poisoning

In bivariate logistic regression analysis, variables with p value less than or equal to 0.25 were entered into multivariable logistic regression analysis to control for potential confounding variables that affect the poor treatment outcome of acute poisoning. In bivariate analysis, variables such as residency, referral status, organophosphate poisoning, main complaint (presentation), and mechanical ventilation had a p -value of less than 0.25. These variables were used in a multivariable model. In multivariable logistic regression analysis, Mechanical intubation with respiratory symptoms, and organophosphate poisoning were significantly associated with poor treatment outcomes of acute poisoning. From a total of 44 organophosphates-poisoned patients 10 (22.7%) were dead, from twenty-two mechanically ventilated poisoned patients 10 (45.45%) were dead, and from twenty-six patients presented with respiratory symptoms 11 (42.3%) were dead.

Table 4: - Bivariate logistic regression analysis of factors associated with poor outcome of acute poisoning in selected governmental hospitals in Addis Ababa, 2024 (n=371).

Variables	Categories	Outcome		COR (95%)	P-value
		Discharge alive	Death		
Residency	Urban	296	6	0.12(0.42, 0.342) *	0.0
	Rural	59	10	1	
Referral Status	Referred	159	14	1	0.005
	Not referred	196	2	0.116(0.026, 0.517) *	
Main complaint and presentation	Mental status change	72	4	1	0.017
	GI symptoms	266	1	0.068(0.007, 0.615) *	
	Respiratory symptoms	15	11	13.2(3.698, 47.117) *	
	Asymptomatic	2	0	0	
Type of poisoning	Organophosphate	34	10	1	

	Rodenticides	44	1	0.077(0.009, 0.633) *	0.017
	Pharmaceutical drugs	203	5	0.084(0.027, 0.26) *	0.00
	Herbal remedies	18	0	0	0.998
	Home detergent	56	0	0	0.997
Mechanical ventilated	Yes	12	10	1	
	No	343	6	0.021(0.007, 0.067) *	0.00

Table 5: - Multivariate logistic regression analysis of factors associated with poor outcome of acute poisoning in selected governmental hospitals in Addis Ababa, 2024 (n=371).

Variables	categories	Outcome		AOR (95%CI)	P-value
		Discharge alive	Death		
Main complaint and presentation	Mental status change	72	4	1	0.002*
	GI symptoms	266	1	0.02(0.0, 1.942)	
	Respiratory symptoms	15	11	4.227(1.376, 12.989) **	
	Asymptomatic	2	0	0	
Type of poisoning	Organophosphate	34	10	1	0.024*
	Rodenticides	44	1	0	
	Pharmaceutical drugs	203	5	0.032(0.001, 1.212)	
	Herbal remedies	18	0	0	
	Home detergent	56	0	0	
Mechanical ventilated	Yes	12	10	1	0.002*
	No	343	6	0.089(0.19, 0.42) **	

1= reference group

* significant at p-value ≤ 0.05

COR = Crude odds ratio* significant at p-value < 0.25

AOR = Adjusted odds ratio** significant at $p\text{-value} \leq 0.05$

6. Discussion

In this study 221(61.2%) were young adults aged 13 – 24 similar to AeBET 43(43.9%), and Gonder age 18 -25 129(55.36%)(5,21). The reason for the high rate of poisoning in young adults was their vulnerability to stressful life situations and immaturity to cope with the situation. They would be easily emotional to decide suicide. People in this age group probably face failure or frustration in love, job, or exams and, an inability to fulfill their parents' expectations(18,28,33).

The majority of cases were females (59.3%) similar to other studies Ethiopia systemic review (51.6%), Mettu (57.9%), Dessie (55%)(2,6,42) but differs with AeBET female (48%) and western Ethiopia female (48.5%)(18,21). It might be hypothetically due to cultural malpractice towards them they are controlled and followed by their families their families. This makes them to hide some behaviors to avoid conflict and disapproval with if the opposition sex relationship found out it cause conflict with their families and leads to a suicidal attempt (2,47).

Therry hundred five (82.2%) were due to deliberate to self-harm similar to other studies, TASH, 96.5%, and Jimma, 50.5%(19,43).

Most of the poisonous substances taken by the patient were pharmaceutical drugs (56.1%) it is one or more drugs. Which is similar with a study of St Peter (31.3%), Iran (60.8%), and Egypt (92.5%)(31,34,41). This might be due to easy access of drugs, poor counseling from pharmacy store, and Poor handling of drugs by family members due to negligence. In a study conducted in different Ethiopian rural areas the most common type of poisoning was organophosphate poisoning in Gonder (20.69%), Western Ethiopia (53.7%), Adama (52.1%), and Ethiopia systemic review (90%)(2,5,18,48).

