

Acute Poison-Related Mortality among Adults at a Tertiary Care Hospital Multan, Pakistan – A Cross Sectional Study

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ABSTRACT

Objective: The objective of the study was to determine the acute poison-related mortality among adults at Nishtar Hospital, Multan.

Study Design: Cross Sectional Study

Place and Duration of Study: This study was conducted at the department of Medicine (unit-I) at Nishtar Hospital, Multan from January 01, 2019 to June 30, 2019.

Materials and Methods: The patients were visited on daily basis to record any death of the patient with the history of poisoning and relative signs and symptoms during hospital stay. The SPSS-21 was used for statistical analysis. Mean and standard deviation were calculated for age, duration of poisoning and hospital stay. Frequency and percentages were calculated for gender, marital status, residence, ethnicity, employment, education, type of poisoning and mortality. Effect modifiers like age, gender, duration of poisoning and type of poisoning were controlled through stratification.

Results: Of these 200 study cases, 66 (33%) were male patients while 134 (67%) were female patients. The mean age of the study cases was 23.4 ± 4.14 years. Of 200 patients, 111 (55.5%) patients were married, 87 (43.5%) were unmarried and 2 (1%) were divorced. Similarly, 70.5%, 22% and 6% patients belonged to Saraiki, Punjabi and Urdu ethnicity, respectively. The residence of 87.5% and 12.5% patients was rural and urban areas, respectively. Of 200 patients, 78% were unemployed while 22% were employed, respectively. Top three type of poisoning were parafenylendiamine poisoning (51%), organophosphate (14%) and aluminium phosphide (10%). Suicidal, accidental and homicidal cases were 86.5%, 7.5% and 6%, respectively. Thirty-three (16.5%) patients died. Mean duration of poisoning at time of presentation and hospital stay were 7.37 ± 12.66 hours and 3.98 ± 4.06 days, respectively. Significant association between hospital stay and mortality was found ($p = 0.002$).

Conclusion: Poison related mortality is significantly associated with hospital stay. Most of the deaths occurred within first three days of admission.

Key Words: Acute Poisoning, Mortality, Adults, Pakistan

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INTRODUCTION

Poisoning refers to the exposure of a person to a substance which can harm or endanger his/her life¹. It is an important, growing and unsolved issue worldwide, affecting all age groups, from infants to elderly ones. In 2019, United States reported 2.1 million human poison exposures from its 55 poison control centers².

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Similarly, it has been reported that 150,000 people suffered from poisoning in England in 2013-2014¹. In this context, poisoning is a significant public health problem worldwide, accounting for the loss of over 7.4 million years of healthy life³. In Pakistan, poisoning has been reported as second commonest cause of unintentional injuries in the individuals of age five years and above⁴. In this regard, the limited number of poison control centers (PCCs) and unlawful use of chemicals in Pakistan make the situation even worse. Therefore, there is urgent need of building more PCCs in Pakistan.

Poisoning can be intentional or unintentional, homicidal or suicidal and drug adverse effects, depending upon the predisposing circumstances. Suicidal poisoning is an emerging problem all over world, accounting for one million deaths each year⁵. Similarly, five million snake-bites occur each year worldwide, accounting for one million deaths⁵. Morbidity and mortality depends on the type and amount of the substance as well as time of

approach to the health-care facility. In Pakistan, incidence of poisoning is on the rise, which can be attributed to the rapid industrialization, rising number of chemical substances and increasing domestic conflicts⁶. Most common poisoning substances reported in Pakistan include pesticides (e.g. OP preparations, aluminum phosphide), cosmetic agents (e.g. paraphenylenediamine - PPD), soporific agents (e.g. benzodiazepines), alcohol, and other drugs.

Suicidal poisoning, especially chemical poisoning, is an emerging problem in Pakistan due to increasing unemployment and domestic violence. However, in Pakistan, epidemiological data on poisoning is scarce, and is only available in the form of a few case series, single center experience or ICU records⁷⁻¹⁰. A retrospective hospital record-based study on acute poisoning in Karnataka India has reported 15.4% mortality, where corrosives were the leading cause of death¹¹.

The rationale of the study was to generate a local data regarding mortality in our local population of Southern Punjab among poisoning cases which is an effective addition to the literature regarding poisoning in our population. There was no such study done in our local population on topic of interest, so the results of study generated baseline database of our local population as we routinely treat such patients in our daily practice, so there was a dire need to conduct such study in our population. The data presented in this study will be helpful in future in making policies regarding readily availability of certain poisonous substances at shops, emphasizing the role legislation in this regard.

