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Original Research Article

Epidemiological Study of Poisoning During Autopsy in Solapur Region

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Abstract

Background: Poison is a substance that causes damage or injury to the body and endangers one's life due to its exposure by means of ingestion, inhalation or contact. Pattern of poisoning in a region depends on variety of factors, such as availability of the poisons, occupation etc. **Aims:** This retrospective study was carried out to know epidemiological aspect of poisoning. **Material and methods:** This study was carried out in Dept of forensic medicine & Toxicology, Dr. V. M. Government Medical college, Solapur, from January 2016 to April 2017. This study is based on the autopsy record of cases of poisoning which had been brought for medicolegal autopsy examination in department. **Results:** During this period, total 2554 medicolegal autopsies were conducted out of which 219 cases were that of poisoning, consisting of 8.57% of total autopsies. Maximum i.e. 161 cases were male (73.51%). The age group most common age affected was 21-30 years (27.85%). The farmer were 62(28.31%) cases. The cases of suicide in present study were 145 (66.21%) . Poisoning due to insecticide group of poison were 125 (57.7%). **Conclusion:** There is increase in frequency of insecticidal poisoning including younger age group & male sex.

1. Introduction

Poison is a substance that causes damage or injury to the body and endangers one's life due to its exposure by means of ingestion, inhalation or contact (Thomas et al., 2004).¹ With the development in the industrial and agricultural field and in medical sciences, much number of poisons has become available, which on exposure may produce severe toxicity.²

High doses of analgesics, tranquillizers, and antidepressants are the commonly used agents for intentional poisoning in industrialized countries³ and agriculture pesticides are used in Asian region

for self-poisoning particularly in rural areas with a fatality range of 10-20%.⁴

Pattern of poisoning in a region depends on variety of factors, such as availability of the poisons, socio-economic status of the population, religious and cultural influences and availability of drugs.⁵ Rapid industrialization, introduction of newer range of drugs for treatment and massive use of pesticides in agriculture has increased the incidence of poisoning. In advanced countries, it has been observed that poisoning deaths are mainly due to cleansing agents, detergents,

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paracetamol, carbon monoxide and other cosmetic products (Gargi et al., 2008).⁶ In India, as agriculture is the main occupation, insecticides and other agrochemical fertilizers are used to a greater extent and the poisoning with such products are more common (Aaron et al., 2004).⁷

2. Material and method

This retrospective study was carried out in the Department of Forensic Medicine and Toxicology, Dr V. M. Government Medical College Solapur, a Western Maharashtra region from January 2016 to April 2017. This study is based on the record of autopsy of poisoning cases that had been brought for medico-legal autopsy in the department. The detailed pertaining to age, gender, area of residence, marital status, occupation, type of poison consumed, time interval between poisoning and admission, length of stay in the hospital taken from post mortem memorandum and investigating agencies documents submitted for requesting autopsy such as Police panchanama and treatment record. The data was entered on predesigned data sheet to maintained uniformity, tabulated and then statistically analyzed.

3. Observations and results

The present observational study conducted in dept. of Forensic Medicine & Toxicology, Dr. V. M. Government Medical College, Solapur from 1st January 2016 to 30th April 2017.

Incidence

During this period, total 2554 medicolegal autopsies were conducted out of which 219 cases were that of poisoning, consisting of 8.57% of total autopsies.

Age and Gender

In present study, out of 219 cases 161 were male (73.51%) & 58 cases were female (26.48%) while considering the age group most common age affected was 21-30 years (27.85%) followed by 41-50 years (20.09%) & 31-40 years (19.63%) (Table 01).

Table 1: Age and gender wise distribution of cases.

Age	Male	Female	Total	%
1-10	2	3	5	2.28
11-20	10	10	20	9.13
21-30	38	23	61	27.85
31-40	31	12	43	19.63
41-50	39	5	44	20.09
51-60	24	1	25	11.41
Above 60	17	4	21	9.58
Total	161	58	219	100

Marital Status

In this study, out of 219 cases 185 cases were married (84.41%) & 34 cases were unmarried (15.52%) in married population out of 143 cases were male & 42 were female (Table 02).

Table 2: Distribution of cases according to marital status.

Sex	Married		Unmarried	
	No. Of cases	%	No. Of cases	%
Male(n=161)	143	88.81	18	11.18
Female(n=58)	42	78.41	16	27.58
Total	185		34	

Table 3: Distribution of cases according to region.

Region	No. Of cases	%
Urban	67	30.60
Rural	152	69.40
Total	219	100

Table 4: Distribution of cases according to manner of death.

Manner	Male	Female	Total	%
Suicide	105	40	145	66.21
Accident	56	18	74	33.78
Homicide	00	00	00	00
	161	58	219	100

Table 5: Distribution of cases according to occupation.

