



A COMPREHENSIVE STUDY OF POISONING IN CENTRAL INDIAN POPULATION.

Forensic Medicine

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ABSTRACT

The prevalence and trends of poisoning varied in different parts of the world. It is an important public health problem causing significant morbidity and mortality throughout the countries, still no sufficient attention is paid in this particular direction regarding the prevention strategies and awareness programs regarding this issue. This study was carried out at forensic medicine department of Government Medical College and hospital, a tertiary care institute serving to needs of both rural and urban population of this region on 204 deceased cases brought for medicolegal postmortem examination having history of death due to poisoning. Out of total 204 cases, 66.67% of the victims were male and 33.33% were female. Death due to poisoning was commonly seen in age groups of 31-40 years found in 29.42% cases. 56.86% of the victims of poisoning deaths were found to be married and 25.49% were unmarried. 53.93% were rural residents and 46.07% were urban residents. 35.29% victims died due to organophosphorous poisoning, 20.59% were died due to unknown compound poisoning 12.76% due to rodenticide poison, 2.94% due to household corrosives. 67.85% victims were died in hospital after admission while under the treatment, however 32.14% patients were brought dead cases. The maximum cases were farmers (27.94%) followed by students (22.05%). The maximum incidence of hospital death occurs in 24-48 hours duration (32.15%) followed by 0-24 hours (26.42%) and 48-72 hours (17.86%).

KEYWORDS

poisoning; corrosives; rodenticide; organophosphorous; poison information center.

INTRODUCTION

Poison is a substance which when taken into body by inhalation, ingestion or injected or absorbed through skin causes damage to the body.¹ Poisoning is described as the fourth common cause of mortality in India.² Pattern of poisoning in a particular region depends on the various factors which includes, availability of poison, access to the poison, socioeconomic status of an individual. Fatal poisoning rates in low-income and middle-income countries are four times that of high-income countries however the highest incidence is seen in Africa and low-income and middle-income countries in Europe and the Western Pacific Regions. Common poisoning agents in high-income countries include pharmaceuticals, household poisons, pesticides, poisonous plants and insects and animals bites. Common poisoning agents in low-income and middle income countries are fuels such as paraffin and kerosene, pharmaceuticals and cleaning agents.³ Organophosphates are the major cause of self-poisoning in southern and central India and aluminum phosphide in northern India, other pesticides used for self-poisoning are organochlorines, carbamates, and pyrethroid.⁴

In 2015, 55 U.S. poison control centers provided telephonically guidance for about 2.2 million human poison exposures. That's about 6.7 poison exposures/1000 populations, 41.9 poison exposures in children younger than 6 years/1000 children, one poison exposure reported to U.S. poison control centers every 15 seconds. Across all ages, 78.4% of poison exposures reported to U.S. poison centers in 2015 were unintentional, 17.6% were intentional, and 2.4% were adverse reactions. In children younger than 6 years, 99% of exposures are unintentional, compared to only 35% of teen exposures and 61% of adult exposures.⁵

As far as India is concerned, The means adopted for committing suicide varied from the easily available and effective means such as consumption of poison, drowning to more painful means such as self-inflicted injuries, hanging, shooting, etc. Like previous year, 'Hanging' (45.6%), consuming 'Poison' (27.9%), were the mode of committing suicides. The poisoning increased from 26.0% in 2014 to 27.9% in 2015) and also poison constitutes the Various Major Causes of Accidental Deaths during 2015 with 6.3% cases.³ This is only a tip of iceberg as most of the cases were goes unreported in developed countries like India as many times the deaths in rural areas not reported.⁶

Rapid industrialization, massive use of pesticides in agriculture has increased the incidence of accidental poisoning. In India agriculture is the largest occupation which leads to use of pesticides, insecticides and other agrochemical fertilizers to a greater extent and the poisoning

with such products are more common. Various studies states that, organophosphate forms the commonest poisoning agent. Pattern of poisoning in a region depends on various factors which include availability and access to the poison, socioeconomic status of an individual.⁷

METHODOLOGY

The retrospective study was undertaken at government medical college and tertiary care hospital during 1st January 2017 to 31st December 2017, on 204 deceased cases brought for medicolegal postmortem examination having history of death due to poisoning. The data was collected from inquest Panchnama, from police and relatives present during Postmortem examination, the data is then tabulated and studied using descriptive statistical analysis.

