

# TRENDS IN POISONING CASES: AN AUTOPSY-BASED STUDY AT KHYBER MEDICAL COLLEGE, PESHAWAR

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## ABSTRACT

**Objectives:** To determine trends of poisoning cases in autopsy examinations conducted at Khyber Medical College, Peshawar.

**Materials and Methods:** This descriptive cross-sectional study enrolled 262 cases of poisoning presented for autopsy at the Department of Forensic Medicine, Khyber Medical College from 1st January 2018 to 31st December 2022. All poison-based autopsy cases of any age and gender were included in the study. Cases with Incomplete documentation and referred from other districts were excluded from the study.

**Results:** Our study showed males 228/262 (87%) were more prevalent than females 34/262 (13%). Moreover, 21-30 years of age were 82/262 (31.3%) individuals. Out of 262 subjects, 50.4% (n=132) were poisoned with a single drug, though 49.6% (n=130) were having multiple drugs. The poisons found in the study were morphine (58.0%, 152), methamphetamines (34.4%, 90), benzodiazepines (34.4%, 90), Tetrahydrocannabinol (19.8%, 52), amphetamines, (15.6%, 41), phosphine (8.8%, 23), Tricyclic antidepressants (8.4%, 22), carbon monoxide (3.8%, 10), methyl alcohol (1.5%, 4), ethyl alcohol (1.1%, 3), propranolol (0.8%, 2), arsenic (0.4%, 1) and tissue paper (0.4%, 1). The trends of poisoning have been looked through the period of 5 years, indicating the use of morphine, amphetamines, and methamphetamines were escalating in the meantime, whereas the frequency of usage of benzodiazepines remain sustained

**Conclusion:** Our study concluded that poisoning was found more prevalent in males in the middle age group. In addition, the analysis of the last five years revealed that trends of morphine and methamphetamine poisoning increased while phosphine was found to be decreased for the cause of death determination.

**Keywords:** Trends, Poisoning, Autopsy, Peshawar

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## INTRODUCTION

Poisoning refers to basically injury or death due to swallowing, inhaling, touching, or injecting various drugs, chemicals, venoms, or gases <sup>1</sup>. For a long time, various poisonous substances known to lead to a very large number of deaths in various societies. Poisons have been the subject of concern for a long time. Poisons had a great impact on human events since ancient times. Over time important poisons of the day have changed to some degree, and toxic substances continue to challenge our everyday lives. Traditionally, arsenic is the favorite poison for homicide and opium for suicide, though there is an increased incidence of the use of organophosphorus insecticides for suicide <sup>2,3</sup>. Death due to poisoning has been known since

times. Poisoning is a major concern all over the world, although its type and associated morbidity and mortality vary from country to country <sup>4</sup>.

According to law, all deaths due to poisons are recorded as unnatural deaths and a case of death that is suspected or a clear case of poisoning must undergo autopsy (5,6). Low cost and easy availability of poisons have a major role in suicide and accidental poisoning in many developing countries like Pakistan <sup>7</sup>. Most of the time fatal poisoning is due to organo-phosphorus compounds (pesticide/ insecticides) <sup>8</sup>. According to WHO in 1999 more than 3 million cases of poisoning has been reported worldwide and out of which many cases ended in deaths mainly in farmers <sup>9-11</sup>. The reason is the vast exposure to poisonous toxins during cultivation and handling. Hence treatment and people preventive steps are in controlling poisoning-related death in any community <sup>6,9</sup>. Comprehensive data has revealed that among developed countries death due to poisoning is low but in developing countries, it is very high and it is the fourth most common cause of mortality especially in rural areas <sup>6,7,8</sup>. Ingestion of Organophosphorus Compound (OPC) as an attempt for suicide purposes are major problem probably because of

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the easy availability of pesticides<sup>10,11</sup>. This occurs due to the extensive use of poisons in the agriculture field and because of the unregulated sale of these products over the country in Pakistan. In our area same situation prevails and difficult to say which kind of poison is more frequently causing deaths. So this study was conducted on various parameters of poisoning such as type of poisoning, gender, frequency, and age group involved, among autopsy cases. Nowadays trends are changing from organophosphorus poisoning to amphetamines and methamphetamines because of its easy availability. It is alarming that most middle age individuals are poisoned and death occurred.

The data of this study shall help have dedicated data of poisoning based on autopsy in the Department. This data can further be utilized for preventive and curative measures which involve early treatment, awareness among masses, and utilization of law & enforcement agencies for law making.

The objective of this study is to determine trends of poisoning cases in autopsy examinations conducted at Khyber Medical College, Peshawar.

## MATERIALS AND METHODS

This Cross-Sectional Chart Review was conducted at the Department of Forensic Medicine, Khyber Medical College, Peshawar from 01<sup>st</sup> January 2018 to 31<sup>st</sup> December 2022 (Five years of data) All cases reported at the department in the said study duration was sample size. All poison-based autopsy cases of any age and gender were included in the study. Cases with Incomplete documentation and referred from other districts were excluded from the study.

