

## Original Article

# Socio-demographic Profile of Poisoning Cases-An Autopsy Based Study

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Received: 22-01-2019; Accepted: 15-02-2019

## ABSTRACT

Poisoning is one of the leading causes of morbidity and mortality in both developed and developing countries. Therefore, knowledge of socio-demographic profile of poisoning cases in a region is helpful in prevention and management of poisoning cases evaluate socio-demographic pattern of poisoning cases in Ajmer region of Rajasthan. The present prospective cross-sectional study was conducted in Department of Forensic Medicine and Toxicology, JLN Medical College, Ajmer, Rajasthan, during period of 1 year (January 2016–December 2016). During this period, a total of 82 cases of suspected poisoning related deaths were autopsied. Suspected poisoning cases accounted for 8.02% of total autopsy performed during study period. About 73.2% of the cases were male with male to female ratio 2.73:1. Peak incidence was observed in age group 21–30 years. Maximum cases (75/82) noted among Hindu community. Majority of victims were married and belonged to rural areas. In 35.2% cases, poison was consumed during evening time. Home was place of exposure in 60% cases. In majority of cases, suicide was manner of death. Route of exposure was oral in 87.8% cases. Maximum cases were happened during summer season. Stomach mucosa was congested in majority cases. Organophosphate compounds (51.21%) were the most common poison detected on chemical analysis of viscera. In this study, chemical analysis report of viscera was available in all cases of suspected poisoning. This differentiates this study from most of the contemporary studies related to poisoning.

**Keywords:** Poisoning, Incidence, Autopsy, Socio-demographic pattern, Organophosphorus compound

## INTRODUCTION

Poisoning is the second most common cause of death after road traffic accident among unnatural death cases. World Health Organization (WHO) estimated death of 0.3 million people every year due to various poisoning agents.<sup>[1]</sup> Of these, 90% of poisoning cases occurs in developing countries due to agrochemical agents especially agricultural pesticides. Poisoning due to narcotics and drug overdose is more common compared

with pesticides in developed world.<sup>[1]</sup> During ancient times, death due to poisoning were mainly accidental but easy availability, low cost, unrestricted sale and painless death have led to an increase in suicidal cases. 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.<sup>[2]</sup> Poisons are known as silent weapons because they can be used without violence and without arousing suspicion.<sup>[3]</sup>

Present day's incidence of poisoning is increasing due to advance development in science, agriculture and industrial sector. Agents such as agrochemicals, drugs or environmental substances are used as poisoning agents. [4]

Cases where cause of death is not clear, poisoning remains a cause in minds of investigating officers as well autopsy surgeon. Trend of poisoning varies from place to place. Therefore knowledge of socio-demographic patterns of poisoning cases of particular region will help in prevention, diagnosis and management of poisoning cases. This study has made an attempt to find out incidence, socio demographic profile, various poisonous compounds, analytical facilities and other significant features of poisoning.

## MATERIAL AND METHOD

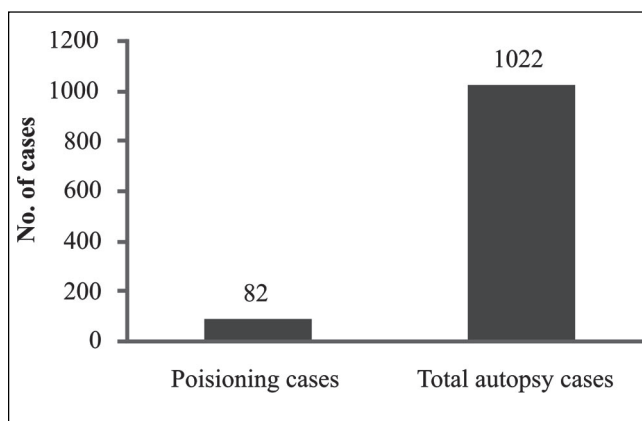
The present prospective cross-sectional study was conducted in Department of Forensic Medicine and Toxicology, JLN Medical College, Ajmer, Rajasthan, during period of 1 year (January 2016–December 2016). The study was approved by institutional ethics committee. All cases having history of poisoning brought for medico-legal autopsy and cases diagnosed as poisoning after autopsy were included in the study.

