



Comprehensive Analysis Of Poisoning Cases In Shimla Region Of Himachal Pradesh

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Abstract

Poisoning is a common medico-legal problem in our country. It is a major cause of morbidity and mortality in human beings and is more common in developing countries. This is an autopsy based prospective study which was carried out in the Department of Forensic Medicine, Indira Gandhi Medical College Shimla, Himachal Pradesh between 1st January, 2019 to 30th June, 2020. During our study period, total 641 autopsies were conducted in the Department of Forensic Medicine, I.G.M.C. Shimla, out of which 154(24 %) of total cases were of poisoning. The most common age group among the cases was between 21-30 (31.16%) years. Out of 154 poisoning cases, 114 (74%) were males. More cases, 134 (87%), were from rural area. 109 (70.85%) cases were from lower socio-economic status. In our study, 118 (76.7%) cases consumed poison at home. During the study period, maximum, 41(26.65%) cases were conducted in Monsoon season of 2019. The most common poisons detected by the Forensic Science Laboratories were Organophosphates in 54 (35.06%) cases. The most common route of administration was Oral in 147 (95.45%) cases. The Hospital reporting time after poisoning was 1-2 hours in 65 (42.21%) cases

Keywords: Poisoning, mortality, organophosphates

Introduction

Poisoning is a common medico-legal problem in the present century. Among the unnatural deaths, deaths due to poisoning come next only to road traffic accident deaths. In earlier times, the poisoning deaths from pesticides were mainly accidental but easy availability, low cost and unrestricted sale have led to an increase in suicidal and homicidal cases as well.

Poison is any substance which if introduced in the living body by any route could cause ill health or death. Poisoning, both accidental and intentional is a significant contributor to morbidity and mortality throughout the world. It is estimated that more than 50,000 people die every year from poisoning in India.

'The dose makes the poison...' Paracelsus once said.
[1]

Any substance given in low dose may act as a medicine and if given in higher dose may act as poison.

According to the World Health Organization (WHO), most of the cases of fatal poisoning occur in developing countries, predominantly among the rural population. Therefore, early diagnosis, treatment and prevention are crucial in reducing the burden of poisoning related injury in any country.

Deaths due to poisoning are also on increasing trend in our state. In hilly areas where fruit and vegetable growers are in abundance the use and availability of agricultural poisons are very common. Similarly in lower belts of Himachal Pradesh, agro-chemical poisons are easily available due to its usage as well as no stringent control over its sale.

The objective of this study is to describe the Medico-legal profile of Autopsy cases related to poisoning in Tertiary care Institute of Himachal Pradesh i.e. Indira Gandhi Medical College.

The comprehensive analysis of all poisoning cases will go a long way in the prevention of preventable causalities in future and to study the pattern and magnitude of poisoning cases in aspect of types of cases, age and sex of cases, time between intake of poison and administration of first aid/hospitalisation, months and seasons of arrival of cases in the department and analyse the data and find out suggestions for improvement of care and nursing in the hospital of all cases while also decreasing the morbidity and mortality of poisoning related patients.

Aims and Objectives:

The main aims and objectives of conducting this study are as follows:

1. To objectively assess the various social and demographic parameters of all poisoning autopsy cases in and around Shimla.
2. To analyze the probable reasons for the same.
3. To find remedial measures to bring down the incidence of poisoning and improve the quality of care provided to such patients.

Methodology:

The study was conducted over a period of one and a half years i.e. from 1st January, 2019 to 30th June, 2020, in the Department of Forensic Medicine, Indira Gandhi Medical College, Shimla.

The cases included were :

- 1) Poisoning cases admitted to Indira Gandhi Medical College and Hospital who died during treatment.
- 2) Poisoning cases directly brought to mortuary or declared brought dead.
- 3) Referred poisoning cases from adjoining health institutions for expert post mortem examination.