The data as per the study sample was collected after taking Ethical/Institutional approval for the said study. After following principle guidelines, and maintaining the ethical concerns and confidentiality of the participant, a pre-designed Performa was used to extract the data. The pre-designed Performa had a demographic component and closed-ended questions regarding the trends of poisoning in the autopsy cases presented at the Department of Forensic Medicine. GCMS is gold standard in forensic toxicology both for qualitative and quantitative analysis. Only qualitative analysis is included in this study. The data was extracted in Microsoft Excel software and SPSS v.25.0 for analysis. SPSS v.25.0 was used for analysis. Categorical variables were analyzed descriptively in the form of frequency and percentages. Numerical variables were analyzed descriptively in the form of mean and stand deviation. Post-stratification two categories were associated with Chi-Square Test. Analysis was presented in the form of tables and figures.

## RESULTS

In our study, a total of 262 poisoned cases were studied out of which 228 (87%) were male and 34 (13%) were female. Middle age group of 21-30 years individuals were poisoned more than others followed by 31-40 years of age.

In this study, we are looking for the inclinations of poisoning, out of 262 subjects 50.4% (n=132) were poisoned with a single drug, though 49.6% (n=130) were having multiple drugs. The poisons found in the study were morphine (58.0%, 152), methamphetamines (34.4%, 90), benzodiazepines (34.4%, 90), Tetrahydrocannabinol (19.8%, 52), amphetamines, (15.6%, 41), phosphine (8.8%, 23), Tricyclic antidepressants (8.4%, 22), carbon monoxide (3.8%, 10), methyl alcohol (1.5%, 4), ethyl alcohol (1.1%, 3), propranolol (0.8%, 2), arsenic (0.4%, 1) and tissue paper (0.4%, 1).

However, the postmortem interval in subjects was seen, 21.0% (55) were in between 1 to 4 hours, 27.9% (73) were in between 4 to 8 hours, 35.5% (93) were in between 8 to 16 hours, 7.6% (20) were in between 16 to 24 hours, 5.0% (13) were between 24-48 hours and 3.1% (8) were more than 48 hours. The trends of poisoning have been looked through the period of 5 years, indicating the use of morphine, amphetamines, and methamphetamines escalating in the meantime, whereas the frequency of usage of benzodiazepines remains sustained; details in Table 3.

## DISCUSSION

To our knowledge, it's a study to focus on the regional trends of poisoning on autopsy in Khyber Pakhtunkhwa. All manners of poisoning based on suicidal, homicidal, or accidental events are included. The study had a total number of 262 subjects of which 87.0% were males, which was consistent with many studies<sup>12,13,14</sup>, in this part of the world where the male gender dominates and a huge burden lies on them, so they are more susceptible to poisoning. The peak deaths were in the age groups of more than 20 years to 50 years, as this is the period in which they are more productive in life, so incline to

**Table 1: OVERALL DEMOGRAPHIC INFORMATION INCLUDED IN THE STUDY**

Variables	n=262	Percentage (%)
Gender		
Male	228	87.0
Female	34	13.0
Age in groups		
< 21 years	11	4.2
21-30 years	82	31.3
31-40 years	77	29.4
41-50 years	48	18.3
51-60 years	29	11.1
> 60 years	15	5.7

**Table 2: DIFFERENT POISONS WITH FREQUENCIES**

Poisons	Single n=132 (%)	Multiple n=130 (%)	Total n=262 (%)
Amphetamine	2 (1.5)	39 (30.0)	41 (15.6)
Arsenic	1 (0.8)	0 (0)	1 (0.4)
Benzodiazepines	25 (18.9)	65 (50.0)	90 (34.4)
Carbon monoxide	10 (7.5)	0 (0)	10 (3.8)
Ethyl alcohol	1 (0.8)	2 (1.5)	3 (1.1)
Methamphetamine	8 (6.1)	82 (63.1)	90 (34.4)
Morphine	44 (33.3)	108 (83.1)	152 (58.0)
Methyl alcohol	4 (3.0)	0 (0)	4 (1.5)
Phosphine	23 (17.4)	0 (0)	23 (8.8)
Propranolol	2 (1.5)	0 (0)	2 (0.8)
Tricyclic antidepressant	3 (2.3)	19 (14.6)	22 (8.4)
Tetrahydrocannabinol	11 (8.3)	41 (31.5)	52 (19.8)
Tissue Paper	0 (0)	1 (0.8)	1 (0.4)