Occupation	Cases	%
Labourer	48	21.91
Farmers	62	28.31
Housewife	37	16.89
Student	31	14.15
Bidi worker	9	4.10
Service holders	6	2.73
Unemployed	26	11.87
Total	219	100

Table 6: Distribution of cases according to type of poison

Type of poison	Cases	%
Insecticide	125	57.7
Snake bite	32	14.61
Keroscene	03	1.36
Alcohol	15	6.84
Corrosive	04	1.82
Asphyxiant gases	03	1.36
Auramine o (morchap)	20	9.13
Unknown poison	17	7.76
Total	219	100

Region wise distribution

In present study 152 cases were from rural area (69.40%) & 67 cases were from urban area (30.60%) (Table 03).

Manner of Death

The cases of suicide in present study were 145 (66.21%) & cases of accidental were 74 (33.78%). There was no single case of homicide (Table 04).

Occupation

In present study, the farmer were 62 cases (28.31%), 48 cases were that of laborer (21.91%), house wife were 37 (16.89%) & student were 31 (14.15%) The Bidi worker consist of 9 cases (4.10%) service holder were 6 (2.77%) 26 (11.87%) cases were that of unemployed person (Table 05).

Type of poison

In this study, poisoning due to pesticide group of poison were 125 cases (57.7%), cases due to snake bite consists of 32(14.61%), the poisoning due to kerosene were 03 (1.36%), alcohol were 15 (6.84%), corrosive were 04 (1.82%), Asphyxiates were 03 (1.36%). There were 20 cases (9.13%) that of Auromin -0- phosphate poisoning (cow dung) and 17 case (7.76%) were that of unknown poisoning (Table 06).

Survival period

The survival period i.e. time period between consumption of poison and death of 135 cases (61.64%) were less than 24 hours & 20 cases (9.13%) were 24 to 48 hours. In 38 cases (17.35%) the survival period was 3 to 5 days. & in 17 cases (7.76%) it was 6-10 days. In present study 04 cases (1.82%) survived for 11 to 20 days & 05 cases (2.28%) were for 21-30 days (Table 07).

Table 7: Distribution of cases according to survival period

Duration of survival after poisoning	Cases	%
Less than 24	135	61.64
24-48 hours	20	9.13
3-5 days	38	17.35
6-10 days	17	7.76
11-20 days	04	1.82
21-30 days	05	2.28
Total	219	100

4. Discussion

Incidence of Poisoning

The incidence of poisoning in the present study was 8.57%. These result were consistent with the result of study by Aggarwal et al (10.57%)⁸, Dalal et al (15.39%)⁹, A.K.Kapoor et al (11.70%)¹⁰, Gupta & Waghela (15.98%)¹¹, Dattarwal S.k(23.42%)¹² Gargi J et al(16%)⁶, Rajani Bhagora et al(13%)¹³, Shailesh Jhaveri et al (11.5%)¹⁴, D Harish (24%)¹⁵, Navinkumar Varma (16.28%).¹⁶

The popular notion that poisoning causes minimal suffering prior to death & that it is less grave a sin than causing death by violence has helped in rapid rise in incidence of poisoning cases (Sharma B.R et al)¹⁷

Age and Sex

The incidence of poisoning was higher in male (161 i.e. 73.51%) as compared to female (58 i.e. 26.48%). This study coincides with the study of Gupta B.D¹¹ where male (62.1%), female(37.9%), The study by Rajani Bhagora¹³ male(57.58%) female (42.42%), Reddy.K.S.N⁵ male (65.65%) female (35.35%), Vinay Shetty¹⁸ male(51.1%) female(49.99%), Zine K.U et al¹⁹ male(68.25%) female(31.77%), Dalal J.S et al⁹ male(63.19%) female(36.81%), Dattarwal S.K et al¹² male(68.62%) & female(31.37%), Navin kumar Varma¹⁶ male(65.03%) female(34.97%). It could be explained by the fact that In India traditionally the male are doing outdoor works & they are exposed to stress & strain of day to day life, occupational hazards & easy availability of poisonous substance are also imp factor for male predominancy (S.B. Patil)²⁰ added families responsibilities, social customs limited resource etc. in males in rural population are some important factors for outnumbering male than female (Harish et al)¹⁵

The present study showed that the most common age group affected was 21-30 years. These observation were coincides to the observation of study conducted by B.D.Gupta and P.C.Vaghela¹¹ shows most common age group 21-30 years(43.1%), Rajini Bhagora,¹³ 21-30 years(28.49%), D.Harish¹⁵ 21-25 years (29.49%), Shailesh Jhaveri¹⁴ 20-30 years (35.9%), Navinkumar varma¹⁶ 21-30 years(30.06%).

