COLLEGE OF MEDICINE AND HEALTH SCIENCES DEPARTMENT OF PUBLIC HEALTH

MAGNITUDE, CIRCUMSTANCE AND TREATMENT OUTCOMES OF ACUTE POISONING CASES PRESENTED TO WUSTH, 2024: A RETROSPECTIVE FOLLOW UP STUDY.

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A RESEARCH PAPER TO BE SUBMITTED TO THE COLLEGE OF MEDICINE AND HEALTH SCIENCE, DEPARTMENT OF PUBLIC HEALTH, WOLKITE UNIVERSITY, IN PARTIAL FULLFILMENT OF THE REQUIRMENTS FOR THE DEGREE OF DOCTOR OF MEDICINE.

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DECEMBER, 2024

WOLKITE, ETHIOPIA

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Declaration (Assurance of Investigators)

We, the undersigned students, declare that this research report is our original work in partial fulfillment of the requirement for the degree of Doctor of Medicine.

Name of Investigators **Signature**

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Date of Submission: December 6, 2024

This research report has been submitted for examination with our approval as Advisors.

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ACKNOWLEDGEMENTS

We would like to acknowledge Wolkite University College of medicine and health sciences, Public Health Department for giving us the chance to be engaged in this program by assigning advisors, and necessary services for this study preparation.

we would like to pass our heartfelt thanks to our advisors Dr. Riyad Ibrahim and Mr. Anteneh Kassa who gave us constructive advice and comments on developing this proposal.

We would also like to express our gratitude for workers of the card office of the WUSTH for their collaboration with our data collection.

ABSTRACT

Background: Acute poisoning is a common reason for visiting emergency department worldwide. However, little is known about this issue in most part of Ethiopia. This study was carried out to determine the magnitude, circumstance, and treatment outcome of acute poisoning at the ED of WUSTH.

Objective: To assess magnitude, circumstance, treatment outcomes and associated factors in patients presenting with acute poisoning to WUSTH.

Methods: A retrospective follow up study was conducted on magnitude, circumstance, treatment outcome and associated factors in patients presenting with acute poisoning to WUSTH from SEP 1, 2022-Oct 30, 2024. The study population consist of all patients seen at MEOPD and/or admitted with cases of acute poisoning during the study period. Data was collected using a semi-structured questionnaire. The estimated sample size was 128. A systematic random sampling technique was used to select patient records. Data was collected from patients' records and analysed using SPSS version 27.0; the result presented using tables. Descriptive statistics was conducted using frequency distributions along with multivariate logistic regression statistical model (with CI= 95% and P< 0.05).

Results: The study included 116 acute poisoning cases of which 59.5% were females and 40.5% were males. 53.4% were single and 46.6% were married. Organophosphate poisoning accounted 50.9%, metallic phosphide 25%, 96.6% of cases were intentional. Social conflicts, psychiatric illnesses and substance abuse were reported as underlying comorbid condition accounting for 57.8%, 34.5% and 3.4% respectively. Clinical presentation of patients and type of poisoning had significant association ($p<0.05$) with treatment outcome of poisoning where those who presented with epigastric pain were shown to have a 99.5% less mortality than those who presented with altered mentation (AOR=0.005(0.00025-0.097), 95% CI, P<0.001) and those who presented with vomiting/diarrhoea had 81% less mortality than those who had altered mentation up on presentation (AOR=0.19(0.001-0.27), 95% CI, P=0.003), and those patients poisoned by

metallic phosphide have 12-times more likely to die than those with organophosphate poisoning (AOR=12.10(2.06-71), CI=95%, P=0.006).

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LIST OF ABBREVATIONS AND ACRONYM

ACH- Acetylcholine

ACHE- Acetyl Choline esterase

CDC- Center for Disease Control

OPD- Out patient department

SRP- Student Research Program

CBE- Community Based Education

UK- United Kingdom

USA-United State of America

WUSTH-wolkite university specialized teaching hospital

WHO- World Health Organization

TASTH-Tikur Anbesa Specialized Teaching Hospital

SPSS-Statistical Package for social sciences

OPS- Organo phosphates

CNS- Central Nervous System

GI- Gastrointestinal

ED- Emergency Department

MDD- Major Depressive disorder

Hr-Hour

AOR- Adjusted odds ratio

COR-Crude Odds Ratio

CI- Confidence Interval

MEOPD-Medical Emergency OPD

1. INTRODUCTION

1.1: Background

Poison is a substance capable of producing damage or dysfunction in the body by its chemical activity. It can enter the body in various ways to produce general or local effects (limited to the eyes, skin, lungs, etc)[2]. All cases of poisoning that result from accidental use of drug and chemical substance or the use of drugs by children due to lack of curiosity are known as accidental or non-intentional poisoning. Poisoning is a qualitative term used to define the potential of a chemical substance in acting adversely or deleteriously on the body [2]

Advances in technology and social development have resulted in the availability of most drugs and chemical substances in the community. These chemical substances pose a significant threat due to their poisonous effect and the extensive use in medicine agriculture, industry and residential environments [3]

Pesticides and drugs are the common agents causing the incidence. Agrochemical pesticides are a major public health problem throughout the developing world. Central nervous system acting drugs are the commonest medicines used for self- harm throughout the developing world cities. While there are few case series of antiepileptic,

benzodiazepines or antidepressants, barbiturates were an extremely common means of self-poisoning during the 1970 and large series exist from this time [1]

Household products like kerosene oil used for lighting cleaning agents such as Dettol (chloroxylenol) and bleach, and strong acid such as sulphuric acid used for drain cleaning are a major problem within some Asian and African communities [2]

Organophosphate pesticides were responsible for the majority of deaths in most series of self-poisoning cases, particularly those from rural areas. Organophosphate (OP) compounds are diverse group of chemicals used in both domestic and industrial settings. Examples of Ops include insecticides (malathion, parathion, diazinon, fenthion), nerve gases (soman, sarin, tabu, vx), ophthalmic agents (echothiophate, isoflurophate) and anti-helminthics (tricholorfon) [3]

The Primary Mechanism of action of op pesticides is by inhibition of carboxyl ester hydrolases, particularly, Acetylcholine esterase (ACHE). AchE is an enzyme that degrades the neurotransmitter Ach into choline and acetic acid. Ach is found in the central and peripheral nervous system, neuromuscular junctions and RBCs. Ops inactivate ACHE by phosphorylating the serine hydroxyl group located at the active site of AchE. Once AchE has been inactivated ACH accumulates throughout the nervous system (NS) resulting in over stimulation of muscarinic and nicotinic receptors. Clinical effects are manifested via activation of the autonomic and CNs and nicotinic receptors on skeletal muscle. Clinical manifestation due to muscarinic effects of Ops are diaphoresis diarrhea, emesis, GI upset, urination, excess lacrimation and salivation miosis, bradycardia, bronchospasm, and bronchorrhea. Nicotinic signs and symptoms include muscle fasciculation, cramping, weakness and diaphragmatic failure. Autonomic nicotinic effects include hypertension, tachycardia, mydriasis and pallor.