Observation and Results:

In our prospective study of one and half year duration total 641 autopsies were conducted in the Department of Forensic Medicine, I.G.M.C. Shimla, out of which

154 cases i.e. 24 % of total cases were of poisoning (Chart I)

The most common age group among the cases was between 21-30 (31.16%) years followed by 31-40 (20.15%), 41-50 (16.9%), 51-60 (12.35%), 11-20 (9.75%), >60 (7.15%) and 0-10 (2.6%). (Chart II, Table II)

Out of 154 poisoning cases, 114 (74%) were of males and 40 (26%) were of females with M:F sex ratio of 2.85:1. (Table III)

In our study population, 134 (87%) cases were from rural and 20 (13%) cases were from urban area. (Table IV, Chart IV)

During the study period, maximum, 41(26.65%) cases were conducted in Monsoon season of 2019, followed by 36 (23.4%) cases in Summer season of 2019.(Table V)

In our study period, 109 (70.85%) cases were from lower, 39 (25.35%) were from middle, 5 (3.25%) was from upper socio-economic status. The socio-economic status of 1(0.65%) case was not known. (Table VI)

During our study period, 118 (76.7%) cases consumed poison at home, 31(20.15%) cases consumed poison at some remote place and 5(3.25%) cases consumed poison at work-place. (Table VII)

During our study period, the most common poisons detected by the Forensic Science Laboratories were Organophosphates in 54 (35.06%) cases, Aluminium Phosphide in 33 (21.43%) cases, Ethyl Alcohol in 27 (17.53%) cases, Paraquat in 17 (11.03%) cases, Pyrethroid compounds in 2 (1.3%) cases, Gases in 2 (1.3%) cases, Amphetamine in 1 (0.65%) case, Carbamates in 1 (0.65%) case and Mixed poisoning in 1 (0.65%) case. No poison/alcohol was detected in 16 (10.39%) cases. (Table VIII)

The route of administration was Oral in 147 (95.45%) cases, Inhalational in 3 (1.94%) cases, Injection in 3 (1.94%) cases and not known in 1 (0.65%) case. (Table IX)

The Hospital reporting time after poisoning was 1-2 hours in 65 (42.21%) cases, 2-3 hours in 34 (22.08%) cases, within 1 hour in 5 (3.25%) cases, > 4 hours in 3 (1.95%) cases, 3-4 hours in 2 (1.3%) cases and 45 cases were brought dead. (Table X)

Chart I : Percentage Of Total Cases Attributed To Poisoning (N=154)