RESULTS

Table 1: Age and Gender distribution of poisoning deaths.

Age /sex	Male		Female		Total	
	Percentage		Percentage		Cases	Percentage
0-10	4	1.96	0	0	4	1.96
11-20	14	6.86	8	3.92	22	10.78
21-30	24	11.77	14	6.86	38	18.63
31-40	46	22.55	14	6.86	60	29.42
41-50	30	14.70	22	10.79	52	25.49
51-60	6	2.95	4	1.96	10	4.90
61-70	8	3.92	4	1.96	12	5.88
71-80	4	1.96	2	0.98	6	2.94
Total	136	66.67	68	33.33	204	100

Out of total 204 cases 136 (66.67%) cases were male and 68 (33.33%) cases were female. The male: female ratio was 2.01:1. The death due to poisoning was most commonly seen in age groups of 31-40 years 60 (29.42%) cases among them 46 (22.54%) cases were male and 14 (6.86%) cases were female, followed by 41- 50 years 52 (25.49%) cases among them 30 (14.70%) cases were male and 22 (10.78%) cases were female. As far as marital status is concerned, 116 (56.86%) cases were married among them 82 (40.19%) cases were male and 34 (16.66%) cases were females and 52 (25.49%) cases were unmarried among them 38 (18.62%) cases were males and 14 (6.86%) cases were females. 36 (17.65%) cases were widows or widower. As far as residence of victim is concerned, 110 (53.93%) cases were rural residents and 94 (46.07%) cases were urban residents. Among rural cases 74 (36.27%) cases were male and 36 (17.64%) cases were female. Among urban residents 62 (30.39%) cases were male and 32

(15.68%) cases were female.

Table 2 : Distribution of poisoning deaths as per opinion to cause of death.

cause of death	Sex				Total	
	Male	Percentage	Female	Percentage	Cases	Percentage
Organophosphorous	58	28.44	14	6.86	72	35.29
Unknown compound	26	12.75	16	7.84	42	20.59
Septicemia	12	5.88	8	3.93	20	9.80
Rodenticide	14	6.86	12	5.88	26	12.76
Opinion Reserved	20	9.80	14	6.86	34	16.66
Corrosives	2	0.98	4	1.96	6	2.94
Sedatives	4	1.96	0	0	4	1.96
Total	136	66.67	68	33.33	204	100

The compound used for poisoning was organophosphorous in 72 (35.29%) cases, unknown compound in 42 (20.59%) cases, rodenticide in 26 (12.76%) cases, corrosives in 6 (2.94%) cases, sedative overdose in 4 (1.96%) cases. In 34 cases (16.66%) cases opinion to cause of death was given as opinion reserved as the classical findings of poisoning were missing in which most cases are admitted in hospital.

Table 3: Distribution of poisoning deaths as per occupation.

Occupation	Male		Female		Total	
	Cases	Percentage	Cases	Percentage	Cases	Percentage
Farmers	45	22.05	12	5.88	57	27.94
Students	28	13.73	17	8.33	45	22.05
Unemployed	25	12.26	8	3.93	33	16.18
House work	5	2.46	24	11.76	29	14.21
Service	15	7.35	5	2.45	20	9.81
Business	18	8.82	2	0.98	20	9.81
Total	136	66.67	68	33.33	204	100

The occupation of maximum cases were farmer 57 (27.94%) cases among them 45 (22.05%) cases were male and 12 (5.88%) cases were female followed by students in 45 (22.05%) cases among them 28 (13.72%) cases were male and 17 (8.33%) cases were female followed by unemployed or unemployed cases were 33 (16.18%).

Table 4: Distribution of poisoning deaths as per duration of admission in hours.

