Original Research Article

Medicolegal autopsy profile study of fatal poisoning cases

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Abstract

Background: Poisoning is a major public health problem worldwide, with thousands of deaths occurring every year, mainly reported from the developing countries; yet medicolegal autopsy is mandatory to confirm the poisoning as cause of death. **Objective:** In present study profiles of confirmed fatal poisoning medicolegal autopsy cases at our hospital were reviewed. **Methods:** The present study was a retrospective data mining of case records of one year from January to December 2019 of conducted medicolegal autopsy reports with alleged history of poisoning and cases that were diagnosed as poisoning after post mortem examination and confirmed by chemical analysis. Data were entered in Microsoft excel sheet and statistical analysis was done using descriptive statistics. **Results:** Total 126 cases of confirmed poisoning deaths were considered in present study. During study period, from all autopsy reports 14.6% deaths were due to confirmed poisoning. 15-29 years was most common age group (40%), followed by 30-44 years (29 %). Male cases (58%) were more than female (42%), male to female ratio was 1.38:1. Most patients died within 2 hours of reported consumption (60%) of toxic materials, only 6% fatal cases survived more than 24 hours of consumption. As per history, most cases were suicidal (78 %), in 6% cases intention of poisoning could not be elicited. Organophosphorus (55%), Aluminum Phosphide (29%) and Alcohol (9%) were common poisons noted in Forensic Science Laboratory reports. **Conclusion:** Majority of victims of poisoning were young individuals and males. From the chemical analysis reports we found that most commonly used poisons were of agricultural use such as organophosphorus compounds and aluminum phosphide.

Keywords: poisoning, Autopsy, suicide, Insecticide, Organophosphorus

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Received Date: 20/11/2019 Revised Date: 19/12/2019 Accepted Date: 11/01/2020
DOI: https://doi.org/10.26611/10181721

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	Accessed Date: 04 February 2021

INTRODUCTION

Poisoning is a major public health problem worldwide, with thousands of deaths occurring every year, mainly in the developing countries. The investigation of cases of poisoning is one of the most difficult tasks. Acute poisoning due to accidental and suicidal exposure causes significant mortality and morbidity throughout the world. It has been estimated that, in India five to six persons per lakh of population die due to acute poisoning every year.[1]

Annually it has been estimated that the health hazards are directly or in directly due to poisons is for more than 1 million illnesses worldwide, and this could be just the tip of the iceberg as most of the cases of poisoning actually go unreported and untreated, especially in developing and underdeveloped countries.[2] In developing countries consequences of unintentional domestic poisoning can be very serious following ingestion of kerosene, caustic agents, pesticides or medicines.[3] The detection of poisons and their identification is an important aspect of forensic science. Knowledge of general pattern of poisoning in a particular region will help in early diagnosis and treatment of cases, thus decreasing the rate of mortality and morbidity. The detection of poisons and their identification is an important aspect of forensic science. The investigation of cases of poisoning is one of the most difficult tasks and medicolegal autopsy has a definite role for suspected poisoning cases.

In present study we analyzed records of the medicolegal autopsy cases to find the profiles of confirmed fatal poisoning at our hospital.

How to cite this article: Niranjan Kumar Gunjan, Kathi Aswani Kishore. Medicolegal autopsy profile study of fatal poisoning cases. *MedPulse International Journal of Forensic Medicine.* January 2021; 17(2): 06-09. https://www.medpulse.in/Forensic%20Medicine/

MATERIAL AND METHODS

The present study was a retrospective data mining of case records of conducted medicolegal autopsy reports with history of poisoning and cases that were diagnosed as poisoning after post mortem examination and confirmed by chemical analysis. The study was conducted in the department of Forensic Medicine and Toxicology at a tertiary care hospital in north-west Delhi and study period was January 2019 to December 2019 (1 year).

Inclusion criteria: Medicolegal autopsy with alleged history of ingestion of poison and cases diagnosed due to poisoning after postmortem examination and confirmed by chemical analysis.

Exclusion criteria: The cases of food poisoning, snake bite and any other insect bite envenomation and deaths due to idiosyncratic reaction to the drugs were excluded.

Strict confidentiality was kept for identity and medicolegal data of autopsy cases. In all cases of poisoning the detailed history and information was collected from the autopsy reports, inquest reports and post mortem findings were analyzed with the chemical analysis reports from Forensic Science Laboratory for Chemical analysis and report.

OPERATIONAL DEFINITION –

Medico-legal autopsy: Postmortem examination of deceased was done where alleged substance that was injurious to life (poison) was ingested and lead to death was performed.