The second most common poisonous chemicals in this study is home detergents but organophosphate poisoning was responsible for 62.5% of deaths similar to other studies Jimma, and northwest Ethiopia organophosphate is the leading cause of death in Ethiopia(2,20,43). This is because organophosphate was used in developing countries to increase agricultural products to meet high demand of society and also popular insecticide by its effectiveness(47).

Majority of patients (72%) complains with gastrointestinal symptoms similar to the study in Jimma, Ethiopia (49.5%) and AeBET, Ethiopia (56.1%)(21,43), but differs with Tanzanian study which is neurologic manifestations (62.3%) were common(39). This is because the most common mode of poisoning in this study (83.6%) was ingestion. This might be due to the ease of administering poisoning agents orally as compared to other routes. This was similar to other studies conducted in Gonder (95.71%) Ethiopia, Turkey, and Tanzania(5,39,44).

Gastric lavage and activated charcoals are good in decreasing the absorption of ingested poisons, they are given within one hour post-ingestion and only if the airway is protected(20). In this study, gastric lavage was done in 20.3% of the cases which is higher than in eastern Ethiopia (10.7%). It was different with other studies in Gonder (81%), Jimma (74%), and India (80%) gastric lavage was conducted(1,5,43). This might be because the majority of the patients 92.5% came ≥ 2 hours after ingestion and delay from the referral site which is different from Gondar, Ethiopia, where 90% of patients comes to hospitals within two hours. Early arrival at the hospital determines the intervention given to the patients to decrease gastrointestinal absorptions by early initiation of gastric lavage, specific antidotes, and initiation of necessary supportive care before decompensating the vital organ. 3% of cases were take-home remedies before arriving in the emergency department which is lower compared to Western Ethiopia at 38.39%(18).

In this study, 4.3% of the patients died of acute poisoning and this was mostly among patients who presented with respiratory symptoms and were intubated which is in the range of 2.4% - 8.4% of a systematic review to Ethiopia(2). All dead patients were mechanically intubated and presented with respiratory and neurological manifestations. The two main common causes of death were organophosphate (62.5%) and pharmaceutical drugs (37.5%).

The significant risk factors that affect the outcomes of acute poisoning patients were organophosphate poisoning which is more like to contribute to a poor treatment outcome by around 2 times more than pharmaceutical drugs. Mechanically ventilated patients had 3 times more poor treatment outcomes than non-intubated patients and complaining respiratory symptoms were 4 times more poor treatment outcomes than complaining of change in mental status similar with a study in Zambia, South Africa, and Tikur Anbessa Ethiopia(15,19,38). Unlike other studies done in eastern Ethiopia, Debre Tabor Ethiopia, Bahir Dar Felege Hiwot and AaBET were drug

poisoning, rodenticide, aluminum phosphide, and 2,4-D poisoning are significant factors for their studies respectively(21,22,45,46).

7. Conclusion

In this study, organophosphate is the leading cause of death followed by pharmaceutical drugs. Majority of intubated and patients presented with respiratory symptoms were dead.

Mechanically ventilated, respiratory symptoms manifested in patients and organophosphate poisoning were significant risk factors associated with poor treatment outcomes of acute poisoning. Therefore, generating community awareness, decreasing easily accessibility of drugs, and designing prevention strategies must be considered to reduce morbidity and mortality related to poisoning.

8. Limitations

Because our study is a hospital-based retrospective study, some had incomplete medical records and study variables could not be completely collected and analyzed. The name of poisoning substance was obtained from patients' and their relatives because specific laboratory tests for investigation of the type of poisons in blood or urine were not available in the hospital. Further study is required to assess specific laboratory test and antidote management for specific poisons in the future since this study mainly assesses the pattern and predictor of poisons.

9. Recommendations

- For FMOH to increase the community awareness of handling and early management of poisoning substances.
 - To establish poison management centers with specific diagnostic capacity and treatment protocols.
- For policymakers to restrict and regulate the open sales of such poisonous substances and drugs without any prescriptions.
- For all hospitals, there should be refreshing training for HCWs working in the emergency department about psychiatric emergencies and the development of tools to assess suicidal attempts and how to handle data for further studies.

