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Magnitude of Acute Poisoning and Associated Factors in Debretabor General Hospital, Ethiopia

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Abstract

Background: Poisoning is an important health problem in developing countries. Poisons are commonly used as self-harming and suicidal agents in agricultural societies. Pesticides are most commonly used substances in our community.

Objective: To describe the magnitude and treatment outcome of patients presenting with poisoning to Debretabor general hospital emergency department in a 3 years' period from September 2013 to August 2016.

Design: It is a retrospective cross sectional hospital based study of 3 years period at Debretabor general hospital, North West Ethiopia.

All patients who presented with emergency conditions to DTH between September 2013 and August 2016 were included in the study.

Data collection and analysis: Data was collected using a data extraction form from the case records. All data were analyzed using SPSS 20. Chi-squared was utilized where appropriate and a p-value of less than 0.05 was considered statistically significant.

Result: There were 102 patients presenting as acute poisoning which accounts 0.45% of all emergency cases. Among these 65 (63.7%) were females and 37(36.3%) were males. The most common age was found to be 15-40 yrs which account about 73.5% (75 cases). Rodentcide (Rat poison) was the most frequent cause of poisoning and accounted for 58 cases (56.9%). The mortality rate is 18.6% (19 cases).

Conclusion: Death due to poisoning is significant in this study. The most common reason for poisoning was suicidal attempt. There should be standard management protocol of poisoning in both hospitals and primary health care unit.

Keywords: Acute poisoning; Absorption; Toxicity

Abbreviations: ALP: Aluminium Phosphide; DTH: Debretabor General Hospital; ECG: Electrocardiography; OP: Organophosphate; OPD: Outpatient Department

Background

Acute poisoning is exposure to a poison on one occasion or during a short period of time. Symptoms develop in close relation to the exposure. Absorption of a poison is necessary for systemic poisoning. It is estimated that some forms of poisons are directly or indirectly responsible for more than 1 million illnesses worldwide annually [1]. More than 300,000 people die every year from pesticide poisoning all over the world. The commonest causes are organophosphates and aluminium phosphide (ALP) [2].

The causes of poisoning can be civilian and industrial, accidental and deliberate. Deliberate self-poisoning has reached epidemic proportions in parts of the developing world, where the toxicity of available poisons and sparse medical facilities ensure a high fatality rate [2-4].

Fatality rates of 20% are common and the World Health Organization has estimated that more than 200,000 people die each year from pesticide poisoning only [1].

Acute poisoning is a worldwide problem and could be intentional or unintentional [5].

The unintentional or accidental poisoning is common among children and contributes to increased childhood morbidity and mortality. [6] Children get poisoned accidentally because of their exploratory nature and their desires to imitate adults. Adults do also get poisoned through intentional poisoning that could be a suicidal attempt.

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. Different studies have shown that these agents are common choices of people for self-harm and suicide [3,4].

Despite these extensive reports from India [6-8] and Iran [1], data is scarce from sub-Saharan countries including Ethiopia. Nonetheless, certain studies have tried to highlight the problem. A study which assessed the trends of poisoning in Gondar university Hospital in Ethiopia showed that Pesticides are commonly used toxicants [3]. To the contrary, a study from Black lion hospital in Addis Ababa Ethiopia showed that household cleansing agents, organophosphates and phenobarbitone were the most common agents for poisoning [4].

Early correct diagnosis and appropriate treatment are often lifesaving. Therefore, the knowledge of the general pattern of poisoning in a particular region would help in early diagnosis and management of poisoning, which in turn should result in a reduction of morbidity and mortality. The present study was undertaken to provide such information.

Exposure to poisons is a common problem. The Institute of Medicine estimates that the incidence of poisoning in the United States is approximately 4 million cases per year, with 300,000 cases leading to hospitalization and approximately 30,000 deaths [9,10].

There are striking differences in the pattern of poisoning between developed countries and developing agricultural countries [3-10]. Morbidity and mortality because of acute poisoning is a worldwide problem; however, its impact may be more on poor countries.

In the developed countries, medications are mostly used for this purpose, while in developing countries, pesticides are mostly encountered in this issue [2,3,10].

Poison control and drug information centers have been established in developing and developed countries with the primary goal of providing information to the general public or medical institutions and professionals who are in urgent need of information pertaining to poisoning.

Literature Review

Despite these extensive reports from India and Iran, data is scarce from sub-Saharan countries including Ethiopia. Nonetheless, certain studies have tried to highlight the problem [1-3].

A study which assessed the trends of poisoning in Gondar university Hospital in Ethiopia showed that organophosphates, rat poison and alcohol were among the common agents, constituting 70% of the cases, the fatality rate was 2.4% [3].