Detailed information of victims, that is, age, sex, religion, marital status, residence and route of exposure of poison was collected from investigating officers, attendants or relatives of deceased, inquest papers and hospital records. Detailed and complete post-mortem examination including chemical analysis of viscera was done to find out the cause of death.

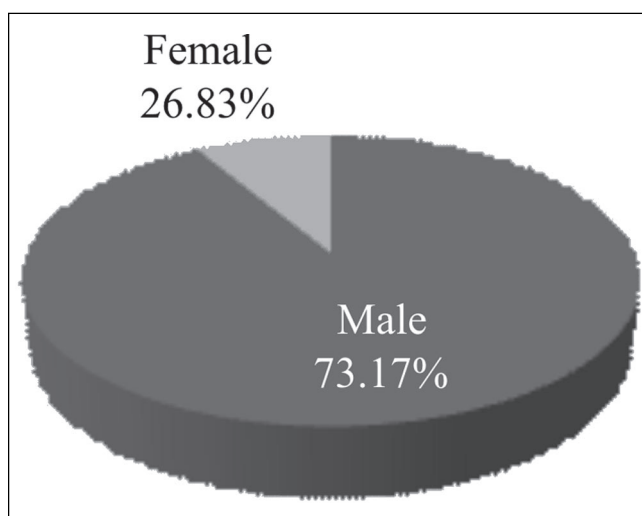
## RESULTS

A total of 1022 post-mortems were conducted in the year 2016 out of which 82 were positive for poisoning on analysis of viscera, this constituted 8.02% of all the unnatural deaths (Figure 1).

Figure 2 shows that majority of victims were male (60/82, i.e. 73.17%). Incidence was the highest in the age group 21–30 years (21/82, 34.14%) followed by the age



**Figure 1: Incidence of Poisoning Cases**



**Figure 2: Sex-Wise Distribution of Poisoning Cases**

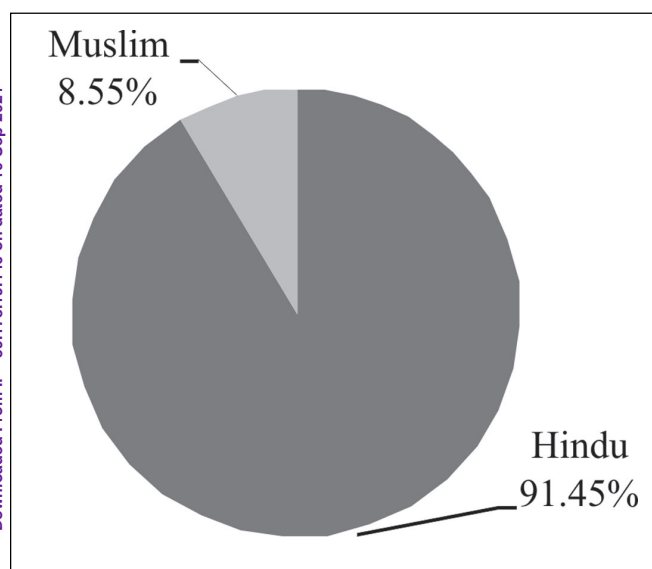
group 31–40 years (19/82, 23.17%). Minimum cases were observed in both extremes of age that is children and older people (Table 1).

Maximum cases noted amongst Hindu community (75/82, 91.45%) (Figure 3). Table 2 shows that maximum cases (42/82, 51.2%) were from medium socio-economic status.

Majority of victims were married (69/82, 84.14%) and in majority of cases (67/82, 81.71%), manner of death was accidental (Table 3). The incidence of poisoning was more in cases having rural background (65.85%) as compared with the urban (Figure 4).