MATERIALS AND METHODS

A cross sectional study was conducted in the department of medicine (unit-I) at Nishtar Hospital Multan including 200 patients with acute poisoning who presented between January 01, 2019 and June 30, 2019. Non-probability consecutive sampling technique was used to collect the required sample size. Inclusion criteria included all patients presenting with poisoning, both genders with age from 15 to 60 years. Exclusion criteria included the patients who did not give consent to be included in the research or those with known case of co-morbid conditions such as diabetes, hypertension, heart failure, renal failure, cardiovascular disease as per patients' history and medical record. All the patients fulfilling criteria admitted in the medicine unit-I of Nishtar Hospital Multan were included in the study after having permission from Ethical Committee and Research Department of the institution. Informed consent was taken on a designed consent form in both English and Urdu languages. In the present study mortality was defined as "poison-related death during hospitalization, confirmed by absent pulse and blood pressure, bilateral fixed dilated pupils, absent corneal reflex, absent cardiac and respiratory activity, and

straight-lined electrocardiogram (ECG)". Poisoning was defined as "ingestion of any harmful substance (suicidal/homicidal) as reported by the patient".

The demographic data including patient's name, age, gender and duration of poisoning before reaching the hospital were noted. All the patients were given treatment according to standard protocol set by the University. The patients were visited on daily basis and any death of the patient with the history of poisoning and relative signs and symptoms during hospital stay was recorded on the designed proforma. The data was saved in soft as well as in hard copy in file folder, proper coding was done.

The data was entered on daily basis in SPSS-21 for statistical analysis. The quantitative variables like age and duration of poisoning and hospital stay were presented by calculating mean and standard deviation. The qualitative variables like gender, marital status, residence (urban or rural), ethnicity, employment, type of poisoning and mortality were presented by calculating frequency and percentages. Effect modifiers like age, gender, duration of poisoning and type of poisoning were controlled through stratification. Chi square test was applied to calculate P value to check their effect on mortality. P value <0.05 was taken as significant.

RESULTS

Of these 200 study cases, 66 (33%) were male patients while 134 (67%) were female patients with mean age of 23.4 ± 4.14 years. The patients were divided into three age groups: group 1 (15-30 years), group 2 (31-45 years), and group 3 (46-60 years). Maximum patients fall in the group 1 (167, 83.5%), followed by group 2 (29, 14.5%) and group 3 (4, 2%). Demographic characteristics including gender, age, marital status, ethnicity, employment, and residence are described in table 1.

One-hundred and two (51%) patients presented with paraphenylenediamine (black stone or kala pathar) poisoning, followed by organophosphate (28, 14%), aluminium phosphide (20, 10%), acid intake (14, 7%), and bleaching powder (12, 6%) poisoning. Regarding mode of poisoning, suicidal, accidental and homicidal cases were as 173 (86.5%), 15 (7.5%) and 12 (6%), respectively. About 33 (16.5%) patients died while 167 (83.5%) patients were discharged home from the hospital. The overall mean duration of poisoning at time of presentation in ER was recorded 7.37 ± 12.66 hours where the shortest duration of poisoning recorded was 10 minutes while the longest duration of poisoning recorded was 5 days. The overall mean hospital stay of the patients was recorded 3.98 ± 4.06 days where the shortest hospital stay recorded was 3 hours while the longest hospital stay recorded was 20 days. Types of poisoning, modes of poisoning, and mortality can be referred to table 2.

Table No.1: Demographic characteristics of the patients (Total = 200)

Demographic Characteristic	Frequency N (%)
Gender	
Male	66 (33%)
Female	134 (67%)
Age	
15-30 years	167 (83.5%)
31-45 years	29 (14.5%)
46-60 years	4 (2%)
Marital Status	
Married	111 (55.5%)
Unmarried	87 (43.5%)
Divorced	2 (1%)
Ethnicity	
Saraiki	141 (70.5%)
Punjabi	44 (22%)
Urdu	12 (6%)
Others	3 (1.5%)
Employment	
Employed	44 (22%)
Unemployed	156 (78%)
Residence	
Rural	175 (87.5%)
Urban	25 (12.5%)

Table 2: Types of poison, modes of poisoning and mortality (N = 200)

Poison	Frequency, N (%)
Type of Poison	
Paraphenylenediamine	102 (51%)
Organophosphate	28 (14%)
Aluminium phosphide	20 (10%)
Acid Intake	14 (7%)
Bleaching powder	12 (6%)
Rodenticide	9 (4.5%)
Opioid	4 (2%)
Anxiolytic overdose	3 (1.5%)
NSAIDs overdose, Nephthalene balls, Digoxin, Copper sulfate, PPIs, Calotropis, Petrol intake, Insecticide	8 (4%; 0.5% for each poison)
Mode of Poisoning	
Suicidal	173 (86.5%)
Accidental	15 (7.5%)
Homicidal	12 (6%)
Mortality	
Died	33 (16.5%)
Discharged	167 (83.5%)
Abbreviations: NSAIDs = Non-steroidal anti-inflammatory drugs; PPIs = Proton pump inhibitors	

A significant association was reported between type of poison and gender ($p = 0.000$; table 3). No significant

association was found between mortality and age groups (p value = 0.83). Similarly, no significant association was recorded between the gender and mortality (p value = 0.24). No association was found between duration of poisoning at the time of presentation and mortality (p value = 0.81). However, significant association between the hospital stay and mortality was recorded (p value = 0.002; table 4). No significant association between type of poisoning and mortality was recorded (p value = 0.31). Similarly, no significant association between mode of poisoning and mortality (p value = 0.81).