To the contrary, a study from Black lion hospital in Addis Ababa Ethiopia showed that household cleansing agents, organophosphates and phenobarbitone were the most common agents for poisoning [4].

A study from Adama hospital, the majority of the patients (83.6%) were below 30 years of age. Organophosphates were the most commonly used toxic agents (52.1%), followed by household cleaning products (12.7%) and alcohols (10.3%). Case fatality rate=1.37%) and all of them were due to complications of OP poisoning [11]. The most commonly affected people in poisoning are adolescents and young adults [2-4,11].

A study done in India Belagavi, showed that commonly used poisons were organophosphate compounds (71.8%), rat poison (10%), pyrethroid compounds (4%), herbicidal poison (4%), fatality rate was 14% [12].

Another study done in India showed that, incidence was more common among males (75.4%) compared to females (24.3). Most cases of acute poisoning presented among 20- to 29-year age group (31.2%) followed by 12- to 19-year age group (30.2%). A majority of poisoning cases (36.0%) were due to organophosphorus compound. Total mortality was found to be 15.4% [13].

Justification

Acute poisoning constitutes one of the main reasons why patients visit emergency departments of hospitals. However, the burden and pattern of acute poisoning in African countries are not well established.

In an agricultural society, like ours, pesticides are widely available. As mentioned in the literature review above, pesticides like organophosphate and ALP tablets are among the commonest causes of poisoning in agricultural societies.

Even if there is no data to substantiate it, it is our observation from our routine practice in this hospital that pesticides are commonly used agent for poisoning. We have also observed that its mortality is high. Considering this, the need for a study to describe the magnitude of poisoning in our hospital cannot be overemphasized.

This study is intended to full fill the deficit of information on the magnitude of poisoning in our community. The evidence generated will be an asset for the improvement in the management of patients presenting with poisoning. By shading light on the magnitude, it also brings the attention of policy makers to be careful on the availability and sales of pesticides. The final goal is to bring public prevention measures to decrease the harmful effects of pesticides on the community.

Objective

General objective

To describe the magnitude, and associated factors of poisoning among patients presented to Debretabor General Hospital (DTH) emergency department between September 2013 and August 2016.

Specific objectives

- To assess the period prevalence of poisoning among total emergency cases seen at DTH between September 2013 and August 2016.
- To determine the case fatality rate of poisoning in DTH between September 2013 and August 2016.
- To identify factors associated with mortality in patients presenting with poisoning to DTH between September 2013 and August 2016.

Methods

Study design

Retrospective hospital based cross sectional study

Study period

September 2016 to December 2016

Study setting

Debretabor General Hospital is located in South Gondar zone in Ethiopia about 654 km north of the capital Addis Ababa. With 94 beds for inpatient service, it delivers health care for a catchment area of about 2.3 million people. It mainly serves the rural population whose living is primarily based on agriculture. About 8,000 emergency patients are seen at emergency department each year.

Emergency cases including poisoned patients are stabilized in the emergency department and then admitted to the wards. Intensive care unit, which is the ideal site for the care and treatment of poisoned patients, is currently not available in our hospital. While basic diagnostic and therapeutic tools are available, important laboratory equipment, ECG and arterial blood gas analysis which are invaluable for the follow up of patients with poisoning are not available. Similarly, important therapeutic drugs for poisoned patients like sodium bicarbonate and potassium permanganate are not available.

Source population

All patients who presented with emergency conditions to DTH between September 2013 and August 2016.

Study population

All Patients who presented with acute poisoning to DTH between September 2013 and August 2016.

Sample size

All patients who presented with poisoning to DTH between September 2013 and August 2016.

Sampling method

Since it is retrospective hospital based study, all patients who presented with poisoning to DTH between September 2013 and August 2016 were included in this study

Inclusion criteria: All poisoned patients during the study period.

Exclusion criteria: Patients whose medical records are without appropriate documentation.

Variables

Dependent: Outcome (improved, died)

Independent: Age, sex, area of residence, types of poison, dosage of a poison, duration of exposure, intention of exposure, method acquisition, clinical features, therapeutic interventions

Data Collection

Medical record number of all patients presenting with acute poisoning to the hospital emergency OPD from September 2013 to August 2016 was collected from log book. The case records then retrieved from the chart room with their record number.

Available records were included in the study. Data was collected using a data extraction form from the records by trained data collectors (physicians). Collected data include sociodemographic, amount and timing of exposure, clinical features, therapeutic interventions and outcome. Data collectors were trained by the investigators who also supervise the data collection process.

Data Analysis

After checking for clarity and completeness, data was entered to SSPS 20. Analysis will be conducted using the same software. Descriptive statistic will be presented as frequency percentages for categorical variables and mean with standard deviation for numerical variables.

