

Original Article

Acute Poisoning in the Community and its Associated Mortality at the University Teaching Hospital, Lusaka, Zambia

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ABSTRACT

Background: Acute poisoning is a common event in the community. Despite the high prevalence of acute poisoning in the community, there are very few studies done on the subject in Zambia. Lack of research on acute poisoning has resulted in lack of information on the pattern of poisoning, morbidity, mortality and pitfalls in management.

Methods: A retrospective study of cases of acute poisoning presenting at the University Teaching Hospital during the period 1st January 2015 to 31st December 2015 was conducted. A total of 131 case records were reviewed. Demographic information, information on the type of poisoning, presenting clinical features, case management and outcome was extracted from the medical records. The data was analysed using descriptive statistics. Frequencies and percentages were calculated for categorical data. All statistical tests were at 5% significance level. The Pearson's chi squared test was used for comparison of proportions between groups.

Results: Of the 131 cases reviewed, 67 were female (51%). The age group 20-39 years had the highest frequency of poisoning (50%). The majority of cases (59%) occurred in individuals of low socio-economic status. The most frequently taken poisons were organophosphates (38%). Other commonly used agents included household chemicals and medicines. The majority of cases were due to suicide attempt, and there

were only 5 cases of accidental poisoning. Of the cases where due to self-poisoning with intent to cause self-harm. The reasons for self-harm behaviour were given in 115 cases, and 71 (62%) of these were due to interpersonal conflicts arising from disharmony in relationships. The rest were due to various psychological disorders including depressive illness. No reason for self-harm was indicated in 16 cases. The majority of cases (86%) recovered without any complications. Mortality rate was 5%.

Conclusion: Most cases of poisoning with the intent of self-harm occur in individuals who are vulnerable to stress. A variety of chemical agents are ingested, with the organophosphates being the group of chemicals taken more often than other groups of chemicals. The majority of cases are intentional with very few poisoning cases being accidental. Most cases have good prognosis and the majority recover without any sequelae. Mortality from acute poisoning cases seen at the University Teaching Hospital is low.

INTRODUCTION

Poisoning may be defined as the “development of dose-related adverse effects following exposure to chemicals, drugs or other xenobiotics through inhalation, ingestion, skin or eye contact, or inoculation”.¹ Deliberate self-poisoning has been defined as “an act with a non-fatal outcome in which an individual deliberately ingests a substance in excess of the prescribed or generally recognized therapeutic dosage.”² Throughout the world, poisoning by drugs or chemicals, is an important medical emergency and carries a high morbidity and mortality rate.³ The World Health Organization estimates that 0.3

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Keywords: *Poisoning*

million people die every year due to various poisoning agents.⁴

Acute poisoning can be intentional or accidental. Most acute poisoning incidents are due to intentional acts.⁵ About 80% of these cases of poisoning are intentional and 20% are accidental.⁶ In a study done in Kenya, poisoning was found to be the most common way of suicide in women and the second most common method in men, and was found to be responsible for 100,000 hospitalizations and over 1,300 deaths per year.⁷ In developing countries suicide by chemical poisoning is 15 times more than in developed countries and mortality rate due to acute poisoning is only second to road accidents.⁸ Accidental poisoning in adults is often in the form of industrial exposure and iatrogenic poisoning resulting from drug interaction, incorrect prescribing and patients misunderstanding of their medication.¹ Cases of acute poisoning take a heavy toll on medical services. About 10% of the workload of emergency department and 20% of workload in the medical department in the United Kingdom are related to self-poisoning.⁹ In Sub-Saharan countries, about 17% of the total ward admissions are due to acute poisoning.

Deliberate self-poisoning is typically employed by individuals, most commonly single females struggling with psycho-social challenges in order to gain attention, express distress or to get revenge and not necessarily to end their lives.¹⁰ High doses of analgesics, tranquilizers, and antidepressants are the commonly used agents for intentional poisoning in industrialized countries while studies done in South Africa and other parts of Africa have shown paracetamol, antibiotics, non-steroidal anti-inflammatory drugs, anti-hypertension drugs, benzodiazepines and organophosphate containing pesticides to be some of the commonly used agents for self-poisoning.^{11,12,13} In developing countries, there is insufficient drug and chemical regulation, lack of surveillance systems, less enforcement, easy access to many different kinds of drugs or chemical and these have been blamed for the higher poisoning rate and possible mortality.¹⁴