Qualitative and quantitative chemical analysis: These were conducted at the Forensic Science Laboratory, Rohini Delhi by Chemical, Microscopic, Thin layer Chromatography and Gas Chromatography-Mass Spectrometry examination and finding were labelled as exhibits that were found to contain specific poison with their name and concentration.

A detailed documentation regarding the age, gender, time of consumption of poison, name and type of poison, mode of transport to the hospital, reason for poisoning, amount of poison taken, route of entry into the body, time interval between the consumption and hospitalization, outcome and other parameters were noted in study proforma. Findings were entered in Microsoft excel sheet and statistical analysis was done using descriptive statistics.

RESULTS

During study period, from all autopsy reports 14.6% deaths were due to confirmed poisoning. Total 126 cases of confirmed poisoning deaths were considered in present study. 15-29 years was most common age group (40.47%), followed by 30-44 years (28.57 %). Male cases (57.93%) were more than female (42.06%), male to female ratio was 1.38:1. Most patients were died within 2 hours of consumption (60.31%), only 5.55% were survived for more than 24 hours of consumption. As per history most cases were suicidal (77.77 %). In 4.76% cases intention of poisoning was not known. Organophosphorus (54.76%), Aluminum Phosphide (28.57%) and Alcohol (8.73%) were common poisons noted in FSL reports.

Table 1: Socio-clinical pattern of poisoning revealed at post-mortem

	Age (years)										Total
	<14		15-29		30-44		45-59		>60		
	M	F	M	F	M	F	M	F	M	F	
	4	**2**	**31**	**20**	**19**	**17**	**11**	**8**	**8**	**6**	126
Time interval											
<2 hours	**1**	**1**	**18**	**11**	**11**	**10**	**7**	**4**	**7**	**6**	**76 (60.31%)**
2-6 hours	**2**	**1**	**7**	**4**	**6**	**5**	**3**	**3**	**1**	**0**	**32 (25.39%)**
6-24 hours	**1**		**3**	**3**	**1**	**2**	**1**	**0**	**0**	**0**	**11 (8.73%)**
>24 hours	**0**	**0**	**3**	**2**	**1**	**0**	**0**	**1**	**0**	**0**	**7 (5.55%)**
Manner of poisoning											
Suicidal	**0**	**0**	**30**	**18**	**14**	**14**	**8**	**7**	**4**	**3**	**98 (77.77%)**
Accidental	**4**	**2**	**0**	**0**	**1**	**1**	**1**	**0**	**3**	**3**	**15 (11.90%)**
Homicidal	**0**	**0**	**1**	**2**	**2**	**1**	**1**	**0**	**0**	**0**	**7 (5.55%)**
Don't know	**0**	**0**	**0**		**2**	**1**	**1**	**1**	**1**	**0**	**6 (4.76%)**
Chemical Analysis (FSL) findings											
Organophosphorus	**3**	**2**	**16**	**11**	**8**	**10**	**5**	**5**	**6**	**3**	**69 (54.76%)**
Aluminum Phosphide	**1**	**0**	**8**	**7**	**2**	**6**	**4**	**3**	**2**	**3**	**36 (28.57%)**
Alcohol			**4**	**0**	**5**	**0**	**2**	**0**	**0**	**0**	**11 (8.73%)**
Carbamate				**1**	**1**	**1**					**3 (2.38%)**
Pyrethroid			**1**	**1**	**1**						**3 (2.38%)**
Sulphuric acid			**1**		**1**						**2 (1.58%)**
Paraphenylendiamine					**1**						**1 (0.79%)**
Benzodiazepine			**1**								**1 (0.79%)**

(Male= M, Female=F)

DISCUSSION

At present due to vast development in all fields of life like industries, medicine, and agriculture a significant number of new compounds have appeared as new poisonous substances, which lead to a greater number of poisoning cases.

Age and gender distribution

In present study maximum number of fatal poisoning autopsy cases were from age group between 21-30 years and male outnumbered female. This age group was the most active one, physically, mentally and socially and therefore more prone to stressful situations in life. Similar findings were noted in other studies.[5,6,7] Availability of poisons in house or the working place is one of the factors which promote suicidal poisoning like, cyanide in electroplating units, pesticides are mostly available with farming communities, thiopental sodium nitrite in dyeing industries etc.[8]

Time interval:

In our study most patients were died within 2 hours of consumption (60.31%), only 5.55% were survived for more than 24 hours of consumption. Srinivasa K *et al.*,[9] studied 272 cases of poisoning, 64% cases were reported to the hospital within 2hrs of the incident and 28.7% were reported between 2-6 hrs.