Bivariate and multivariate analysis will be done to see association of factors with mortality. Odds ration with 95% confidence interval with p value will be used as a measure of strength of association. Statistical significance is defined as 95% confidence interval of odds ratio not including 1 or p value<0.05.

Result

A total of 22,770 patients visited the hospital emergency department from September 1, 2013 to August 30, 2016. Of these 102 cases were diagnosed to have acute poisoning. This constituted for 0.45% of the total emergency room visits during the study time.

There were about 4562 patients admitted from emergency room. Of these 52 cases were due to poisoning which accounts about 1%. The majority (65, 63.7%) of the cases were females, giving male to female ratio of 1: 1.75. 70.6% of cases were from urban and the rest were from rural area

The majority of the cases were from the age group of 21 – 40 years accounting for 47% of the cases followed by 16 – 20 years (26.5%). 18 cases (17.4%) were children less than 15 years (Figure 1). Most patients live in urban area (70.6%).

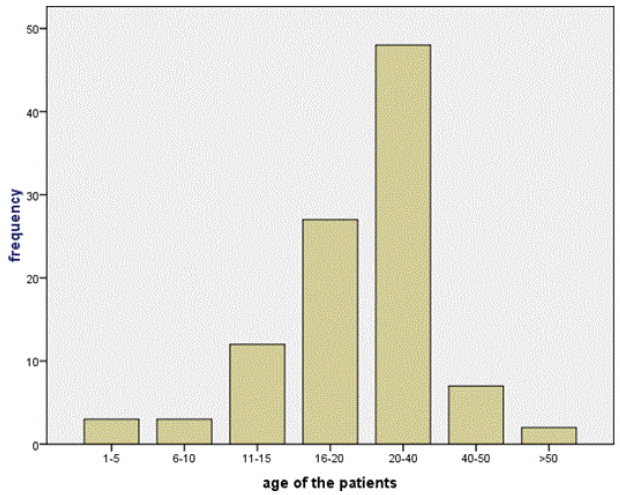

Figure 1: Distribution of cases by age.

In 90% of cases, the place where they got the poison is not known. 3% of cases bought the poison from shop. Suicide by poisoning was

the most common (77.5%) reason for poisoning and 8.8% of the cases were poisoned accidentally.

Among the suicidal cases 64.5% are females. 9.8% of cases have psychiatric illness. In about 49% of cases the reason for suicide was not known. 11.8% is due to conflict.13.7% reason is not documented. Suicide was mainly seen in age groups of 20-40 years (Table 1).

Type of poison	Number of cases, n	(%)
Rodentcide	58	56.9
Organophosphate	28	24.5
Hydrocarbon	4	3.9
Bleach	1	1
Others	7	6.9
Unknown	7	6.9
Total	105	100.1

Table 1: Distribution of cases depending on type of poison.

A total of 19 cases were died due to poisoning (Table 2). The mortality rate from poisoning is around.

Outcome	Number of cases, n	(%)
Improved	80	78.4
Died	19	18.6
Referred	1	1
Disappeared	2	2
Total	102	100

Table 2: Distribution of cases based on their clinical outcome.

%. The mortality among poisoned males is higher than females (21.6% Vs16.9%)

Rodentcide (rat poison) is the most common poison associated with death (13 cases, 68.4%) followed by organophosphate (5 cases, 26.3%) (Table 1). 4% of cases arrive to hospital within 1 hr of poisoning and about 35.3% b/n 1-6 hr.

49% of the poison cases were discharge from the emergency department after management and the remaining 51% were admitted to wards. Among admitted patients most patients 38.4% stay in hospital for 24-48 hours followed by 12-24 hours (28.8%). Only 8 cases (15.3%) stay for more than 72 hours in hospital (Figure 2).

Only 17.6% of case got some intervention before hospital presentation. The rest, more than 80% did not get any form of intervention before hospital arrival. Gastric lavage was done for 45 patients (44.1%). Mortality is low in patients who undergo gastric lavage compared to those who did not (12.8% vs. 35%).

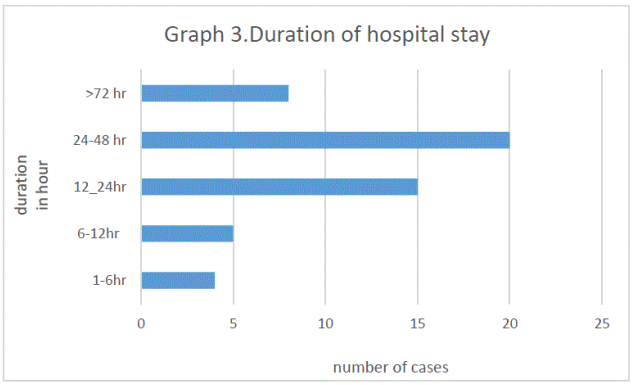

Figure 2: Duration of hospital stay.