Admission hours	Male		Female		Total	
	Cases	Percentage	Cases	Percentage	Cases	Percentage
0-24	26	18.57	11	7.85	37	26.42
24-48	32	22.85	13	9.28	45	32.15
48-72	17	12.14	8	5.72	25	17.86
72-96	12	8.57	10	7.15	22	15.71
>96	8	5.72	3	2.14	11	7.86
Total	95	67.85	45	32.14	140	100

The maximum incidence of hospital death occurs in 24-48 hours duration with 45 cases (32.15%) followed by 0-24 hours 37 cases (26.42%) and 48-72 hours 25 cases (17.86%). (Table 4) As far as place of death is concerned, 140 (68.63%) cases were died in hospital casualty or in ward while under the treatment, among them 95 (67.85%) cases were male and 45 (32.14%) were female and 64 cases were not hospitalized, among them 41 (64.06%) cases were male and 23 (35.94%) cases were female. Non-hospitalized cases were either spot dead cases or brought dead to hospital due to death during transportation and shifting to hospital.

DISCUSSION

A poison is any substance which is harmful to the human body which when swallowed, inhaled, injected or absorbed through the skin.⁸ Acute poisoning is the exposure to a poison on one occasion or during a short period of time causing severe symptoms to develop in close relation to the degree of exposure. Chronic poisoning is long-term repeated or continuous exposure to a poison where symptoms do not occur immediately or after each exposure, however the patient becomes gradually ill, or becomes ill after a long and latent period. Chronic poisoning most commonly occurs after the exposure to poisons that accumulate in body.⁹

Shrivastav et al conducted the retrospective study of poisoning calls received by National Poisons Information Centre. The queries on call were made mainly regarding poisoning management (92%), information about poison (8%). The data were analysed with respect to sex, age, mode of poisoning and type of poisoning on the basis of 2719 calls received over a period of three years from April 1999 to March 2002. The agents were household products, agricultural pesticides, industrial chemicals etc. The age ranged from 1 to 70 years, with highest incidence in the range of 14 years to 40 years, with males (57%) outnumbering females (43%). The commonest mode of poisoning was suicidal (53%) which is followed by accidental (47%). The highest incidence of poisoning was due to household agents (44.1%) followed by drugs (18.8%), agricultural pesticides (12.8%), industrial chemicals (8.9%), animals bites and stings (4.7%). Among the agricultural pesticides aluminium phosphide was the most commonly consumed followed by organochlorines and organophosphates. Accidental mode was the most common (79.7%). Intentional attempts were also noticed (20.2%) in the age group above 12 years.¹⁰

Jessin et al. conducted a study on 1045 poisoning cases from January 2005 to September 2008. Among them, 68.40% of cases were due to intentional poisoning and 31.60% due to accidental poisoning. About 84.4% of patients recovered, whereas in 7.6% of cases condition did not improve. Mortality rate was observed 4%. Intentional poisoning was observed more in male population (60.2%) in the age group of 18-29 years. Incidence of overall poisoning cases were high due to pesticides (39.5%) followed by medicines (26.1%), household products (22.1%), environmental poisoning (12.1%) and heavy metals (0.2%).¹¹ Mew EJ et al in their study observed that the data from 108 countries (102 from WHO data, 6 from the literature). A conservative estimate based on these data indicates that there were approximately 110,000 pesticide self-poisoning deaths each year from 2010 to 2014, comprising 13.7% of all global cases of suicidal poisoning. The under-reporting of suicides in India resulted in an increased estimate of 168,000 pesticide self-poisoning deaths annually, which is 19.7% of global suicides. The proportion of suicides due to pesticide self-poisoning varies considerably from region to region, from 0.9% in low- and middle-income countries in the European region to 48.3% in low- and middle-income countries in the Western Pacific region.¹² Boedeker W et al covered total 141 countries, including 58 by the 157 articles and an additional 83 by data from the WHO Mortality Database. Approximately 740,000 annual cases of unintentional pesticide poisoning were reported by the extracted publications resulting from 7446 fatalities and 733,921 non-fatal cases. On this basis, we estimate that about 385 million cases of unintentional pesticide poisoning occur annually world-wide including around 11,000 fatalities. Based on a worldwide farming population of approximately 860 million this means that about 44% of farmers are poisoned by pesticides every year. The greatest estimated number of UAPP cases is in southern Asia, followed by south-eastern Asia and east Africa with regards to non-fatal unintentional pesticide poisoning.¹³