10. References

1. Jesslin J, Adepu R, Churi S. Assessment of prevalence and mortality incidences due to poisoning in a South Indian tertiary care teaching hospital. *Indian J Pharm Sci.* 2010;72(5):587–91.
2. Mariam ETG, Gelaw BK. *International Journal of Pharma Sciences and Global epidemiology of acute Poisoning with an Emphasis to Ethiopia : Systematic Review.* 2016;2(4).
3. Hassan BA, Siam MG. Patterns of Acute Poisoning in Childhood in Zagazig, Egypt: An Epidemiological Study. *Int Sch Res Not.* 2014;2014:1–5.
4. WHO. Guidelines for Establishing a Poison Centre [Internet]. 2020. 1–174 p. Available from: <https://apps.who.int/iris/bitstream/handle/10665/338657/9789240009523-eng.pdf?sequence=1&isAllowed=y>
5. Waktola LG, Melese EB, Mesfin N, Altaye KD, Legese GL. Prevalence of unfavorable outcome in acute poisoning and associated factors at the University of Gondar comprehensive specialized hospital, Gondar, Northwest Ethiopia: a hospital-based cross-sectional study. *Front Public Heal.* 2023;11.
6. Getie A, Belayneh YM. A retrospective study of acute poisoning cases and their management at emergency department of Dessie Referral Hospital, Northeast Ethiopia. *Drug Healthc Patient Saf.* 2020;12:41–8.
7. Cunningham RM, Walton MA, Carter PM. The Major Causes of Death in Children and Adolescents in the United States. *N Engl J Med.* 2018;379(25):2468–75.
8. Leathard A. Policy overview. *Interprofessional Collab From Policy to Pract Heal Soc Care.* 2004;12–43.
9. Gummin DD, Mowry JB, Beuhler MC, Spyker DA, Rivers LJ, Feldman R, et al. 2021 Annual Report of the National Poison Data System© (NPDS) from America’s Poison Centers: 39th Annual Report. *Clin Toxicol (Phila).* 2022;60(12):1381–643.

10. Bronstein AC, Spyker DA, Cantilena LR, Green JL, Rumack BH, Giffin SL. 2009 annual report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 27th annual report. *Clin Toxicol*. 2010;48(10):979–1178.
11. Schmidtke A, Bille-Brahe U, DeLeo D, Kerkhof A, Bjerke T, Crepet P, et al. Attempted suicide and sociodemographic characteristics of suicide attempters in Europe: rates, trend and phic characteristics of A during the period 1989-1992. Results of the WHO/EURO Multicentre Study on Parasuicide. *Acta Psychiatr Scand*. 1996;93:327–38.
12. Townsend E, Hawton K, Harriss L, Bale E, Bond A. Substances used in deliberate self-poisoning 1985-1997: Trends and associations with age, gender, repetition and suicide intent. *Soc Psychiatry Psychiatr Epidemiol*. 2001;36(5):228–34.
13. Michel K, Ballinari P, Bille-Brahe U, Bjerke T, Crepet P, De Leo D, et al. Methods used for parasuicide: Results of the WHO/EURO Multicentre Study on Parasuicide. *Soc Psychiatry Psychiatr Epidemiol*. 2000;35(4):156–63.
14. Eddleston M. Patterns and problems of deliberate self-poisoning in the developing world. *QJM - Mon J Assoc Physicians*. 2000;93(11):715–31.
15. Van Hoving DJ, Veale DJH, Müller GF. Clinical Review: Emergency management of acute poisoning. *African J Emerg Med*. 2011;1(2):69–78.
16. Orsini J, Din N, Elahi E, Gomez A, Rajayer S, Malik R, et al. Clinical and epidemiological characteristics of patients with acute drug intoxication admitted to ICU. *J Community Hosp Intern Med Perspect* [Internet]. 2017;7(4):202–7. Available from: <https://doi.org/10.1080/20009666.2017.1356189>
17. Tefera GM, Teferi LG. Prevalence, predictors and treatment outcome of acute poisoning in western Ethiopia. *Open Access Emerg Med*. 2020;12:365–75.
18. Woyessa AH, Palanichamy T. Patterns, Associated Factors, and Clinical Outcomes of Poisoning among Poisoning Cases Presented to Selected Hospitals in Western Ethiopia: Hospital-Based Study. *Emerg Med Int*. 2020 May 6;2020:1–9.
19. Desalew M, Aklilu A, Amanuel A, Addisu M, Ethiopia T. Pattern of acute adult poisoning