Clinical presentation of poisoning cases in the UTH emergency unit ranges from an ambulant, asymptomatic

patient, to a comatose patient. Time interval between the onset of poisoning and presentation at the emergency department, type, dose, potency, multiplicity of poison/drug used and association with alcohol intake are factors which often determine the clinical presentation and outcome of poisoned patients presenting at the emergency department.^{15,16,17} One of the greatest obstacles to effective prevention and control of poisoning is lack of reliable epidemiological data.¹⁸

The main aim of this study was to profile community based acute poisoning and its associated mortality at the University Teaching Hospital in 2015. The study determined the demographics of the patients who presented with acute poisoning, the reasons or circumstances accounting for the poisoning, the chemical agent ingested by the patient, presenting clinical features and the clinical outcomes. The University Teaching Hospital was chosen for the study because it the largest referral hospital in Zambia, with a very large catchment population consisting of people of various socio-economic, cultural and ethnic backgrounds.

METHODS

Study design and setting

A retrospective study that included cases presenting with acute poisoning to the University Teaching Hospital between 1st January 2015 and 31st December 2015 was conducted. The University Teaching Hospital is located in Lusaka, the capital city of Zambia, and is the largest referral hospital in the country. The hospital has a wide catchment area that constitutes urban, peri-urban and rural populations.

Medical records of all cases of acute poisoning presenting to the adult emergency department UTH during the study period were obtained and information extracted from the records.

Sample size

All cases of acute poisoning that presented to the UTH adult emergency unit from 1st January 2015 to 31st December 2015 were included in the study. A total of 198 cases of acute poisoning were recorded in the admission register, and of these, 131 medical records were found. The 131 medical case records were included in the study.

Data collection

Pre-tested data forms were used to record the relevant information extracted from the medical case records. The details that were recorded include: sex, age, ethnicity, occupation, marital status, circumstances relating to the poisoning, chemical ingested, presenting clinical features, treatment given and outcome.

Data analysis

Data was analysed using the Statistical Package for Social Sciences (SSPS) version 21. All statistical tests were at 5% significance level. The Pearson's chi-squared test was used for comparison of proportions between groups. The Fisher's exact test was used when one or more cells had an expected frequency of five or less. Descriptive statistics included frequency distribution of the variables.

RESULTS

Table 1: Age distribution of the study subjects (n=131)

Age group (years)	Frequency	Per cent
<18	11	8.4
18-19	15	11.5
20-29	65	49.6
30-39	27	20.6
40-49	9	6.9
50-59	2	1.5
70+	2	1.5
Total	131	100

Table 2: Socio-demographic characteristics of the study subjects (n=131)

Gender	Frequency	Per cent
Male	64	48.9
Female	67	51.1
Total	131	100

Occupation	Frequency	Per cent
Unemployed	62	47.3
Students/scholars	19	14.5
Employed	34	26.0
Not stated	16	12.2
Total	131	100

Marital status	Frequency	Per cent
Single	70	53.4
Married	48	36.6
Separated/Divorced	9	6.9
Widowed	2	1.5
Not stated	2	1.5
Total	131	100

Area of residence	Frequency	Percent
Low density	20	15.3
Medium density	21	16.0
High density	77	58.8
Rural	5	3.8
Not stated	8	6.1
Total	131	100

Table 3: Chemical agent ingested (n=131)

Toxic agent	Frequency	Per cent
Household chemicals	15	11.5
'Others'	11	8.4
Antibiotics	8	6.1
ARVs	4	3.1
Antidepressants	5	3.8
Herbal medicines	1	0.8
Heroin/cocaine	6	4.6
Iron tablets	2	1.5
Organophosphates	50	38.2
Paracetamol tablets	10	7.6
Alcohol	8	6.1
Rat poison	7	5.3
Unknown	4	3.1

Table 4: Reasons for poisoning (n=131)

Reasons for poisoning	Frequency	Per cent
Marital issues	32	24.4
Relationship issues	25	19.1
Psycho-social problems	16	12.2
Medical reasons	7	5.3
Family issues	14	10.7
Depression	6	4.6
Post-traumatic stress	4	3.1
Accidental poisoning	5	3.8
Poisoned by others	2	1.5
Unknown	20	15.3

Table 5: Co-morbidities (n=131)

Co-morbidity	Frequency	Percentage
Hypertension	3	2.3
Depression	15	11.5
Epilepsy	6	4.6
HIV/AIDS	13	9.9
Others	11	8.4
None	83	63.4