Discussion

Morbidity and mortality due to acute poisonings is a worldwide problem and has enormous medical, legal and social significance. There are reports available from different parts of the world highlighting various substances abused for acute poisoning. From Western countries, drugs (sedatives and analgesics) have been reported as the most common abused substances with mortality rates varying between 0.4% and 2.0% [8–10].

Reports available from certain Asian (Pakistan and SriLanka) and African countries (Uganda) describe Ops (crop sprays) and the drugs as most common causes of poisonings with mortality rates of 2.0% – 2.1% [14].

The mortality/morbidity in any case of acute poisoning depends on a number of factors such as nature of poison, dose consumed, level of available medical facilities and the time interval between intake of poison and arrival at hospital.

The results of this study indicate that a total of 102 patients were diagnosed to have acute poisoning during three years' period which accounts 0.45% of total emergency room visits and 1% hospital admission during the study time. This finding is in agreement with various studies [3,4]. The majority (65, 63.7%) of the cases were females, giving male to female ratio of 1: 1.75.

Most of studies have shown higher incidence of acute poisonings in male [15–17] but some studies have including ours found female cases higher than males [1,18,19]. Besides, intentional poisoning was more common in women in the current study resembling a study in India [13]. This can be explained by the fact that more socio-economic pressure might be laid on women in developing societies. Moreover, women might be more sensitive to socio-psychological problems such as marital disharmony, family conflicts and loss of family members [20].

In our study, Suicide by poisoning was the most common (77.5%) mode of poisoning and 8.8% of the cases were poisoned accidentally. The present study revealed that self-poisoning (suicidal 79%) is the most common manner of acute poisoning followed by unintentional (accidental 21%). A 10-year study in Chandigarh, India, revealed that intention of poisoning was suicide in 72% of cases followed by accidental 25% [14]. The similar result has been reported by other researchers [16].

The reason for poisoning is not known in the majority of cases in this study. But conflict among families account for about 12%, psychiatric problem in around 5% which is similar to other studies [3, 4].

The majority of the cases were from the age group of 21 – 40 years accounting for 47% of the cases seeming to be in relation with youth characteristics. Supporting this finding, there are reports indicating prevalence of OP-induced poisoning and death in the young economically active age group [17].

The common agents involved in the poisoning were rat poison (56.9%) followed by organophosphate (24.5%). This is different to the findings by Abula and Wondmikun demonstrating OPs as the most commonly used poisons in Gondar, Ethiopia [3]. Similarly, in Nakuru, Kenya, pesticide poisonings accounted for highest number of cases [13].

In contrast, in the study done by Desalew et al. in Addis Ababa, Ethiopian capital [4], in a study by Ouédraogo et al. [21] in a multi-center study by Malangu in Botswana, South Africa and Uganda [22] drugs and household chemicals were the commonest agents used for poisoning [20]. The reason why rat poison is the most common agent in our study may be due to its easily accessibility.

The mortality rate from poisoning is around 18.6% (19 cases). The most common cause of death was rat poison (13 cases, 68.4%) followed by organophosphate (5 cases, 26.3%). The mortality rate is significantly high compared to similar studies done in Ethiopia [3,4] but similar result has been seen in some studies in India (13.6%) Prayag et al. [12]. The reason for higher death rate in this study may be due to the most commonly poison used for poisoning is rat poison which is more fatal even with small dose. The other reasons may be delayed arrival to hospital after poisoning or inappropriate management.

Only 39 cases (38.2%) got some sort of intervention before arrival at hospital. The intervention given was gastric lavage, IV fluids and other medication like atropine.

Limitations

In this study, poisoning was not confirmed with blood analysis and was based on reported information by the case or his/her family. In addition, as this study was hospital based retrospective evaluation of acute poisoning, so the result may not represent the general population.

Conclusion

Death due to poisoning is significant in this study. The most common reason for poisoning was suicidal attempt. Rat poison, which is more fatal, was mainly used for poisoning. There should be standard management protocol in both hospitals and primary health unit. More attention should be given on Interdisciplinary based prevention of poisoning at community level.

Declarations

Ethics approval and consent to participant

This study uses secondary data from case records of patients who were treated according to the routine treatment guidelines. The information gathered from the records was handled with extreme confidentiality and will not be used for any other purpose. Patients were not contacted in any ways are not at risk for any danger. Therefore, we asked waiver of consent from the Hospital management. The study was started after ethical clearance was obtained from the hospital management.

Consent to publish

Not applicable

Availability of data and materials-The datasets used and/or analyzed during this study are available from corresponding author on reasonable request

Competing interests

The authors declare that they have no competing interests

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Authors

All authors approved the manuscript before submission. The corresponding author YE involved in developing proposal, analysis and write up. The other author ES was participating in proposal writing and support the corresponding author

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