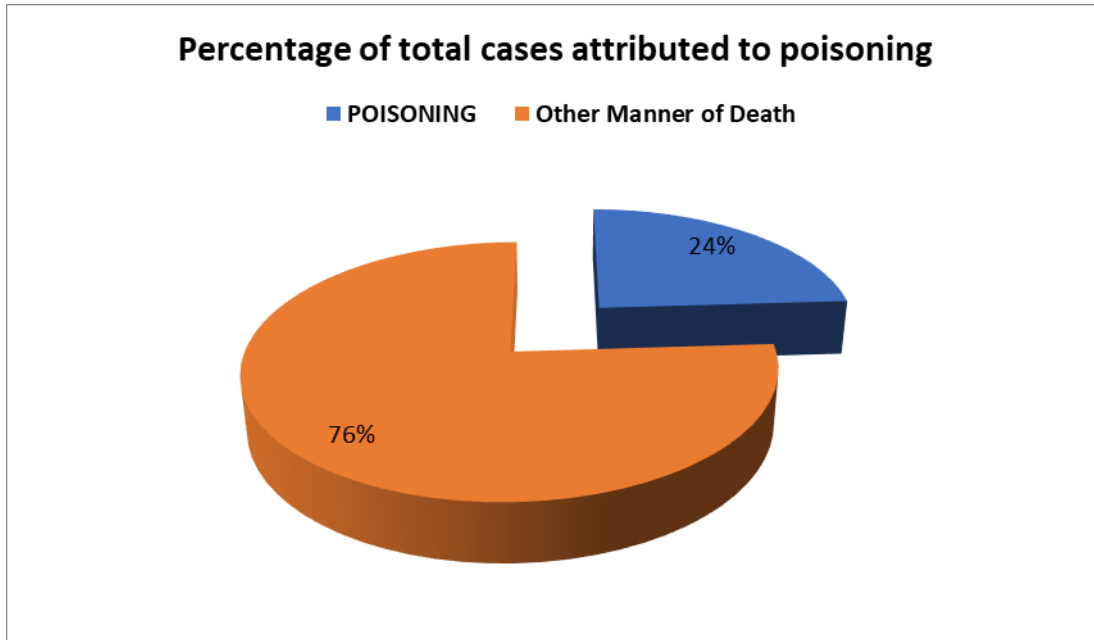


Chart II Age distribution of study population (n=154)

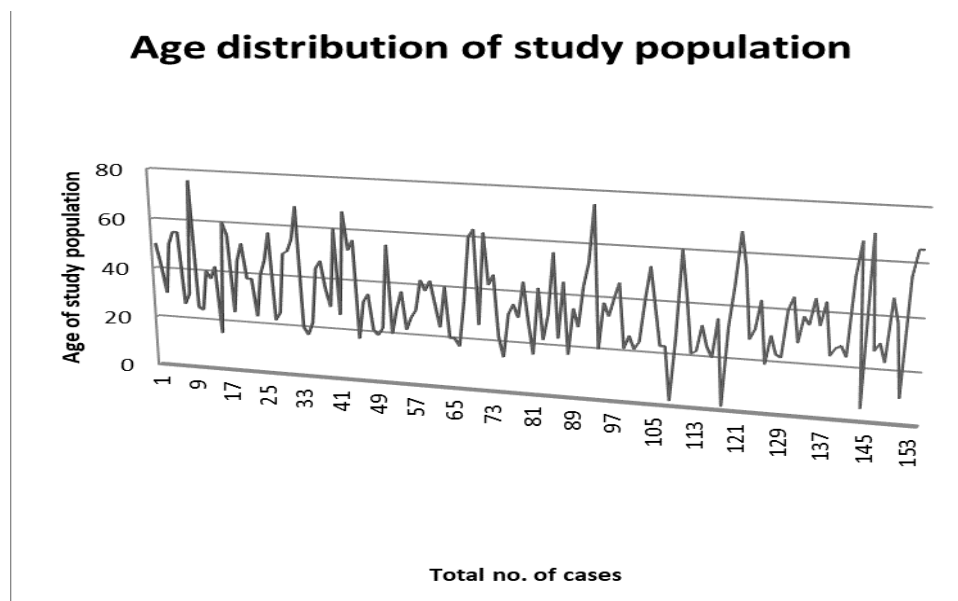


TABLE II- AGE GROUP

Age (in years)	Males(%)	Females(%)	Total (%)
0-10	1 (0.65)	3(1.95)	4(2.6)
11-20	9(5.85)	6(3.9)	15(9.75)
21-30	36(23.4)	12(7.8)	48(31.2)
31-40	23(14.95)	8(5.2)	31(20.15)
41-50	24(15.6)	2(1.3)	26(16.9)

51-60	15(9.75)	4(2.6)	19(12.35)
>60	6(3.9)	5(3.25)	11(7.15)
Total	114(74.1)	40(26)	154(100)

Table III- Sex Distribution Of The Study Population (N=154):

Sex	Number (%)
Male	114 (74%)
Female	40 (26%)
Total	154 (100%)

Table IV: Residential Status Of Study Population (n=154):

Residential Status	Male(%)	Female(%)	Total(%)
Urban	17(11.05)	3(1.95)	20(13)
Rural	97(63)	37(24)	134(87)

Chart IV: Residential Status Of Study Population (n=154):