Table 6: Time between poisoning and presentation at the emergency department (n=131)

Time between poisoning and presentation	Frequency	Per cent
0-3 hours	74	56.5
4-6 hours	38	29.0
7-9 hours	8	6.1
> 9 hours	2	1.5
Not stated	9	6.9

Table 7: Clinical state on presentation to the UTH emergency unit (n=131)

Patients' Glasgow Coma Scale (GCS)	Frequency	percentage
15	53	40.5
9-14	24	18.3
8	26	19.8
Not stated	28	21.4

Blood pressure

Blood pressure	Frequency	percentage
Normal (systolic 90-139, diastolic 60-89)	72	55.0
Low (< 90/60 mmHg)	35	26.7
High (≥ 140/90 mmHg)	22	16.8
Not stated	1	0.8

Oxygen saturation

Oxygen saturation	Frequency	percentage
Normal (≥ 95%)	104	79.4
Low (< 95%)	24	18.3
Not stated	3	2.3

Table 8: Clinical outcome (n=131)

Outcome	Frequency	Per cent
Full recovery	119	90.8
Death	6	4.6
Outcome not indicated in the medical record	6	4.6
Total	131	100

DISCUSSION

In this study, it was found that there were slightly more females than males. Other studies have also shown a slightly higher incidence of poisoning in females.^{1,19} The female gender may be more prone to deliberate self-poisoning. Men on the other hand generally tend to attempt suicide by employing much more dangerous and violent methods such as hanging and gunshot. More often than not, they succeed in killing themselves. This may be the reason why they are less represented in the statistics of poisoning presenting at the emergency department.¹⁹

The study has shown that the age group of 20 – 29 years had a higher number of cases of acute poisoning attended to at the UTH emergency unit compared to other age groups. The probable reason could be that these age groups are involved in relationships that are more prone to disharmony. Similar age distribution in acute cases of poisoning has been found in similar studies done in Oman, India and South Africa.^{20, 21, 13} The age-group of 20 – 29 years falls within the working and reproductive age. This age-group is associated with pregnancy, child-bearing, single-parenting, employment-seeking, and vulnerability to assault, abuse and rape. These stressors may predispose the affected individuals to depression, and in the absence of adequate support services, suicidal ideation may set in. However, a study done in the United States of America (USA) found that the age group 15- 19 years accounted for the most cases of poisoning.²²

This study also shows that poisoning cases were more common amongst the unemployed compared to the

employed. The probable reason for this could be lack of income with its resultant stress due to inability to cope with various demands of life in this group of people. The findings of this study are similar to other studies that determined the profiles of acute self-poisoning victims.^{13, 23} There is therefore a strong possibility of unemployment being an important predisposing factor to self-harm behaviour.

In this study, the proportion of unmarried subjects was higher than that of married subjects. This may be due to unmarried individuals having less social support compared to their married counterparts, and thus increased vulnerability to stress. The study also shows that the majority of the poisoning cases occurred in areas associated with low socio-economic status (informal settlements and locations). A similar result was found in a study done in South Africa where the highest number of overdose cases per square kilometre occurred in an informal settlement with high density of people and very poor socio-economic circumstances.¹³ Lack of basic life needs might be the probable reason why poisoning is high in this group of people as they are likely to be more vulnerable to stress.

Most of the cases of poisoning in this study were due to deliberate self-poisoning. The various reasons identified for this self-harm behaviour include marital problems, relationship disharmony, psycho-social problems (unspecified), health concerns, family issues, depression and unemployment. The most frequently stated reason amongst the above mentioned reasons was relationship disharmony and family conflicts. Post-traumatic stress disorder as reasons for poisoning in four subjects in this study was a result of rape and loss of a close relative.

The study found very few cases of accidental poisoning and this was mainly due to overdose of prescription medicines. The findings are similar to several other studies where the majority of acute poisoning cases were due to deliberate self-harm behaviours.^{19,20,24} The study has shown that the agents mostly taken by victims of self-poisoning are readily available and affordable chemicals, or drugs prescribed for medical purposes. Organophosphates pesticides were the most commonly used poisoning agents. Poisoning with pesticides either

accidental or intentional is common due to them being readily available and affordable. Other studies that have investigated poisoning in Africa and Asia have found a similar pattern.^{7,25,26}