CNS effects include anxiety, emotional liability, restlessness, confusion, ataxia, tremors, seizures and coma. Respiratory failure is the most life-threatening effect and requires immediate intervention [3].

1.2: Statement of the problem

Acute poisoning is a common reason for visits to emergency departments and hospitalizations as well as a common cause of morbidity and mortality worldwide. World health organization (WHO) data of 2016 showed that, worldwide, approximately 106,683 people died due to unintentional poisoning**.** [4]**.** There were an estimated 385 million unintentional acute pesticide poisoning (UAPP) cases worldwide including around11, 000 fatalities. [4]

In the USA alone, mortality rates increased from 25% to 40%, leading to a six-fold increase in mortality rates and ranking suicide tenth among the top 10 leading causes of death. According to the Global Burden of Disease (GBD), unintentional poisoning accounted for 0.14% of global deaths, and self-harm accounted for 1.34%. [5]

Especially, the problem is common and much worse in low- and middle-income countries (LMICs), because of the weak regulations and poor healthcare services. According to the World Health Organization (WHO) estimates, in 2004 and 2012 there were 193,460 to 346,000 deaths (3.5/100,000) worldwide from unintentional poisoning. Of these deaths, 84% to91% occurred in LMICs. In 2004 and 2012, there is a loss of over 7.4 to 10.7 million years of healthy life (disability-adjusted life years) due to unintentional poisoning. [6]

This can be minimized by reducing the availability and access to highly toxic pesticides as well as by having a well-organized health care system. 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 [7]

In Ethiopia, epidemiological data on acute poisoning is extremely few and it is very difficult to find primary data. The culprits of this problem are unavailability of well-organized poison control center and routine screening & confirmatory tests. [8]

This study is aimed at increasing the availability of organized and scientific based evidences regarding the magnitude, circumstance and treatment outcomes of acute poisoning cases.

1.3: Significance of the study

Since there are few studies done on poisonings in this country, it is believed that valuable information will be gained from the study.

The result will be used as baseline data for future investigators in the area and recommend the responsible bodies.

- For prevention and intervention of poisoning by public health workers
- For decision making and better management of cases by clinicians
- As general information for planning by policy makers

2: LITERATURE REVIEW

Poisoning continues to be an important public health problem. Various studies were done on poisoning cases, even though epidemiological data on this important health issue are scarce in Ethiopia.

A study done in Nantong city, Jiangsu province, China produced a significant result. Among the 493 patients with acute poisoning patients in the ED of the second affiliated hospital of Nantong university from May 2018 to December 2021 were selected from which men 227 (46.04%) and women 266 (53.96%). The age from 12 to 89 years old, average age 41.6 years. Thirty to 39 years group most poisoning cases (18.05%), farmers were 30.02%, followed by individual industrial and commercial was 15.01%, pesticide poisoning 178 cases (36.11%), drug poisoning 158 cases (32.05%). Among the 415 cases of oral exposure poisoning, gastric lavage 155 cases (37.35%), time to start gastric lavage <30 minutes 99 cases (63.87%), gastric lavage juice volume 10 to 20 L 122 cases (78.71%) and three hundred ninety-three patients (79.72%) were cured of acute poisoning, including 279 patients (56.59%) hospitalized, 114 patients (23.12%) in ED, and 89 patients (18.05) with residual organ dysfunction, including nervous system and respiratory system. There were 11 deaths (2.23%). [9]

Another study done in Toxicology Unit at Tanta University Hospital, Egypt (2017-2021) showed that from 2017 to 20219713 cases of acute poisoning were retrieved; 44.1% were males and 55.9% were females. Most patients were children, adolescents, and young adults (29.7%, 24.3%, and 36.1%, respectively). Intentional poisoning was the most frequently represented by 58.6% of all cases followed by accidental poisoning (34.7%). Intentional poisoning was commonly caused by rodenticides (39.3%), CNS abused pharmaceutical drugs (22.3%) and other pharmaceutical drugs (20.4%)**,** 70.3 % of cases were discharged due to family requests (against medical advice), and 15.7% were discharged after improvement. Overall mortality was at 4.0%. Mortality caused by rodenticides was the highest at 12.5% followed by botulism at 5.3%. [10]

A study was conducted in department of medicine of a teaching institute in North India, where total of 417 patients with poisoning were recruited in the study from August 2021 to July 2022 showed that a maximum number of patients were in the age group 21–30 years (*n* = 141, 33.8%), 248 (59.5%) were males and rest 169 (40.5%) were females, about 23.5% of the patients (*n* = 98) were illiterate. Educational status of 101 (24.2%) patients was up to high school, 117 (28.1%) were educated up to intermediate, and rest 101 (24.2%) were graduates, majority [248 (59.47%)] were married and rest 169 (40.53%) were unmarried. Family conflict (family problem/altercation with family members/marital discord) was the most common (40.44%) reason of consumption of poison, having psychiatric illness accounts for 8.09% of cases (males 8% and females 8.20%). Out of 417 patients included in the study, 349 (83.69%) improved, whereas rest of the 68 (16.3%) expired.