In present study it was observed that, the male cases (66.67%) was more than female cases (33.33%) seen in all age groups. The possible reason may be the inability of persons to handle day to day work related issues, familial stress and financial stress burdens arising due to responsibilities etc. In case of marital; status the married cases are more (56.86%) than unmarried cases (25.49%) among them males outnumbered the female in both groups. As the study region is surrounded by mostly villages and farming area the deaths in rural area (53.93%) was more than urban population (46.07%) The poison or compound used for poisoning was organophosphorous (35.29%) followed by unknown compound (20.59%) followed by rodenticide (12.76%) this is due to the vast use of organophosphorous and pesticides used in agriculture present in this area. The number was hospitalized

cases were more (68.63%) than non hospitalized or brought dead cases. It may be due to many cases were referred for treatment and postmortem examination to tertiary care center. In case of occupation the farmers (27.94%) was died more in number due to poisoning because it may be accidental in farms due to improper use or non use of protections while spraying or due to suicidal tendencies by consumption of organophosphorous compounds. This was followed by students (22.05%) and unemployed persons (16.18%) due to study stress, unfulfillment of expectations, exam stress, competitions due to peer pressure.

CONCLUSION

From above study it is concluded that poisoning is the ultimate hazard to human life. Strict implementation of pesticide act, import, manufacture, sale, transport, distribution and use of pesticides should be under the supervision of the some authority. Persons with stress, depression, psychosocial problems, personal and family problems, students, people with financial problems should be identified and referred to counseling center to avoid the suicidal tendencies. The special attention should be given to farmers because suicides due to agricultural poisons are more in farmers; also they must be educated regarding the prevention and primary management to combat the accidental poisoning while inappropriate use of agricultural poisons.

REFERENCES

1. Thomas WF, John HD, William RH. Stedman's medical dictionary. Lippincott William and Wilkins, New York. 28th Ed. (2007)
2. Unnikrishnan B, Singh B, Rajeev A. Trends of acute poisoning in south Karnataka. Katmandu University Medical Journal. 2005; 3(2): 149-154 www.who.int/violence_injury_prevention_control/injury/world_report/Poisoning_english.pdf [Accessed on 15 May 2022]
3. Mathai A, Bhanu MS. Acute aluminium phosphide poisoning: Can we predict mortality?. Indian J Anaesth. 2010;54(4):302-307.
5. <https://www.webpoisoncontrol.org/poison-statistics-2015-data>. [Accessed on 15 May 2022]
6. <http://ncrb.nic.in/StatPublications/ADSI/ADSI2015/chapter-1%20accidentals.pdf> [Accessed on 15 May 2022]
7. Maharani B. and Vijayakumari N., Profile of poisoning cases in a Tertiary care Hospital, Tamil Nadu, India. J App Pharm Sci. 2013; 3 (01): 091-094.
8. Poisoning". <https://medlineplus.gov/poisoning.html> National Library of Medicine, accessed on 12 May 2022-10-26.
9. Aki ES, Alessai J. General Approach to Poisoned Patient; Poisoning in the Modern World - New Tricks for an Old Dog? IntechOpen; 2019 [cited 2022 Jun 14]. Available from: <https://www.intechopen.com/chapters/66310>
10. Srivastava A, Peshin SS, Kaleekal T, Gupta SK. An epidemiological study of poisoning cases reported to the National Poisons Information Centre, All India Institute of Medical Sciences, New Delhi. Hum Exp Toxicol. 2005;24(6):279-85
11. Jesslin J, Adepu R, Churi S. Assessment of prevalence and mortality incidences due to poisoning in a South Indian tertiary care teaching hospital. Indian J Pharm Sci. 2010;72(5):587-591.
12. Emma J. Mew, Prianka Padmanathan, Flemming Konradsen, Michael Eddleston, Shu-Sen Chang, Michael R. Phillips, David Gunnell, The global burden of fatal self-poisoning with pesticides 2006-15: Systematic review, Journal of Affective Disorders; 2017; 219; 93-104.
13. Boedeker, W., Watts, M., Clausen, P. et al. The global distribution of acute unintentional pesticide poisoning: estimations based on a systematic review. BMC Public Health 2020; 20: 1875