**Table 3: TRENDS OF POISONING THROUGH 5 YEAR-PERIODS**

Poisons	Years									
	2018		2019		2020		2021		2022	
	Frequency N=45 (%)	Frequency N=60 (%)	Frequency N=60 (%)	Frequency N=58 (%)	Frequency N=58 (%)	Frequency N=48 (%)	Frequency N=48 (%)	Frequency N=51 (%)	Frequency N=51 (%)	
Amphetamine	4	8.9	11	18.3	8	14	10	20.8	8	15.7
Arsenic	0	0	0	0	0	0	0	0	1	2.0
Benzodiazepines	20	44.4	20	33.3	16	27.6	15	31.2	19	37.3
Carbon monoxide	4	8.9	2	3.3	2	3.4	0	0	2	3.9
Ethyl Alcohol	1	2.2	0	0	1	1.7	1	2.1	0	0
Methamphetamines	3	6.7	20	33.3	22	37.9	26	54.2	19	37.3
Morphine	13	28.9	34	56.7	41	70.7	31	64.6	33	64.7
Methyl Alcohol	0	0	0	0	2	3.4	0	0	2	3.9
Phosphine	7	15.6	7	11.7	6	10.3	2	4.2	1	2.0
Propranolol	0	0	0	0	1	1.7	0	0	1	2.0
Tricyclic antidepressants	1	2.2	7	11.7	4	6.9	4	8.3	6	11.8
Tetrahydrocannabinol	9	20	14	23.3	6	10.3	11	22.9	12	23.5
Tissue Paper	0	0	1	1.7	0	0	0	0	0	0

wards poisoning due to occupational hazards, accidental threats, social disputes, and jealousy, and mental stress, seen in a lot of studies conducted<sup>14-17</sup>.

As it is an autopsy-based study, the testing of samples showed multiple poisons in samples which came out to be 49.6%, while the rest were cases of single poisoning. Most of the cases of multiple poisons were a combination of morphine, methamphetamines, Tetrahydrocannabinol, and benzodiazepines. The most common poison either single or in multiple cases was morphine (58%) succeeded by benzodiazepines (34.4%) and methamphetamines (34.4%), which is contrary to a study in Pakistan where organophosphate was the most common<sup>17</sup> as well as in India<sup>13,18</sup> and in China<sup>19</sup>. Morphine, methamphetamines,

amphetamines, and Tetrahydrocannabinol are recreational drugs, but their extravagance use harms one's life. These are illegally used by the youth to cope with their daily stress, which unintentionally leads to toxicity ending up in death. On the other hand, benzodiazepine misuse is increased in the study showing that people having depression and insomnia overuse it, neglecting the adverse events relating to it. Moreover, carbon monoxide poisoning is prevalent because of its production in cars, industries, generator use, and household stoves as well, this is also consistent with a study in Turkey<sup>20</sup>.

Now, we are here to discuss the trends of these poisons over the 5 years, in which the use of stupefying agents was topmost and escalating in the meantime. The

morphine and cannabis abuse and methamphetamines hype is an alarming sign in the region engulfing the mind of youngsters, especially. This is due to illicit drug trafficking, lack of law enforcement agencies, and adverse impacts of social media. Drug abuse is responsible for decreased job output and attendance, increased health care costs, and intensification of domestic violence and violent crimes. Drug addiction is a preventable disease<sup>21</sup>. However, the misuse of benzodiazepine was steady throughout the 5 years, with the fact of increased depression and anxiety in the population due to inflation and economic crisis in the country, domestic and social norms, and competitive behaviors. Another reason pointing to its toxicity is that it's misused after medical prescription. People with a history of benzodiazepine prescription had four times higher odds of misusing benzodiazepines and the primary source of misused benzodiazepines was from family or friends<sup>22</sup>. Many sporadic cases of ethyl alcohol, methyl alcohol, and Tricyclic antidepressants have appeared as shown in the data. Nowadays trends are changing mostly morphine followed by amphetamines poisoning is more prevalent as shown in our study. Peshawar being the capital city has more poisoning cases than other cities.

## CONCLUSION

Our study concluded that poisoning was found more prevalent in males in the middle age group. In addition, the analysis of the last five years revealed that trends of morphine and methamphetamine poisoning increased while phosphine was found to be decreased for the cause of death determination.

## RECOMMENDATIONS

Our analysis clearly indicates that future studies must incorporate a quantitative analysis of poisons to gain a better understanding of the associations with variables. It is imperative to take immediate action against the most prevalent poisons, namely morphine, methamphetamines, and benzodiazepines, by reducing their availability and implementing rigorous checks during sales. This article serves as the foundation for further research on the contributing factors to poisoning trends.

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#### AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

**Baqi NU:** Concept, Critical appraisal, and Discussion Writing

**Nadeem F:** Data collection, compilation of results, formatting of the article

**Wasif M:** Data Collection, Manuscript writing

**Ali SA:** Manuscript Writing, Bibliography

**Aziz S:** Overall compilation of the article

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.



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