Medical records of 150 adult patients presented to Hiwot Fana Comprehensive Specialized Hospital from 1 January2016 to 31 December 2020, were reviewed retrospectively. The majority of participants 89 (59.3%) were in the age group of19–37 years. The mean age of participants was 24.2 years with an SD of 16.3. More than half of the participants 86(57.3%) were females. Half of the participants 76(50.7%) lived in rural areas. The mode of poisoning was suicidal in77 (51.3%) participants. The majority of participants 107 (71.3%) arrived at the hospital 1 h after the intake of the poisoning agent. Histamine 2 receptor blocker particularly cimetidine was administered for 34% of the cases. 56.7% were recovered and discharged while death was recorded in 25(18.6%) cases. Pesticide poisoning was the commonest poisoning which accounted for 72(48%) cases and followed by household poisoning 54 (36%). [11]

The medical records of patients with acute poisoning presented to the Gonder university Hospital between January 2, 2021 to September 30, 2021 and were reviewed retrospectively. Two hundred thirty-three (233) patients presented to the emergency department of the hospital, of which 8.15%(19) had known psychiatric illness. [12]

A study conducted at five public university referral hospitals (University of Gondar, Debre Markos, Tibebe Ghion, Felege Hiwot, and Debre Tabor comprehensive specialized hospital), reviewed a total of 400 poisoned patients' medical charts from June 1, 2019, to May 31, 2022 retrospectively. The study showed that about 238 (59.5%) were females, 192 (48.0%) were in the age group of 19–34 years, and 203 (50.7%) lived in rural areas, organophosphate

poisoning (OPP) and metallic phosphide poisoning (MPP) were 272 (68.0%) and 129 (32.3%), respectively. 359 (89.8%) happened unintentionally, among the reasons reported by the poisoned patient's family disharmony and unwanted pregnancy were 129 (32.3%) and 7 (1.8%), respectively. The study showed case fatality rate to be 16.1%. [13]

Another study done in Dessie referral hospital in the year 2018 showed that from 120 patients presented with acute poisoning, 19 (15.8%) of them reported marital disharmony.

Another study was conducted at emergency outpatient department (EOPD) of Debre Markos comprehensive specialized hospital in July 2021 to include data of 1 year period (July 1, 2020 to June 30, 2021), the medical records of 315 poisoned patients were evaluated where the majority of patients were between the ages of 21 and 30 years, accounting for 139 (44.1%) of all cases, a higher percentage of poisoning was seen in females 188 (59.7%) when compared to males (40.3%). Another finding was bout 135(42.9%) were not attained primary education. In this study, OP was the most frequently consumed poison, accounting for 193 (61.3%) followed by aluminium phosphide 79(25%). Two hundred eighty-three (89.8%) of the 315 poisoned patients took the poison intentionally, from which 236 of them reported social conflict as a reason for their suicidal attempt. Almost all of the patients took the poison orally; 313 (99.4%) did so.

According to the findings, the most common symptom was vomiting, which accounted for 238 (75.6%) of the patients, followed by loss of consciousness and epigastric pain, which accounted for 59 (18.7%) and 18(5.7%) of the patients, respectively. The majority of patients (227/72.1%) arrived at the hospital between 1 and 24 h after poisoning, and 24 (7.6%) arrived within 30 min of poisoning. During the study period, 315 poisoning cases visited the EOPD, with 260 (82.5%) being cured and 55 (17.5%) died as a result of poisoning [14]

Another study was conducted in Ambo University Referral Hospital from March 27, 2019, to April 5, 2019 reviewed charts of 134 patients retrospectively and showed that the mean ±SD age of the study participants was 23.90±10.606 with 69/134 (51.5%) males that equate to female-to-male ratio of 1:1.06. Of the 134 poisoned cases, the oral route is the most common route of exposure 122/134 (91.0%), organophosphate was the most common poisoning agent 72/134 (53.7%). Intentional poisoning was the most common 103/134 (76.9%). Among the 103 patients who had a known reason of poisoning, 68/103 (66.2%) of cases reported family disharmony followed by financial problems in 38/103 (36.9%). The most commonly used pharmacological treatment was antacid 54/134 (40.3%) (cimetidine/ranitidine) 45/134 (33.6%), followed by atropine injection 23/134 (17.2%). Regarding the outcome of poisoning, almost 117/134 (87.3%) of the cases were cured without a disability. The case fatality rate of acute poisoning in the two hospitals was 2/134 (1.5%) [15]

A retrospective cross-sectional study was conducted from March 10 to May 2, 2018, in Dessie referral hospital, Among the total of 120 studied poisoning cases, 66 (55%) were females, and 53 (44.2%) were in the age group of 21-30 years. Organophosphates were the most common poisoning agents involved in 54 (45%) of the cases followed by sodium hypochlorite, 27 (22.5%), and food poisoning, 19 (15.8%). Mental disorder, 25 (20.8%); family disharmony, 23 (19.2%); and marital disharmony, 19 (15.8%) were the three most common causes of intentional poisoning. Cimetidine was the most commonly used pharmacologic treatment, 118 (98.3%), followed by antiemetic, 107 (89.2%); proton pump inhibitor, 87 (72.5%), and atropine, 67 (55.8%). [16]