- at Tikur Anbessa specialized teaching hospital, a retrospective study, Ethiopia. *Hum Exp Toxicol.* 2011;30(7):523–7.
20. Adinew GM, Asrie AB, Birru EM. Pattern of acute organophosphorus poisoning at University of Gondar Teaching Hospital, Northwest Ethiopia. *BMC Res Notes.* 2017;10(1):1–6.
 21. Zemedie B, Sultan M, Zewdie A. Acute Poisoning Cases Presented to the Addis Ababa Burn, Emergency, and Trauma Hospital Emergency Department, Addis Ababa, Ethiopia: A Cross-Sectional Study. *Emerg Med Int.* 2021 Dec 8;2021:1–5.
 22. Nigussie S, Demeke F, Getachew M, Amare F. Treatment outcome and associated factors among patients admitted with acute poisoning in a tertiary hospital in Eastern Ethiopia: A cross-sectional study. *SAGE Open Med.* 2022;10.
 23. Chala TS, Gebramariam H, Hussen M. Two-Year Epidemiologic Pattern of Acute Pharmaceutical and Chemical Poisoning Cases Admitted to Adama Hospital Medical College , Adama , Ethiopia. 2015;(June):106–11.
 24. Zöhre E, Ayrik C, Bozkurt S, Kose A, Narci H, Cevik I, et al. Retrospective analysis of poisoning cases admitted to the emergency medicine. *Arch Iran Med* 2015; 18: 117–122
 25. Razwiedani LL, Rautenbach PGD. Epidemiology of Organophosphate Poisoning in the Tshwane District of South Africa. 2017;10–3.
 26. Mekuria Y, et al. Insecticides sold in the streets of Addis Ababa for domestic use and the possible health hazard associated with the practice. *Ethiop J Health Dev* 1984; 1: 73–77.
 27. Malanga N. Acute Poisoning in Three African Countries: Botswana, South Africa and Uganda Doctoral dissertation. University of Limpopo; 2011.
 28. Shadnia S, Esmaily H, Sasanian G, Pajoumand A, Hassanian-Moghaddam H, Abdollahi M. Pattern of acute poisoning in Tehran-Iran in 2003. *Hum Exp Toxicol.* 2007;26(9):753–6.
 29. Poojari PG, Thunga G, Nair S, Kunhikatta V, Rao M. A Global Overview of Poison

- Treatment Apps and Databases. 2019;38(2):146–53.
30. Maheswari E, Abraham L, Chacko CS, Saraswathy GR, Ramesh AC. Assessment of pattern, severity and outcome of poisoning in emergency care unit. *J Appl Pharm Sci.* 2016;6(12):178–83.
 31. Abseno M, Worku A, Assefa B. The Pattern and Outcome of Acute Poisoning at Toxicology Center in St . Peter Specialized Hospital. 2022;4(1):1–15.
 32. Clark D, Murray DB, Ray D. Epidemiology and outcomes of patients admitted to critical care after self- poisoning. 2011;12(4).
 33. Zhang Y, Yu B, Wang N, Li T. Acute poisoning in Shenyang, China: A retrospective and descriptive study from 2012 to 2016. *BMJ Open.* 2018;8(8):1–11.
 34. Mehrpour O, Akbari A, Jahani F, Amirabadizadeh A, Allahyari E, Mansouri B, et al. Epidemiological and clinical profiles of acute poisoning in patients admitted to the intensive care unit in eastern Iran (2010 to 2017). *BMC Emerg Med.* 2018 Sep 19;18(1).
 35. Joshi M, Patel D V. A Study on Clinical Profile of Patients with Acute Poisoning. 2015;(December):97–100.
 36. Sheinicharmian A, Nagaraju K. Patterns of Poisoning and the Treatment Outcome in patients admitted to the Department of Emergency Medicine , KIMS Hospital , Bangalore , India. 2019;13(2):531–4.
 37. Gyenwali D, Vaidya A, Tiwari S, Khatiwada P, Lamsal DR, Giri S. Pesticide poisoning in Chitwan, Nepal: A descriptive epidemiological study. *BMC Public Health.* 2017 Jul 3;17(1).
 38. Z'gambo J, Siulapwa Y, Michelo C. Pattern of acute poisoning at two urban referral hospitals in Lusaka, Zambia. *BMC Emerg Med.* 2016 Jan 9;16(1).
 39. Kaale E, Mori A, Risha P, Hasham S, Mwambete K. A Retrospective Study of Poisoning at Muhimbili National Hospital in Dar-Es Salaam, Tanzania. Vol. 2, *Journal of Public Health.* 2013.