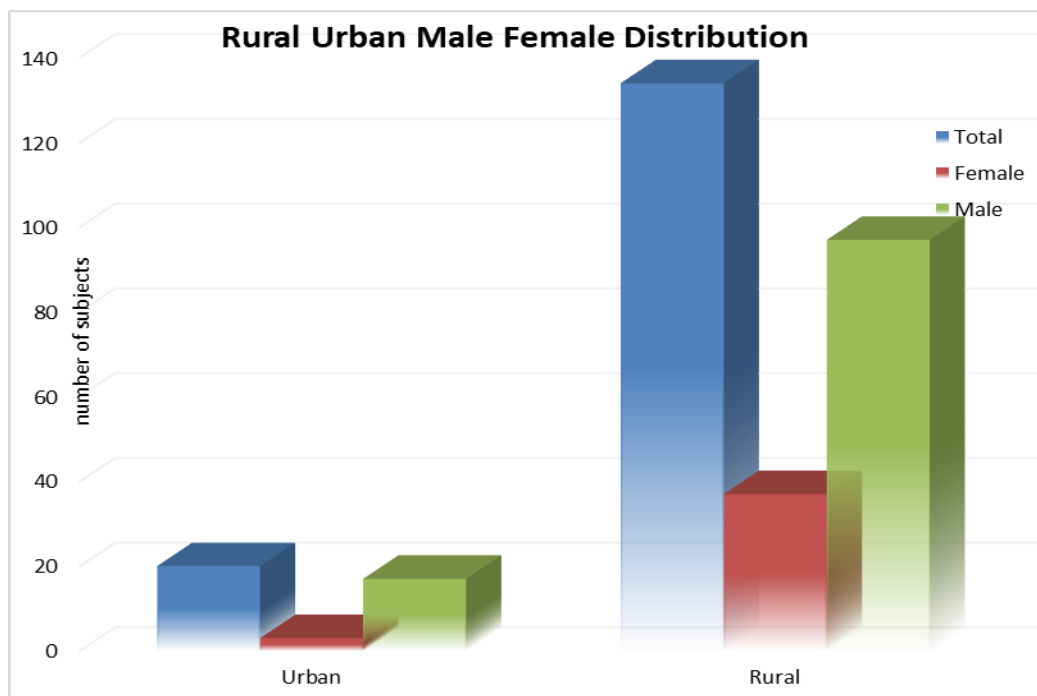


Table V: Season Wise Distribution Of Study Population (n=154):

Season	Male(%)	Female(%)	Total(%)
Winter'19 (From Jan'19)	7(4.55)	1(0.65)	8(5.2)
Summer'19	27(17.55)	9(5.85)	36(23.4)
Monsoon'19	29(18.85)	12(7.8)	41(26.65)
Autumn'19	11(7.15)	4(2.6)	15(9.75)
Winter'20	17(11.05)	5(3.25)	22(14.3)
Summer'20	17(11.05)	5(3.25)	22(14.3)
Monsoon'20 (Till June'20)	6(3.9)	4(2.6)	10(6.5)
Total	114(74)	40(26)	154(100)

Table VI: Socio-Economic Status Of Study Population (n=154):

Status	Male (%)	Female (%)	Total (%)
Lower	81(52.65)	28(18.2)	109(70.85)
Middle	29(18.85)	10(6.5)	39(25.35)
Upper	3(1.95)	2(1.3)	5(3.25)
Not Known	1(0.65)	0(0)	1(0.65)
Total	114(74)	40(26)	154(100)

Table VII: Place Of Consumption Of Poison In Study Population (n=154):

Place	Male (%)	Female (%)	Total (%)
Home	85(55.25)	33(21.45)	118(76.7)
Remote	26(16.9)	5(3.25)	31(20.15)
Work Place	3(1.95)	2(1.3)	5(3.25)
Total	114(74)	40(26)	154(100)

Table VIII: Poisons/Alcohol Detected In Forensic Science Laboratory Results Of Viscera Of Study Population (N=154):

Type of Poison	Male(%)	Female(%)	Total(%)
Organophosphates	38(24.7)	16(10.4)	54(35.06)
Aluminium phosphide	19(12.35)	14(9.1)	33(21.43)
Paraquat	15(9.75)	2(1.3)	17(11.03)
Plant poison	0(0)	0(0)	0(0)