3: CONCEPTUAL FRAMEWORK

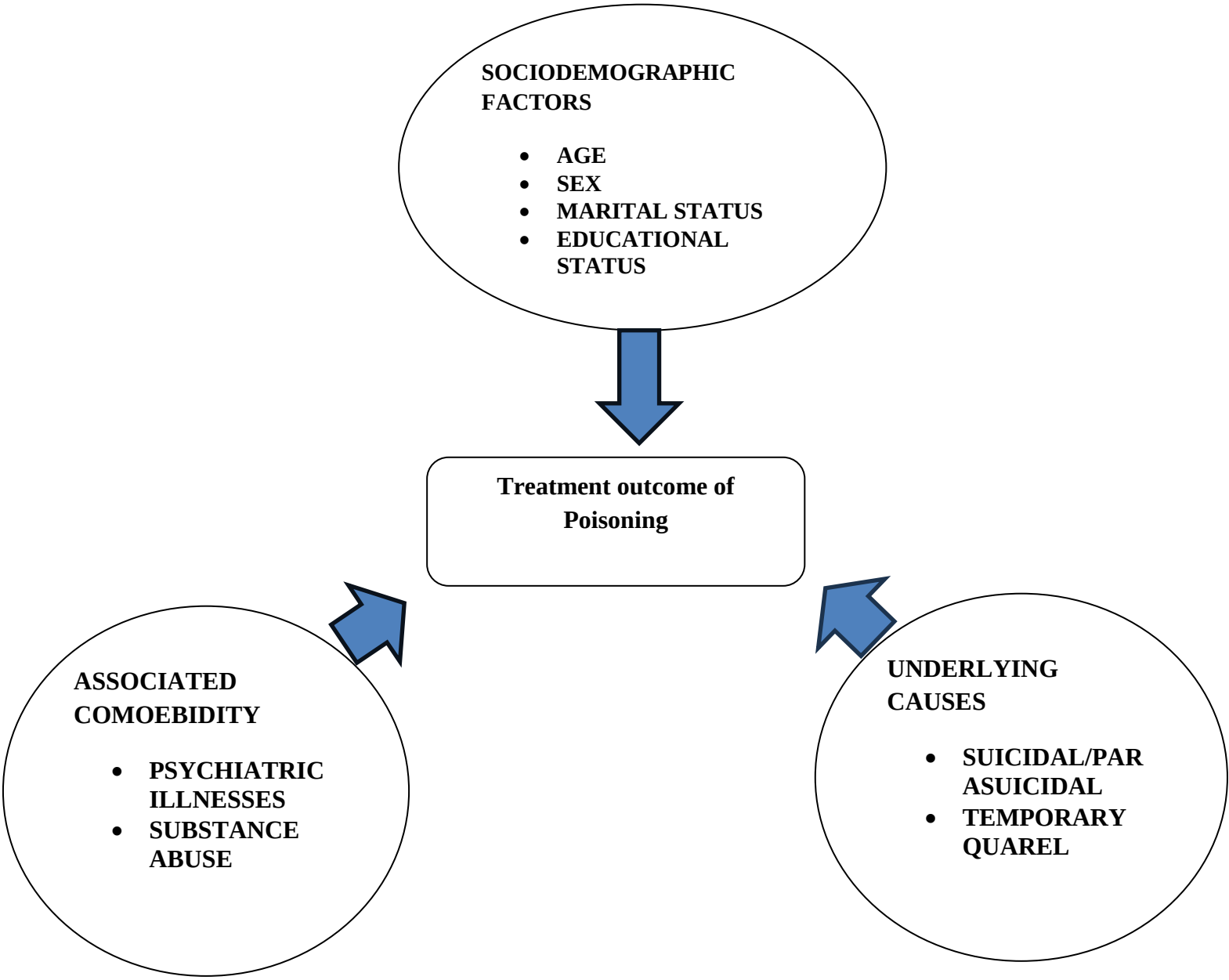

FIGURE 1: CONCEPTUAL FRAMEWORK (developed by the research team members after revising different literatures)

4. OBJECTIVES

4.1: General Objectives

- To assess the magnitude, circumstances, treatment outcome and associated factors of acute poisoning cases presented to WUSTH, Ethiopia, 2024.

4.2: Specific Objectives

1. To assess the magnitude of acute poisoning cases attended WUSTH from SEP 1, 2022-Oct 30, 2024
2. To assess the circumstances of acute poisoning cases attended to WUSTH from Sep1, 2021 to Oct 30, 2024.
3. To determine treatment outcomes of patients with acute poisoning presented to WUSTH from Sep 1,2022- Oct 30, 2024
4. To determine factors associated with treatment outcomes of acute poisoning patients attended WUSTH form Sep 1, 2022- Oct 30, 2024.

5. METHODS AND MATERIALS

5.1: Study area and period

The study was conducted in Wolkite university specialized teaching hospital (WUSTH) from Nov 14 to Dec 6. It is a referral hospital located in Gubre sub city, wolkite town, Gurage zone, Central Ethiopia. It is about 158km from the capital Addis Ababa, almost halfway between Addis and Jimma. Geographically, it lay between $8^0 17'$N latitude and$37^0 49'$E longitude with an elevation between 1910 and 1935 meters above sea level. It was surrounded by Kebena and Abeshghe woredas, and Cheha woreda. According to the statistics obtained from Wolkite's Town Municipality, the population was 70,796 out of which 35, 848 were males and 34,948 females Gubre sub city is located at about 12 km from Wolkite town in South West direction

Wolkite university specialized teaching hospital (WUSTH) was established on Hamile 29 2011EC. This hospital provided full health care service for population Gurage zone and its surrounding in Oromia region such as silk amba and keta wayu as their primary catchment areas. The total number of staff of the hospital was 406 including 11 surgeon, 5 gynaecologist-obstetrician, 9 internist, 8 paediatricians, 59 residents, 23 general practitioners, 10 health officers, 9 anaesthetists, 1 dentist, 2 psychiatrist, 2 ophthalmologist, 2 radiologist, 1 pathologist, 128 nurses, 25 laboratory technologists, and 24 pharmacists.

5.2: Study Design

A retrospective follow up study of poisoning case records among attendants of WUSTH from Sep 1, 2022- Oct 30,2024.

5.3: Source population

All patients with acute poisoning cases visiting emergency OPD and/or admitted to WUSH from August, 2019 to Oct 30, 2024.

5.4: Study population

All patients seen at medical emergency OPD and/or admitted to ward with cases of acute poisoning from Sep 1, 2022– Oct 30, 2024.

5.5: Eligibility criteria

5.5.1: Inclusion Criteria

- All acutely poisoned patients who had visited the emergency department and were listed in the registry emergency cases during the study period.

5.5.2: Exclusion Criteria

- Acute poisoning cases with incomplete information on the patient card.
- Acute poisoning case records with undetermined or unspecified outcome on the patient card.
- Patient cards lost during the study period
- Patients aged less than 14.

5.6: Sample size and sampling technique

5.6.1 Sample size

The required sample size for this particular study was determined using a single population proportion formula, and the proportion was taken from a previous study conducted in Hiwot Fana Comprehensive Specialized Hospital, the proportion of mortality of poisoning = 18.6%.8 Considering the following assumptions, A 95% confidence level, margin of error (0.05), and P = 18.6% were substituted in the following single population proportion formula

$$n0 = \frac{(Z\alpha/2)^2 \, \mathrm{p(q)}}{(d)^2} \quad n0 = \frac{(1.96)^2 0.186(1-0.186)}{(0.05)^2} = 232$$

Where;

n0 =minimum required sample size if population size is >10,000

P = Mortality rate of poisoning from previous study = 18.6%,

d = margin of error = 5%,

q = 1-p,

Z = critical value for normal distribution at 95% confidence level, which equals to

1.96 (z value at α = 0.05).

Based on the proportion which was taken from a previous study conducted in Gonder specialized hospital poisoning patient with psychiatric illness = 8.15%

$$n0 = \frac{(Z\alpha/2)^2\,\mathrm{p(q)}}{(d)^2} \quad n0 = \frac{(1.96)^2 0.0815(1-0.0815)}{(0.05)^2} = 115$$

n0 = minimum required sample size if population size is >10,000

P = poisoning patient with psychiatric illness = 8.15%

d = margin of error = 5%,

q = 1-p,

Z = critical value for normal distribution at 95% confidence level, which equals to 1.96 (z value at α = 0.05).