Among therapeutically used agents, the study has found paracetamol to be the agent most commonly used in self-poisoning. This may be due to the fact that paracetamol is readily available and is a widely used over-the-counter drug. Other studies have shown a similar trend. A study done in the United Kingdom (UK) on poisoning showed that paracetamol and paracetamol-containing compounds were implicated in about 50% of the cases.²⁷ While a study done in Oman showed that 41% of poisoning cases involved the use of paracetamol and non-steroidal anti-inflammatory agents.²⁰ The use antidepressants for self-poisoning by a sizable number of subjects may imply that depression is common amongst self-poisoning cases. A high rate of the use of antidepressant in self-poisoning in UK has been correlated with increase in the rate of its prescription.²⁷

Some subjects in this study had taken overdose of anti-retroviral drugs (ARVs) with the intention of causing self-harm. Approximately 1.5 million Zambians are on ARVs for the treatment of HIV infection.²⁸ The widespread availability of these drugs coupled with a high tendency for depression amongst these patients, might explain the reason for their use in acute self-poisoning.

We have also found that a significant proportion of subjects took chemicals for domestic use (e.g. detergents, bleach, disinfectants and cosmetics) for self-poisoning. Most of these chemical agents are readily available with little or no restrictions to their purchase. This however, differs a lot from findings in a similar study done in UK where chemicals such as bleach and disinfectants were used for poisoning in only about 1% of patients.²⁷

This study has shown that there is a very wide variety of chemical agents that are used in self-poisoning, most of which are readily available and affordable, and this includes taking overdose of therapeutically used agents. The majority of the subjects in our study had presented to the UTH acute emergency unit with normal conscious level, and with stable cardio-respiratory function. Thus the majority of the subjects made full recovery without

any complications. The mortality rate was low. This is may have been due to having taken low quantities of the agents and early presentation to the hospital. Most of the subjects had presented to the hospital within 6 hours of ingesting the poisonous agent. Patients who presented with a depressed conscious level (Glasgow Coma Scale 8 and low oxygen saturation (< 95%)) had a poor clinical outcome with increased mortality.

CONCLUSION

Prior to this study, no studies had been conducted to profile the cases of acute poisoning presenting at the University Teaching Hospital adult emergency unit. This study therefore served to fill this research gap and provide the much needed epidemiological data on acute poisoning cases seen at UTH. The study has yielded some information in the epidemiology of acute poisoning cases presenting at the UTH emergency unit. The information will be useful for planning interventions in the prevention and management of acute poisoning.

In all, this study shows that the majority of poisoning cases occurred amongst the unemployed in the age-group 20-29 years, living in areas with poor socio-economic status. It can also be deduced that the majority of these poisoning cases were black females who were single and unemployed, residing in areas with poor socio-economic status.

The study has identified some of the factors that are associated with acute self-poisoning include low socio-economic status, unemployment, relationship problems, interpersonal conflicts, depressive disorders and chronic diseases. The prevalence is slightly higher in females. The 20-29 years age-group is affected more than the others.

The most commonly used chemicals in self-poisoning are organophosphate pesticides. Paracetamol, antidepressants and anti-retroviral drugs are the most common therapeutically used drugs that are taken in self-poisoning. Other agents taken in self-poisoning include chemicals for domestic use such as kerosene, furniture polish, cosmetics, detergents and battery acid.

The majority of patients with history of acute poisoning present in the emergency unit in a fairly stable state and mortality is low. Most patient recover fully without any complications or long term sequelae.

ABBREVIATIONS

ARVs	Anti-retroviral drugs
UK	United Kingdom
USA	United States of America
UTH	University Teaching Hospital
WHO	World Health Organization

ACKNOWLEDGEMENT

We thank the University Teaching Hospital management for authorizing access to medical records of the subjects included in the study

FUNDING

We have not received any funding for conducting the study, preparing the manuscript or publication of the manuscript

AVAILABILITY OF DATA

The data sets used in the study are available from the correspondence author on request

AUTHORS' CONTRIBUTIONS

Mr Boris Mwanza developed the research proposal and conducted the research, performed the analysis and prepared a research report. Dr Sindwa N. Kanyimba was the principal supervisor for the study from proposal development to report writing. Dr Sindwa N. Kanyimba prepared the manuscript for publication. Both authors approved the final version of the manuscript.

COMPETING INTERESTS

None

ETHICS APPROVAL

The study was approved by the University of Zambia Biomedical Research Ethics Committee. The University Teaching Hospital gave permission to access medical records of the subjects.

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