Table No.3: Association between type of poisoning and gender (N = 200)

Type of Poison	Male	Female
Paraphenylene Diamine	22 (21.6%)	80 (78.4%)
Organophosphate	11 (39.3%)	17 (60.7%)
Aluminium Phosphide	12 (60%)	8 (40%)
Acid Intake	5 (37.5%)	9 (64.3%)
Bleaching Powder	1 (8.3%)	11 (91.7%)
Rodenticide	4 (44.4%)	5 (55.6%)
Opioid	4 (100%)	-
Anxiolytic Overdose	3 (100%)	-
NSAIDs Overdose	1 (100%)	-
Nephthalene Balls	-	1 (100%)
Digoxin	-	1 (100%)
CUSO ₄	1 (100%)	-
Proton Pump Inhibitors	-	1 (100%)
Calotropis	1 (100%)	-
Petrol Intake	1 (100%)	-
Insecticide	-	1 (100%)
p-value = 0.001		

Table No.4: Association between hospital stay and mortality (N = 200)

Mortality	Hospital stay		P value
	Mean	SD	
Yes	48.15	79.96	0.002
No	104.94	98.49	

DISCUSSION

Acute poisoning is a major but preventable healthcare problem worldwide that increases both morbidity and mortality. Globally, millions of people suffer from poisoning every year, leading to loss of millions of years of healthy life. The major findings of the present study were female predominance, young adults, suicidal mode of poisoning, frequent poisoning with PPD, frequent deaths with acid intake and significant association of mortality with the hospital stay. The most common mode of poisoning was suicidal, contributing to more than three quarters (3/4th) of all the indoor patients admitted with acute poisoning. The most common poisoning was PPD (kala pathar, black stone

or hair dye) poisoning that contributed to more than half of all the indoor patients admitted with the history poisoning. The overall mortality recorded in the study was 16.5%. The most common death frequency was recorded among the patients with acid intake, followed by PDD, ALP (aluminium phosphide, wheat or rice pill) and bleaching powder. Most of the mortality was recorded within the first three days of hospital stay.

Predominance of gender differs with the type of poisoning. However in terms of overall poison-related mortality, female gender predominates. In this regard, Muhammad et al.¹² studied 103 patients with acute poisoning, reporting the female predominance of 65.1%. In United States, Gumminet al.¹³ reported male predominance below 12 years of age while female predominance among teenagers and adults. On the contrary, a retrospective study conducted in Malaysia to evaluate type of poisoning exposure calls reported overall male predominance¹⁴.

One of the most important concerns of poisoning is that it frequently affects the young adults. Muhammad et al.¹² reported majority of the patients with the age group of 21-30 years of age. In this regard, it supports the results of the present study where 83.5% patients had age from 15 to 30 years. Similarly, in China, Zhang et al.¹⁵ reported 52.7% acute poisoning in the age group of 20-39 years.

The most common mode of poisoning is suicidal. Similarly, self-poisoning is the most common method of suicide¹⁶. Chowdhury et al.¹⁷ reported 68.7%, 15.9% and 15.2% patients with suicidal, accidental and homicidal modes of poisoning, respectively. PPD, OP and ALP poisoning were most commonly encountered in the present study which warrants urgent restriction on the production of these substances.

Poisoning is one of the most common causes of mortality world-wide. Poison-related mortality is high (16.5%) among the indoor patients admitted in the acute poisoning. In rural South India, poison-related mortality has been reported to be 4.30% where highest incidence of poison was recorded among the age group of 21-30 years¹⁸. Khan et al.¹⁹ studied patients from Pak-NEDS regardless of age. They reported 6.6% mortality among the patients with intentional or unintentional poisoning. It shows that poison-related mortality is high at Nishtar Hospital Multan, warranting development and application of urgent policies and programs in order to reduce the poison-related mortality.

The important finding of the study was the association of mortality with hospital stay. Most of the deaths occurred within first three days of admission. It shows that the patients with poisoning require maximum care during their early days of admission. In this regard, Eddleston et al.²⁰ reported maximum deaths with 24 hours of admission among those with acute self-poisoning.

The strengths of the present study include its appropriate sample size, prospective design and individual monitoring of the patients. However, the present study is not without limitations. The poisoning cases were included in the study on the basis of history, clinical examination or laboratory results. No confirmatory tests were used to determine the poison used. Therefore, further studies are required at large scale based on confirmatory tests for poisons along with history, clinical examination and laboratory investigations.

CONCLUSION

In conclusion, acute poison-related mortality is high at Nishtar Hospital Multan. Most common victims are young adults and female gender which warrant an urgent evaluation of the causes and circumstances of poisoning. Highly toxic PPD, OP and ALP products should be withdrawn from the market and banned for use. Domestic use of strong acids should be restricted. Particular standard operating procedures (SOPs) should be developed for the management of poisoning cases especially in the early days of poisoning.

Author's Contribution:

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