Manner of poisoning

In our study manner of poisoning in most cases was suicidal (77.77 %), while in 5.55% cases intention of poisoning was not known. In a study from Kalburgi, Karnataka, 95.2% cases were due to suicide followed by 4.8% cases were due to accidental poisoning.[5] Tejus P *et al..*,[7] studied 366 cases of acute poisoning over a period of one year and in 74.6% of cases poisoning was suicidal. In study by Srinivasa K *et al.*,[9] intention of poisoning was suicidal in 65.4% cases followed by accidental poisoning seen in 32.7% cases.

Chemical Analysis (FSL) findings

In our study organophosphorus (54.76%), Aluminum Phosphide (28.57%) and Alcohol (8.73%) were common poisons noted in FSL reports. In a study from Kalburgi, Karnataka, maximum number of deaths due to poisoning involved Organophosphorus compounds (72.9%), followed by Carbamate compounds and alcohol (9.4%) and followed by Aluminum phosphide (3.5%).[5] In study by Mrinal H *et al.*,[6] organophosphorus compounds were the most common agents responsible for poisoning with 22.91% cases. While Tejus P *et al..*,[7] noted that commonest type of poison was pesticide in 33.9% cases, followed by household chemicals (26.8%), and in 74.6% of cases poisoning was suicidal. Srinivasa K *et al.*,[9] reported organophosphorus compounds (25.7%) being the commonest poison in poisoning cases. Singh B *et al.*,[10] noted that agrochemicals were the preferred agents with organophosphates alone responsible for maximum (50%) suicidal mortalities, followed by aluminium phosphide (40%) and others (8%). The commonest cause of poisoning in India and other developing countries is pesticides, the reasons being agriculture-based economics, poverty, unsafe practices, illiteracy, ignorance and lack of protective measures and easy availability of highly toxic compounds. Because of their easy availability, low cost, lethal nature; insecticides are widely used as means for committing suicide. Organophosphate poisoning is the most common poisoning in India followed by aluminum phosphide. Most pesticides related poisoning in developing countries can be attributed to lack of training in their use, poor regulation or legislative control toward their cases and carelessness in providing protection to the body during their application. Organophosphate insecticides are highly toxic chemicals rapidly absorbed by all routes –respiratory, Gastrointestinal, ocular and dermal. Denatured spirit, which is not meant for human consumption also contains ethyl alcohol. Alcoholics often clandestinely consume this denatured spirit on account of its cheapness and ready availability, is also common cause of death in rural areas. This results in poisoning due to denaturing material (Methyl alcohol, Pyridine, Colchicine oil, etc.) used in it. It is important to understand the magnitude and pattern of fatal poisonings in a particular region, which is helpful in early diagnosis and treatment, as well as in implementing the preventive measures.[11] It is customary to emphasize the role of psychiatric consultant in most of the background situations most important to death from poisoning, Strict legal enforcement in selling and handling of agrochemicals is the need of the hour, and establishment of poison detection centres and early management of poisoning cases at all hospitals, primary health care centres could considerably minimize the morbidity and mortality due to poisoning.

STRENGTHS OF THE STUDY:

Knowledge of general pattern of poisoning in our particular region will help in early diagnosis and treatment of cases, thus decreasing the rate of mortality and morbidity.

LIMITATIONS OF THE STUDY:

The sample size was small. Only a small geographic area was considered. Under-reporting of the incident poisoning cases and their mortality is common due to legal consequences. Some poison may also have produced signs and symptoms resembling disease. Death caused by those poisoning may be considered as natural death which are usually not reported to police so they don't reach to mortuary. Few exotic poisons may not have been detected in routine toxicological analyses.

FUTURE DIRECTIONS OF THE STUDY:

Most commonly used poisons were organophosphorus compounds and aluminum phosphide. Stringent laws should be imposed for manufacturing and regulation of its usage. Abnormal behaviour of the person in the house, as well as in the working place like depression, isolation, mood changes which may lead to suicidal tendencies should be identified both in the house as well as in working place and necessary counselling to be given, by psychologist.

CONCLUSION

Majority of victims of poisoning were young individuals and males. From the chemical analysis reports we found that most commonly used poisons were of agricultural use such as organophosphorus compounds and aluminum phosphide. Establishment of specialized toxicological units for detection and management of poisoning cases at all hospitals and primary health care centers could considerably minimize the morbidity and mortality due to poisoning.

Acknowledgement: The author acknowledges the contribution by the staff members at Forensic Science Laboratory, Rohini Delhi to confirm the chemical diagnosis.

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Source of Support: None Declared
Conflict of Interest: None Declared