By taking the proportion which was taken from a previous study conducted in Desse referral hospital poisoning patient with marital disharmony = 15.8 %

$$n0 = \frac{(Z\alpha/2)^2\,\mathrm{p(q)}}{(d)^2} \quad n0 = \frac{(1.96)^2 0.158(1-0.158)}{(0.05)^2} = 195$$

Where;

n0 =minimum required sample size if population size is >10,000

P = poisoning patient with marital disharmony = 15.8 %

d = margin of error = 5%,

q = 1-p,

Z = critical value for normal distribution at 95% confidence level, which equals to

1.96 (z value at α = 0.05).

We take a sample size of 232 from P = 18.6% (largest sample size)

Since population size is < 10,000

$$n = \frac{n0}{(1+\frac{n0}{N})}$$

Where,

n =minimum required sample size

n0 = minimum required sample size if population size is >10,000

N = Total population size

$$n = \frac{n0}{(1+\frac{n0}{N})} = n = \frac{232}{(1+\frac{232}{233})} = 116$$

Considering non-respondent (lost cards) sample size will be n = 116 + 10%= 128

5.6.2 Sampling technique

In the study population, there were 233 adults who were presented to medical emergency OPD with acute poisoning. The sampling technique used was the systematic random sampling. The sampling interval was determined by the formula N/n = 2. After the calculation it became 1 in every 2 charts, so one adult medical record with acute poisoning was been taken from the HMIS log book by lottery method; which was the first card and then continues every 2nd card in similar pattern until the required numbers of samples were collected

$$K = N/n = \frac{233}{116} = 2.026 = 2$$

Where,

N= Total population size

n= Minimum required sample size

k= Interval

5.7: Data collection tool and procedure

The data used in this study was collected by members of sixth year medical students of WUSTH. Data was collected from patients' charts after tracing by ID number. The information was collected using a semi-structured questionnaire which includes Socio-demographic characteristics, causes of poisoning, Circumstances of poisoning, any comorbid conditions/underlying, reasons for poisoning, route of exposure, Average time of presentation to hospital after poisoning, clinical presentation, approaches employed in the management and Outcome.

After preparing a semi-structured questionnaire, cards were collected from the card office by workers in the office. For this purpose, the card number in the registration book of medical OPD was used. After selecting the cards, the structured format was filled by the team members.

5.8: Data quality control

After checking the semi-structured questionnaire for their completeness and brief training for data collectors how to extract necessary information from the cards, the team members had an ongoing supervision each day during the data collection to ensure the quality of data by checking filled formats for their completeness and consistency.

5.9: Data management and data analysis

Data processing was made by checking in the field to ensure that all the information have been properly collected and recorded. Here before and during data processing, however, the information was checked again for completeness and consistency. The data collected by the questionnaire was checked and inspected for any unfilled variables and will be managed accordingly. Data entered and analysed using SPSS version 27. The data was sorted, checked, categorized, coded and summarized. A descriptive statistical test such as proportion, frequency and mean were used to compute the socio demographic, behavioural and the outcome variable of the study population. Binary logistic regression analysis was used to determine the association between predictor (explanatory) variables and the outcome variable with odds ratio at 95% confidence interval (CI). All explanatory variables with P-value $\leq$ 0.25 in the bivariate analysis was included in multivariate logistic regression model. P-value < 0.05 in multivariable analysis was considered as statistically significance. Finally, the result was presented using frequency, percentage, tables and graphs.

5.10: Variables

5.10.1: Dependent variables – Treatment outcome (either survived Vs died).

5.10.2: Independent variables - age, sex, address, occupation, marital status, educational status, underlying causes, personal income, causes of poisoning, circumstances of poisoning like suicidal, intentional, route of poisoning'

5.11 Ethical consideration

Permission and collaboration letter was obtained from Wolkite university college of medicine and health sciences and submitted to the hospital's medical director. At all levels, officials will be contacted and permission will be secured. The necessary explanation about the purpose of the study and about its procedure, assurance of confidentiality.

6: Results

During the study period, we retrieved a total of 128 records of acute poisoning cases out of which 116 of them had complete information to be included in the study.

6.1: Sociodemographic characteristics

During the specified study period, the charts of 116 patients with acute poisoning were retrieved and according to the study 40.5% of patients presented to WUSTH with acute poisoning were male and 59.5 % were female.

Table 1: Percentage distribution of acute poisoning cases who attended WUSTH, by age and sex, from September 1, 2022 – OCT 30, 2024.

Age (in years)		**Sex**			**Total** No	**Percent**
	Male		**Female**			
	Nº (%)	**Percent**	**Nº (%)**	**Percent**		
15-19	9	53%	8	47%	17	14.6%
20-24	14	42.4%	19	57.6%	33	28.4%
25-29	4	44.4%	5	55.6%	9	7.8%
30-34	5	38.5%	8	61.5%	13	11.2%
35-39	4	36.4%	7	63.6%	11	9.5%
40-44	2	25%	6	75%	8	6.9%
45-49	3	37.5%	5	62.5%	8	6.9%
>50	6	35.3%	11	64.7%	17	14.7%
Total	47	40.5%	69	59.5%	116	100%

From 116 patients who presented with acute poisoning 53.4 % were single and 46.6 % were married. Among 116 patients, 112 0f them reported intentional poisoning in an attempt of suicide and the rest (4), their circumstance of poisoning was not specified.

Table 2: Percentage distribution of the marital status and educational status of patients with case of acute poisoning at WUSTH from September 1, 2022 to Oct 30, 2024.

Educational status	Marital status			Percent
	Married	Single	Total	
No school	36	36	72	62%
Elementary	17	22	39	33.6%
Highschool	0	3	3	2.6%
Collage/university	1	1	2	1.7%
Total	54	62	116	100%
Percent	46.6%	53.4%	100%	

6.2: Circumstance of acute poisoning

Table 4: Percentage distribution of the circumstance of acute poisoning cases attending to WUSTH from September1, 2022 to Oct 30, 2024.