The younger age group was physically socially & mentally active. The younger age group is most susceptible to the lure of riches the modern society yardstick of success frustrations causes by inability to cope with the highly competitive, indifferent & materialistic society have resulted in increasing in younger generation (D. Harish)¹⁵ The problems in family studies marriage life settlement & employment are responsible for stress & inclination towards the suicide. The person of this age group as are active & they are also exposed to accidental exposure to the poisonous substance while they are working in that environment.

Marital Status

In this study, out of 219 cases 185 cases were married (84.41%) & 34 cases were unmarried (15.52%), similar pattern of result was noted by S.B. Patil et al.²⁰ In which married population is 79.92%. This might be due to additional mental stress and exposure in married as compared to unmarried.

Region wise distribution

In present study, 69.40% were from rural & 30.60% from urban area, this coincides with study by B.D.Gupta and P.C.Vaghale¹¹ cases of poisoning in rural area is 68.88% and urban area is 37.12% Navin Kumar Varma¹⁶ rural cases are 58.05% and urban area 40.55%.Rajani Bhagore et al¹³ rural cases are 57.58% and urban area 42.43%,Dalal J.S et al⁹ rural cases are 74.84% and urban cases are 23.92%,Dhattarwal S.K et al¹² rural cases are 71.03% and urban cases are 28.97%. In India most of the population belongs to rural area & agriculture is the main profession. The pest control is the most common problem faced by the farmers in agriculture. In Order to eradicate the weeds & pests farmer procure and keep pesticide at their houses because of easy availability of pesticide people are tend to use them for intentional poisonous substance. Illiteracy, less education & less availability of immediate treatment in rural area are the reasons for maximum incidence in the rural area (Rajni Bhagora).¹³

But study by Sanjeev Choudhary et.al.²² showed 64.90% cases were from urban area they stated that due to globalization & Urbanization the people are migrating from other descript & other state which causes in population of city, the urban people have lot of business failure & social problems so these factors are contributing main role to commit suicide.

Manner of Death

In present study, 66.21% cases were suicidal and 33.78% were accidental & 00 % homicidal. The most common manner was suicidal. This coincides with study of B.D. Gupta(68.2%)¹¹,Navin kumar Varma(72.02%)¹⁶, Chaudhary (92.78%)²¹ The various stress factor coming from social family, Financial problem were responsible for this act. In adolescents age group stress factors like family arguments, love failures, failures in studies & mental conflicts are responsible for poisoning cases (MC Clure GM)³ In cases of females mainly in married females' dowry, cruelty by in- laws family quarrels maladjustments in married life low level of education. Infidelity, unemployment, dependence of woman on husband etc. are important predisposing factor for suicide by poisoning (D. Harish)¹⁵

Occupation wise distribution

The incidence of poisoning is more in farmers and housewives. Similar results were noted by B. Maharani and vijayakumari²² as these groups are

more vulnerable groups and easily exposed to the poisoning agents. Poverty, inadequate income to run the family, monsoon failure was responsible for higher incidence of poisoning among laborers and farmers (Vinay et al. 2008).¹⁹

This may due to factors like dowry, cruelty by the in-laws, family quarrels, maladjustment in married life and dependence of women on husband are responsible for the higher incidence of poisoning among house wives. As agriculture is major profession in the rural part of India farmers stock the pesticides to eradicate the weeds and pests. Due to easy availability of the pesticides, they are commonly used by the individuals to end their life in stressful situations.⁷

Type of poison

Insecticides are most common elusive agent in present study i.e. 57.7 % cases. This coincides with Study of B.D. Gupta & Waghela¹¹ revealed that 53.79% cases were that insecticide poisoning also with study by S.B. Patil et.al.²⁰ which showed that out of 744 cases 406 cases of insecticide poisoning i.e. 54.56% but D. harish et.al.²¹ in their study showed that Aluminium Phosphide poisoning consist of 50.52%. which does not coincide. The reasons being agriculture-based economics, poverty unsafe practices, illiteracy, ignorance and lack of protective clothing and easy availability of highly toxic pesticides and among pesticides. Organophosphates form the largest bulk of poisoning in India.

As in this study, 20 cases of auramine-o diarylmethane dye i.e in local language it is called as "MORECHAP". It is used as a synthetic yellow cow dung powder. It was used to clean living premises in south india, in this region, most of the peoples are south indians, so auramine poisoning is used for suicide²³.

Survival period

In present study, most of cases survived for duration less than 24 hours. The study by Gupta & Waghela¹¹ reveals that spot deaths were more, which does not coincide. The reason behind it were lack of awareness to go for treatment, lack of proper treatment, distance between hospital & scene of incidence.

5. Conclusion & Recommendation

The present study helps to interpret the epidemiology of poison used. In this study, there is increase in frequency of insecticidal poisoning in rural population including younger age group & male sex.

Strict implementation of insecticide act & education to handled mainly farmer & laborer in agriculture industries who are involved in handling of pesticide about the life-threatening effect of compounds & taking precaution while handling & giving primary management in case of accidental poisoning will be helpful.