40. Malangu N, Ogunbanjo GA. Original Research: A profile of acute poisoning at selected hospitals in South Africa A profile of acute poisoning at selected hospitals in South Africa. Vol. 24, South Afr J Epidemiol Infect. 2009.
41. Rageh OES, Sabra HK, Alammar AA, Alanazi ON, Nagy A, Kabbash IA. Profile and outcomes of acute poisoning in the toxicology treatment and control center at Tanta University Hospital, Egypt. BMC Pharmacol Toxicol. 2023 Dec 1;24(1).
42. Bereda G. Occurrence, overall rate and prognosticators of acute poisoning in emergency department of Mettu Karl Referral Hospital, Southwest Oromia, Ethiopia: A retrospective cross-sectional study. Arch Epidemiol Public Heal. 2021;3(2).
43. Teklemariam E, Tesema S, Jemal A. Pattern of acute poisoning in Jimma University Specialized Hospital, South West Ethiopia. World J Emerg Med. 2016;7(4):290.
44. Satar S, Seydaoglu G, Akpınar A, Sebe A, Karakoc E, Gumusay U, et al. CLINICAL STUDY Trends in acute adult poisoning in a ten-year period in Turkey: factors affecting the hazardous outcome [Internet]. Vol. 110, Bratisl Lek Listy. 2009. Available from: www.bmj.sk.
45. Endayehu Y, Shenkutie E. Magnitude of acute poisoning and associated factors in Debretabor general hospital, Ethiopia. J Clin Toxicol. 2019;9(5):57.
46. Shumet A, Shiferaw N, Mekonnen D, Asemahagn MA. Trends and Outcomes of Acute Poisoning in Felege Hiwot Comprehensive Specialized Hospital Medical Intensive Care Units: Retrospective Study. Open Access Emerg Med. 2022;14:649–56.
47. Chelkeba L, Mulatu A, Feyissa D, Bekele F, Tesfaye BT. Patterns and epidemiology of acute poisoning in Ethiopia: Systematic review of observational studies. Vol. 76, Archives of Public Health. BioMed Central Ltd.; 2018.

11. APPENDIX

Annex

Questionnaire

Part I: Socio-demographic data

1. Patient's age ____ Sex ____ MRN _____
2. Marital status: a. Single b. Married c. Divorced d. widowed
3. Residency: a. Urban b. Rural
4. Educational level: a. can't read and write b. primary school c. secondary school d. College and above
5. Occupation a. Government employee b. Self-employed c. Unemployed d. Student d. Housewife e. Merchant f. Farmer

Part II: Associated factors

1. Did the patient come with a referral? a. yes b. no
2. If yes, what interventions were done in the referring health facility?
 - a. GI decontamination b. fluid resuscitation c. antidote (specify) d. other, mention _____
3. Duration of stay from poison exposure to ER arrival
 - a. < 2hr b. $\geq$ 2hr
4. The main complaint at presentation a. change in mentation b. GI symptoms
 - c. Respiratory symptoms d. Asymptomatic but complaining of poisoning

5. What is the type of poison?
- a. organophosphate b. rodenticide(specify) c. pharmaceutical drugs, specify d. Herbal remedies e. home detergents
6. Source of poison expose
- a. workplace b. home c. other, specify _____
7. Intent of poisoning
- a. accidental exposure b. deliberate self-harm c. recreational d. deliberately given by others
8. Is there previously known comorbidity? a. yes b. no
9. If yes, what was the diagnosis a. Hypertension b. Diabetes mellitus c. Chronic kidney diseases d. cardiac diseases e. Epilepsy f. other (specify) _____
10. Is there a previously known psychiatric illness? a. Yes, b. no
11. If yes for question number 10, was the patient on treatment? a. yes b. no
12. Did the patient require mechanical ventilation?
- a, yes b. no
13. If yes, what was the indication for mechanical ventilation?
- a. airway protection
- b. respiratory failure
- c. refractory shock
- d. for transportation others _____
14. Root of exposure
- a. ingestion b. inhalational c. skin contact d. injection e. Unknown

15. Any home remedies given before arrival to hospital, mention _____

Part III: Outcome Assessment

1. What was the outcome of the patient?
 - a. discharged alive
 - b. death
2. Is the patient developing organ damage? a. yes b. no
3. If yes for question number 2, which organ is damaged?
 - a. Cardiovascular
 - b. Central nervous
 - c. Renal
 - d. Respiratory
 - e. Other (specify)_____