Circumstance	**No**	**Percent**
Suicidal	112	96.6%
Unspecified	4	3.4%
Total	116	100%

6.3: Type of poisoning substance

The involved poisoning agents in descending order were: Organophosphates (50.9%), metallic phosphides (25%), drugs (10.3%), household cleansing agents (7.8%), and other carbon monoxide (6%) respectively.

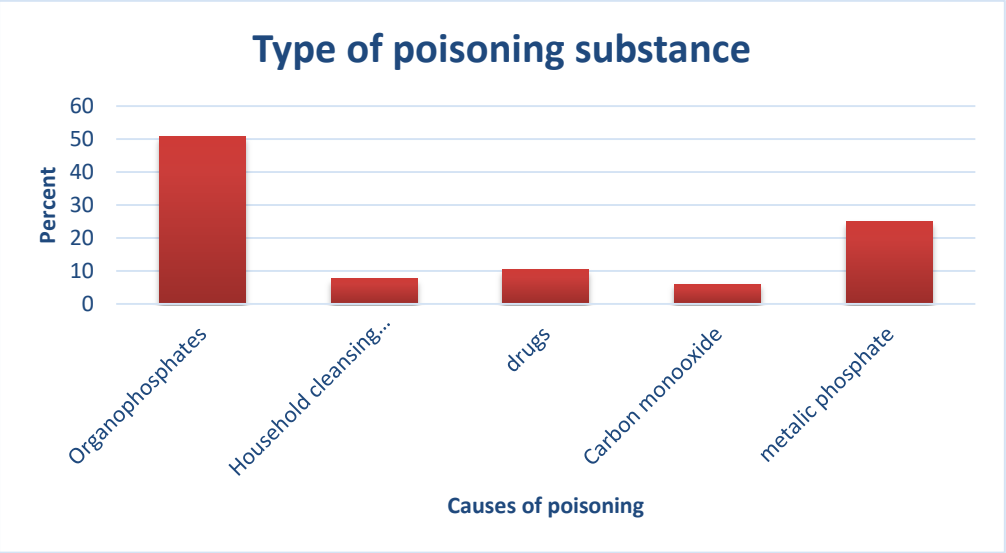

Figure 1: Percentage distribution of the causes of acute poisoning cases attending to WUSTH from September1, 2022 to OCT 30, 2024.

6.4: Clinical presentation

Regarding the clinical presentations of patients presenting with acute poisoning, epigastric pain was the commonest accounting for 44.8 %, followed by Vomiting/diarrhoea and altered mentation with 42.2% and 12.9 % respectively.

Table 6: Percentage distribution of clinical presentation of patients with acute poisoning cases who attended WUSTH from Sep, 2022 –Oct, 30, 2024

Clinical presentation	**No**	**Percent**
Vomiting/diarrhea	60	51.7%
Epigastric pain	50	43.1%
Altered Mentation	6	5.2%

6.5: Route of exposure

In all the cases the route of exposure was through oral ingestion. 30.2 % of patients presented to the hospital with in 30 minutes to 1 hour of ingesting the poison and the rest 69.8 % presented between 1-24 hour.

6.6: Average time of presentation

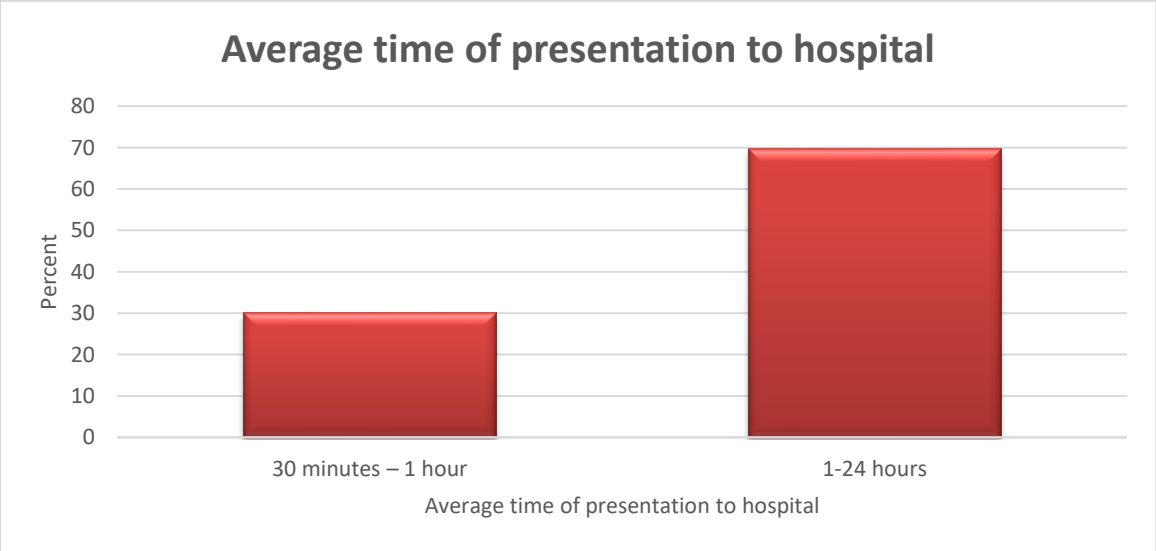

Figure 2: Percentage distribution of the average time of presentation of acute poisoning cases attending to WUSTH from September1, 2022 to Oct 30, 2024.

6.7: Comorbid condition

The frequently cited possible underlying comorbid conditions by patients presented to WUSTH with acute poisonings were social conflicts (65.5%), psychiatric illness (23.3%) and substance abuse (6.9), respectively.

Table 7: Percentage distribution of the possible underlying causes/co morbid conditions of acute poisoning among patients who presented to WUSTH from Sep 1, 2022- Oct 30, 2024.

Comorbid Condition	**No**	**Percent**
Psychiatric illness	40	34.5%
Substance abuse	4	3.4%
Epilepsy	1	0.9%
Social conflict (family, marital)	67	57.8%
Others	4	3.4%
Total	116	100%

6.8: Route of Exposure

In our study, all patients were exposed to the poisoning agent through oral ingestion.

6.9: Management applied

In this study, from 116 patients 36(31%) were given GI decontamination procedure, 18(15.5%) were given specific antidote(atropine), 101(87%) were given PPI and 4(3.4%) of patients were intubated in the ICU.

6.10: Address

In our study 57(49%) of patients were from Abeshge Woreda, 24(20.7%) were from Ameya, 20(17.2%) were from Wolkite town, 12(10.3%) from Cheha Woreda and 3(2.6%) were from Tolay.