Animal poison	0(0)	0(0)	0(0)
Opioids	0(0)	0(0)	0(0)
Amphetamine	0(0)	1(0.65)	1(0.65)
Alcohol	25(16.25)	2(1.3)	27(17.53)
Carbamates	0(0)	1(0.65)	1(0.65)
Corrosives	0(0)	0(0)	0(0)
Pyrethroid Compounds	1(0.65)	1(0.65)	2(1.3)
Gases	1(0.65)	1(0.65)	2(1.3)
Mixed Poisoning	1(0.65)	0(0)	1(0.65)
Not Detected	14(9.1)	2(1.3)	16(10.39)
Total	114(74%)	40(26%)	154(100)

Table IX: Route Of Administration Of Poison In Study Population (n=154):

Route	Male(%)	Female(%)	Total(%)
Oral	108(70.2)	39(25.35)	147(95.45)
Inhalation	2(1.3)	1(0.65)	3(1.95)
Injection	3(1.95)	0(0)	3(1.95)
Not Known	1(0.65)	0(0)	1(0.65)
Total	114(74)	40(26)	154(100)

Table X: Hospital Reporting Time Of Study Population (n=154):

Time	Male(%)	Female(%)	Total(%)
Within 1 hour	3(1.95)	2(1.3)	5(3.25)
1-2 hours	43(27.95)	22(14.3)	65(42.21)
2-3 hours	25(16.25)	9(5.85)	34(22.08)
3-4 hours	1(0.65)	1(0.65)	2(1.3)
>4 hours	1(0.65)	2(1.3)	3(1.95)
Not Applicable	41(26.65)	4(2.6)	45(29.25)
Total	114(74)	40(26)	154(100)

Discussion:

The most common age group among the cases was between 21-30 (31.16%) years which is consistent with the study conducted by Gupta P *et al.*^[2], Patil SB *et al.*^[3], Dhaval JP *et al.*^[4], Kumar SV *et al.*^[5], Panda

BB *et al.*^[6], Barman DD *et al.*^[7], Gupta B *et al.*^[9], Thakur S *et al.*^[10], Lad KS *et al.*^[11], Pawar CK *et al.*^[12], Singh SP *et al.*^[14] and Haridas S.V. *et al.*^[17].

In our study population, of 154 poisoning cases, number of males were more than females i.e. 114 (

74%) were of males and 40 (26%) were of females with M:F sex ratio of 2.85:1 which is consistent with Dhaval JP et al^[4], Kumar SV et al^[5], Panda BB et al^[6], Alam F et al^[8], Pawar CK et al^[12], Singh SP et al^[14], Kurtas O et al^[15] and Zaheer et al^[16].

In our study population, 134 (87%) cases were from rural and 20 (13) cases were from urban area which is consistent with Patil SB et al^[3], Kumar SV et al^[5], Gupta B, Kishore K, Rastogi P et al^[9], Lad KS et al.^[11], Singh SP et al^[14], Jayanta P.D. et al^[19], S Peranatham et al^[24] and Dash SK, Mohanthy MK et al.^[25].

During the study period, maximum, 41 (26.65%) cases were conducted in Monsoon season of 2019, followed by Summer season of 2019. Maharani B.,Vijayakumari N.^[21] conducted a study in which maximum cases were reported during summer season which is in contrast to our study. Singh SP, Aggarwal AD, Oberoi SS^[14] conducted a study in which maximum cases were reported during peak summer and peak winter months which is in contrast to our study. Bharath K Guntheti, Udaypal Singh^[24] conducted a study in which 203 cases (40.35%) were encountered in summer season, followed by rainy season 159 cases (31.67%) which is in contrast to our study. Dash SK, Mohanthy MK et al.^[25] in which maximum incidences of cases 97 (31.7%) were recorded in summer season which is in contrast to our study.