Ethical Clearance: IEC approval is taken from the Institutional Ethical committee.

Contributor ship of Author: All authors equally contributed.

Conflict of interest: None to declare.

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References:

1. Thomas M, Anandan S, Kuruvilla PJ, Singh PR, David S. Profile of hospital admissions following acute poisoning--experiences from a major teaching hospital in south India. *Adverse Drug React Toxicol Rev.* 2000 ;19(4):313-7.
2. Das RK. Epidemiology of Insecticide poisoning at A.I.I.M.S Emergency Services and role of its detection by gas liquid chromatography in diagnosis. *Medico-Legal Update.* 2007; 7(2):49-60.
3. McClure GM. Suicide in children and adolescents in England and Wales 1970- 1998. *Br J Psychiatry.*2001;178:469–74.
4. Marecek J. Culture, gender, and suicidal behavior in Sri Lanka. *Suicide Life Threat Behav.* 1998;28: 69–81.
5. Reddy KSN. *The Essentials of Forensic Medicine and Toxicology.* 31st ed. India: K Suguna Devi; 2012, P 467.
6. Gargi J, Tejpal H R. A Retrospective autopsy study of poisoning in the northern region of Punjab. *J Punjab Acad Forensic Med Toxicol.* 2008; 2:17-19.
7. Aaron R, Joseph A, Abraham S, Muliyl J, George K, Prasad J, et al. Suicides in young people in rural southern India. *The Lancet.* 2004;363(9415):1117-8.
8. Aggarwal NK, Aggarwal BBL. Trends of poisoning in Delhi. *J Indian Acad Forensic Med.* 1998; 20 (2): 32-6.
9. Dalal JS, Goria RK, Aggarwal AK, Thind AS, Sandhu SS. Poisoning Trends- a post mortem study. *J Indian Acad Forensic Med.* 1998; 20 (2): 27-31.
10. Kapoor AK, Sinha US, Sinha AK, Mehrotra R. An epidemiological study of aluminium phosphide poisoning at Allahabad. *IJFMT;* 2006; 4(1): 1-11.
11. Gupta BD, Vaghela PC. The profile of fatal poisoning in and around Jamnagar. *J Ind Acad Forensic Med.* 2005; 27(3):145–8.
12. Dhattarwal SK, Dalal SS. Profile of Deaths Due to Poisoning in Rohtak. Haryana in the year. *J Forensic Med Toxicol.*1995; 14 (1); 51.
13. Bhagora RV, Parmar DJ, Desani CA. Profile Study of Fatal Poisoning Cases Brought for Postmortem Examination at Mortuary of Sir Takhtsinhji General Hospital, Bhavnagar(Gujarat). *Int J Res Med.* 2015; 4(3):59-63.
14. Jhaveri S, Prajapati P, Shaeikh MI. Profile of deaths due to poisoning: A three-year study at Surat Municipal Institute of Medical Education and Research, Surat during 2010-2012. *Int J Res Med.* 2013; 2(4): 67-9.
15. Harish D, Sharma BR, Chavali KH, Sharma A. Poisoning mortality in Chandigarh: an overview. *J Ind Acad Forensic Med.* 2006;28(3):110-3.
16. Varma NM, Kalele SD. Study of profile of deaths due to poisoning in Bhavnagar region. *J Ind Acad Forensic Med..* 2011;33(4):311-6.
17. Sharma BR, Harish D, Sharma V, Vij K. The epidemiology of poisoning: An Indian view point. *J Forensic Med Toxicol.* 2002;19(2):5-11.
18. Shetty VB, Pawar GS, Inamadar PI. Profile of poisoning cases in district and medical college hospitals of north Karnataka. *Ind J Forensic Med Toxicol.* 2008:26-8.
19. Zine KU, Mohanty AC. Pattern of acute poisoning at Indira Gandhi medical college and hospital, Nagpur. *J Ind Acad Forensic Med.* 1998 ;20(2):37-9.
20. Patil SB, Karaddi S, Thakur BS. Death due to poisoning with special reference to insecticide. *BMR Medicine:* 2014; 1(1):1-6.
21. Chaudhary S, Momin SG, Vora DH, Modi P, Chauhan V, Chotaliya D. An epidemiological study of fatal aluminium phosphide poisoning at Rajkot. *IOSR Journal of pharmacy.* 2013 ;3(1):17-23.
22. Maharani B, Vijayakumari N. Profile of poisoning cases in a Tertiary care Hospital, Tamil Nadu, India. *J Appl Pharm Sci.* 2013; 3(1):91-4.
23. Karikalan T, Murugan M. Profile of poisoning cases in a tertiary care Hospital, Tamilnadu. *J Evol Med Dent Sci.* 2014;3(56):12754-61.