6.11 Associated factors

6.11.1: Bivariable association table

Variables	Category	Treatment outcome		P Value	COR (95% CI)
		Improved	Died		
Clinical presentation	Altered mentation	1	5		1
	Epigastric pain	48	2	0.000263	0.008(0.001-0.109)
	Vomiting/diarrhea	53	7	.002	0.026(0.003-0.260)
EDUATIONAL SATATUS	college//university	1	1		
	High school	3	0	.999	6.1901-10
	Elementary	29	10	.466	.345(.020- 6.042)
	No school	69	3	.041	.043(.002- .876)
Type of substance	Organophosphate	56	3	1	1
	Household cleansing agents	8	1	.486	2.333(.216-25.245)
	Drugs	11	1	.660	1.697(.161-17.859)
	CO	7	0	.999	1.1555-8
	Metallic phosphide	20	9	0.003	8.400(2.066-34.161)

Table 8: Bivariable association table

6.11.2: Multivariable association table

Variables	Category	Treatment outcome		P Value	AOR (95% CI)
		improv	Died		
Educational status	college//university	1	1		1
	High-school	3	0	0.999	2.1417E-10
	Elementary	29	10	0.279	0.176(0.008-4.095)
	No school	69	3	0.029	0.024 (0.001-.690)
Clinical presentation	Altered mentation	1	5		1
	Epigastric pain	48	2	0.000480	0.005(0.000252-0.097)
	Vomiting/diarrhea	53	7	0.003	0.19(0.001-0.269)
Type of substance	Organophosphate	56	3		
	Household cleansing agents	8	1	0.386	3.142(0.235-41.928)
	Drugs	11	1	0.990	0.979(0.042-22.786)
	CO	7	0	0.999	3.1253E-8
	Metallic phosphide	20	9	0.006	12.104(2.063-71.034)

Table 9 ***: Multivariable association table***

7: Discussion

As the majority of the Ethiopian population makes a living on agriculture, pesticides and insecticides are widely used in the population. Even though they are useful adjuncts to increase productivity, they are causing a significant collateral damage to the community. They cause serious harm to humans upon exposure. Accidental or intentional (suicidal/ homicidal) exposure of humans leads to serious morbidity and mortality.

7.1: Sociodemographic characteristics

According to our study 69(59.5%) of cases presented to WUSTH with acute poisoning were female and 47(40.5%) were male which is in line with a study done in Toxicology Unit at Tanta University Hospital, Egypt and Hiwot Fana Comprehensive Specialized Hospital showed that majority of participants were females, accounting for 53.96% and 57.3% of poisoning cases, respectively.[13] A possible explanation for these findings is the higher suicide rates among females in Ethiopia, influenced by cultural norms and practices. Young females in Ethiopia often experience close monitoring by their families, leading to behaviours such as concealing intimate relationships to avoid conflict. This can result in familial and personal discord, potentially prompting suicide attempts involving various poisons or drugs.

In our study majority of participants 60(51.7%) were in the age group of 15 to 29 years. The mean age of participants was 24.2 years. similarly, other studies conducted in Hiwot Fana Comprehensive Specialized Hospital showed majority of participants 59.3% were in the age group of 19–37 year[13]. Which is also consistent with another study done at five public university referral hospitals (University of Gondar, Debre Markos, Tibebe Ghion, Felege Hiwot, and Debre Tabor comprehensive specialized hospital) showed 48.0% were in the age group of 19–34 years.[14] .The reason for the high rate of poisoning in young adults may be explained by their vulnerability to stressful life situations such as unemployment, marital problems, failure or frustration in love or job or examinations, inability to fulfill the parents' expectations, and immaturity to cope up with those situations; thus, they would be easily tempted to attempt suicide

7.2: Causes and Circumstance of poisoning

The study showed that Organophosphates (50.9%) followed by metallic phosphides (25%) were the two most common cause of poisoning. similarly other studies conducted in Nantong city, Jiangsu province, China, and Hiwot Fana Comprehensive Specialized Hospital showed

pesticide poisoning cases 36.11% and 48%, respectively. study conducted at five public university referral hospitals (University of Gondar, Debre Markos, Tibebe Ghion, Felege Hiwot, and Debre Tabor comprehensive specialized hospital), organophosphate poisoning (OPP) and metallic phosphide poisoning (MPP) were 68.0% and 32.3%, respectively. The prevalence of organophosphate poisoning may be attributed to their widespread use as chemical agents, with agrochemicals being the most commonly used for self-harm in developing countries.

Intentional(suicidal) poisoning was the most common 112(96.6%) manner of poisoning in this study which is consistent with study conducted in Toxicology Unit at Tanta University Hospital, Egypt,[13] and Hiwot Fana Comprehensive Specialized Hospital showed intentional poisoning is more common, accounting for 58.6% and 51.3% of poisoning cases, respectively. The high intentional poisoning rate can be attributed to various factors including familial, social, economic, psychological, personal challenges, and immaturity or inadequacy in coping with immediate situations.

Social conflict (family, marital) and Psychiatric illnesses were the two most common reasons for taking accounting for 67(57.8%) and 40(34.5%) cases in this study, study conducted at department of medicine of a teaching institute in North India reported Family conflict (family problem/altercation with family members/marital discord) was the most common (40.44%) reason of consumption of poison, having psychiatric illness accounts for 8.09% of cases.

7.3: Route of poisoning

This study showed that oral route was the most common route of poisoning. Similarly, other studies conducted Debre Markos comprehensive specialized hospital and Ambo University Referral Hospital almost all of the patients took the poison orally, 99.4% and 91.0%, respectively. [15] .This finding might be due to easy availability of orally ingestible poison in the markets.

7.4: Clinical presentation and time of arrival

The majority of participants (69.8 %) arrived at the hospital between 1-24 hour of ingesting the poison. Similarly, other studies conducted in Hiwot Fana Comprehensive Specialized Hospital and Debre Markos comprehensive specialized hospital showed majority of participants, 71.3% and 72.1%, respectively arrived at the hospital 1 h after the intake of the poisoning agent both of which are in line with our study. This might be due to lack of transportation and late referral from nearby health centers.

Our study shows that Vomiting/diarrhea was the commonest clinical presentation accounting for 51.7%, followed by epigastric pain and altered mentation with 43.1% and 5.2 % respectively. Other study done at Debre Markos comprehensive specialized hospital showed most common symptom was vomiting, which accounted for 238 (75.6%) of the patients, followed by loss of consciousness and epigastric pain, which accounted for 59 (18.7%) and 18(5.7%) of the patients, respectively.