In our study period,109 (70.85%) cases were from lower, 39 (25.35%) were from middle, 5 (3.25%) was from upper socio-economic status. The socio-economic status of 1(0.65%) case was not known. This is consistent with the study conducted by Lad KS^[11], Patil A et al^[18] and S Peranatham et al^[24].

During our study period, 118 (76.7%) cases consumed poison at home, 31(20.15%) cases consumed poison at some remote place and 5(3.25%) cases consumed poison at work-place which is consistent with the study conducted by Panda BB et al^[6] and Patil A et al^[18].

During our study period, the most common poison detected by the Forensic Science Laboratories was Organophosphates in 54 (35.06%) cases which is consistent with the study conducted by Gupta P et al^[1], Barman DD et al^[7], Gopal BK, Viswakanth B, Shruthi P et al^[13], . Haridas S.V. et al^[17],

Shivaramu MG et al^[20], Maharani B.,Vijayakumari N. conducted a study^[21], Ahmad M et al.^[22], Bharath K Guntheti,Udaypal Singh^[23] and Dash SK, Mohanthy MK et al.^[25].

In our study, the route of administration was Oral in 147 (95.45%) cases, Inhalational in 3 (1.94%) cases, Injection in 3 (1.94%) cases and not known in 1 (0.65%) case. Maharani B.,Vijayakumari N.^[21] conducted a similar study and found that in all the cases the route of exposure was oral, which is consistent with our study.

The Hospital reporting time after poisoning was 1-2 hours in 65 (42.21%) cases, 2-3 hours in 34 (22.08%) cases, within 1 hour in 5 (3.25%) cases, > 4 hours in 3 (1.95%) cases, 3-4 hours in 2 (1.3%) cases and 45 cases were brought dead. Barman DD^[7] et al conducted a study and found that out of the 124 cases, 52 (41.9%) reported to the hospital within 1 hour after the incident which is consistent with our findings.

Conclusion:

Poisoning is accountable for majority of unnatural deaths in India. Individuals in rural areas are more commonly involved when they fail to cope up with financial and personal problems . Poisoning present a significant social and public health problem in our region.

Following measures are highly recommended to reduce deaths due to Poisoning:

1. Government should implement strict rules and regulations to reduce the easy availability of pesticides.
2. Education regarding poisoning must be provided to the students in the school and colleges.
3. Persons with psychosocial problems should be identified at the earliest and should be referred for psychiatric counselling. Educate the family to support them in recovering. Persons with mental health problems must be encouraged to attend the psychosocial counselling sessions wherever available specially in cases of chronic substance abuse.
4. House wives should get involved in recreational activities.

5. There must be strict implementation of anti-dowry law.
6. To avoid accidental poisoning, all poisons kept at home must contain the caption "POISON" and must be kept out of reach from children.
7. Poison information centre should be initiated in every tertiary care hospitals.
8. All the hospitals should have separate toxicological unit exclusively dealing with clinical poisoning cases.
9. Facilities must be improved at Primary Health Centres for the treatment of poisoning cases.
10. Further research is needed to introduce safer pesticides with minimal harm to the human.
11. Proper preservation of viscera and packing to be done after autopsy.
12. Detailed history and specific clues like empty tablet strips taken by the deceased should be collected from the relatives of the deceased.
13. All these information should be conveyed to the FSL toxicology department along with request from, it will help them to narrow down to a group of poison.
14. In our State, the Forensic Science Laboratories are only doing qualitative analysis of the poisons except for Ethyl Alcohol. Quantitative analysis can be very helpful in determining the time since consumption of poison, the fatality of the poison and the treatment of the future poisoning cases. So, the Forensic Science Laboratories should start doing quantitative analysis with specific and sensitive methods.
15. In some of the cases, no poisons/alcohol are detected by the Forensic Science Laboratories. In such cases, ante-mortem clinical findings and autopsy findings should be taken into consideration along with certified and verified history surrounding the circumstances of the case, to arrive at the possible cause and manner of death in a case of poisoning.

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