7.5: Management and Treatment outcome

Gastric decontamination using gastric lavage is known to limit the absorption of ingested poisons, provided that they are given within one-hour post-ingestion and only if the airway is protected. In this study, gastric decontamination by lavage was done in 36(31.0%) of the cases. In another study done in Nantong city, Jiangsu province, China showed gastric lavage was conducted for 37.35% of the poisoning cases. Lower utilization of gastric lavage in the current study may result from delayed arrival of poisoned patients in the emergency department.

7.6: Treatment outcomes

Our study showed 102(87.9%) cases were recovered and discharged, while death was recorded in 14(12.1%) cases. Of the discharged cases 94(92.2%) were discharged with psychiatric referral. Similarly study done in Nantong city, Jiangsu province, China (79.72%) were cured of acute poisoning, and there were 2.23% mortality. Another study done in Toxicology Unit at Tanta University Hospital, Egypt showed 70.3 % of cases were discharged due to family requests (against medical advice), and 15.7% were discharged after improvement. These findings might be explained by the higher prevalence of organophosphate poisoning which have a specified antidote with general better outcome.

7.6 Factors associated with treatment outcome of acute poisoning

This study showed that there is statistically significant association ($p<0.05$) between treatment outcomes of poisoning and clinical presentation of patients where those who presented with epigastric pain were shown to have a 99.5 % less mortality than those who presented with altered mentation (AOR= 0.005 (0.00025-0.097), 95% CI, P<0.001). And those who presented with vomiting/diarrhoea had a 81% less mortality than those who had altered mentation up on presentation (AOR=0.19(0.001-0.27), 95% CI, P=0.003). A possible justification could be the presence of hypoxia or hypercarbia, respiratory distress, hypoglycaemia, and decreased airway protection posed to aspiration, hence leading to airway obstruction. Moreover, unconscious patients are at risk of developing multi-organ failure.

Cause of poisoning had a significant association with treatment outcome of poisoning where those patients poisoned by metallic phosphide have 12 times more likely to die than those with organophosphate poisoning (AOR=12.10(2.06-71), CI=95%, P=0.006). This finding is consistent with a study done in Western Ethiopia on prevalence, predictors and treatment outcomes of acute poisoning where patients poisoned by metallic phosphides had 8 times higher mortality than those poisoned by agrochemical agents. This might be due to the smaller lethal dose of metallic phosphides and availability of specific antidote.

Educational status had a significant association with treatment outcome of poisoning where those with no formal education had a 97 % less mortality than those with educational status of college/university (AOR=0.024(0.001-0.69), CI=95% P=0.029).

8: Strengths and limitations of the study

7.1: Strengths

- Since acute poisoning is a major public health problem and there is scarce of information on acute poisoning in the study area, this study can be used as a baseline information data on this sensitive health issue.

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7.2: Limitations

1. Cross-Sectional Nature: The study cannot establish causal relationships between the identified factors and poisoning.

3. The sample size is small which may affect the representativeness of the results.

3. Single-Site Study: Conducted in one hospital, the findings may not be generalizable to other regions of Ethiopia or broader populations.

9: Conclusion and Recommendations

9.1: Conclusion

This study revealed a significant burden of acute poisoning among adult patients attending the Wolkite University Specialized Hospital which is slightly more common in females than males with the commonest agent being organophosphates followed by metallic phosphides and household cleansing agents.

Most of the patients presented within 24hour of the poisoning. Epigastria pain, Diarrhea and vomiting were the common clinical manifestations. Most patients were discharged improved and were referred for psychiatric consultation. Factors such as age, clinical presentation and cause of the poisoning agent were strongly associated with treatment outcomes of poisoning.

9.2: Recommendations

9.2.1: For WUSTH and Health Professionals

Those patients who presented with metallic phosphide poisoning and those with altered mentation should be given special attention starting from the triage unit.

Healthcare facilities are encouraged to meticulously record and report instances of acute chemical poisoning, ensuring accurate data collection for evidence-based policy formulation.

9.2.2: For college of Medicine and Health science, Wolkite University

It calls for an urgent need to raise public awareness about the severity of this issue. Education should be given about the morbidity and mortality of acute poisoning with special focus on young adults with no formal education.

9.2.3: For policy makers

Implementing effective poisoning prevention strategies could significantly mitigate its impact on the health of the general population. Policies and regulations should be developed and strictly implemented to limit the access to toxic chemicals, especially among sensitive demographics such as young females. Policy intervention should be designed to reduce the magnitude of acute poisoning cases.

It is imperative to set up Poison Information and Control Centers that offer essential public and medical information, establish standard case definitions, provide treatment protocols, and facilitate training for prompt diagnosis and treatment to support informed decision-making.

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Annex

DATA COLLECTION TOOL

Part 1: Sociodemographic data

Sex	Age	Marital status	Educational status	Address
1: Male 2: Female	1:15-19 2:20-24 3:25-29 4:30-34 5:35-39 6:40-44 7:45-49 8:>50	1: Married 2: Single 3: Divorced	1: college/university 2: highschool 3: elementary 4: no school	

Part 2: Clinical factors

Type of poisoning	1: Organophosphate 2: Household 3: cleansing agents 4: Drugs 5: Carbon monooxide 6: metalic phosphate
Circumstances of poisoning	1: Suicidal 2: accidental 3: unspecified
Any comorbid conditions/underlying reasons for poisoning	1: Psychiatric illnesses 2: Substance abuse 3: Epilepsy

	4: Social conflict (family, marital) 5: others
route of exposure	1: Oral ingestion 2: through eye 3: through skin (per cutaneously) 4: inhalation
Average time of presentation to hospital after poisoning	1: < 30 minutes 2: 30 minutes – 1 hour 3: 1-24 hours 4: >24 hours
clinical presentation	1: altered consciousness 2: epigastric pain 3: diarrhea/vomiting 4: others
approaches employed in the management	1: GI decontamination 2: specific antidote given(specify) 3: intubations 4: others (specify)
Outcome	1: cured and sent at OPD level 2: died
If admitted, duration of stay in Hospital	1: < 2 days 2: at 2 days 3: > 2 days
Discharged with	1: Psychiatric referral 2: Specific education on further prevention 3: unspecified