**Table 1: Age-Wise Distribution of Cases**

Age group in years	Cases	
	Number	Percentage
1-10	0	0.0
11-20	14	17.1
21-30	21	34.1
31-40	19	23.1
41-50	17	20.7
51-60	8	9.7
61-70	3	3.6
>70	0	0.0
Total	82	100



**Figure 3: Case Distribution According to Religion**

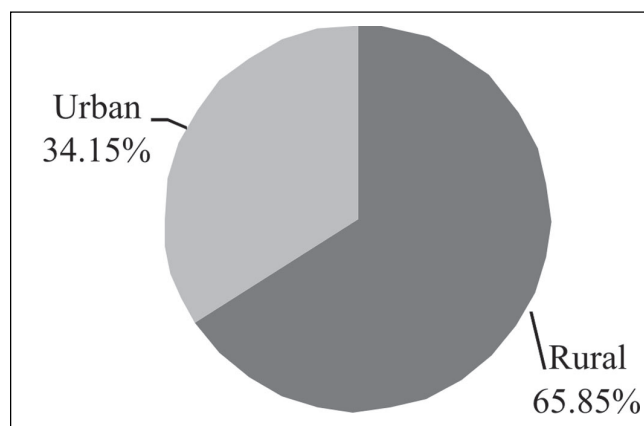
**Table 2: Socio-Economic Status of Victims**

Socio-economic status	Cases	
	Number	Percentage
Low	40	48.8
Medium	42	51.2
High	0	0.0

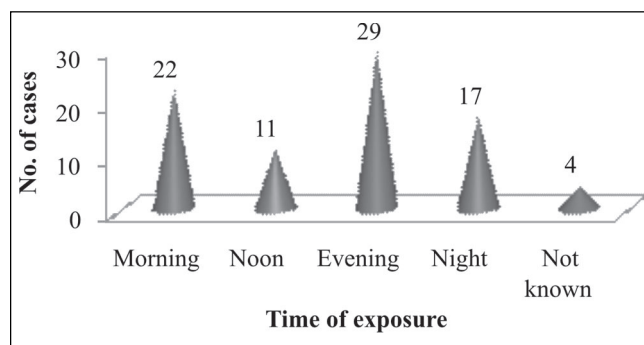
This study shows that maximum cases occurred in evening time (29/82, 35.21%), followed by morning time (Figure 5). This study shows home (55/82, 67.07) was the most common place for exposure of poisoning (Figure 6).

**Table 3: Manner of Death in Relation to Marital Status**

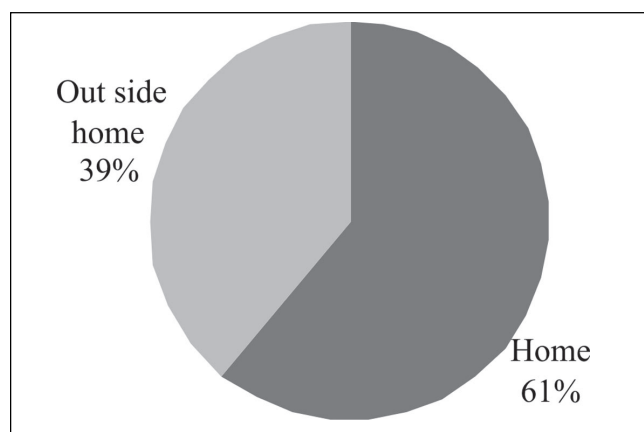
Manner of death	Marital status		Total cases	
	Married	Unmarried	No.	%
Suicide	56	11	67	81.71
Homicide	00	00	00	0.00
Accident	13	02	15	18.29
Total	69	13	82	100



**Figure 4: Residence-Wise Distribution of Cases**



**Figure 5: Cases According to Time of Exposure of Poisoning**



**Figure 6: Place of Exposure in Poisoning Cases**

Table 4 shows that in maximum cases, route of exposure selected by victims was oral (72/82, 87.80%). Table 5 shows that summer season (March–June) records the highest number of cases followed by monsoon season (November–February). In maximum cases, organo-phosphorus compound (42/82, 51.21%) was detected on analysis of viscera followed by aluminium phosphide (Table 6).

**Table 4: Cases Distribution According to Route of Exposure**

Route of exposure	Total cases	
	Number	Percentage
Ingestion	72	87.8
Inhalation	10	12.2
I.V.	00	0.00

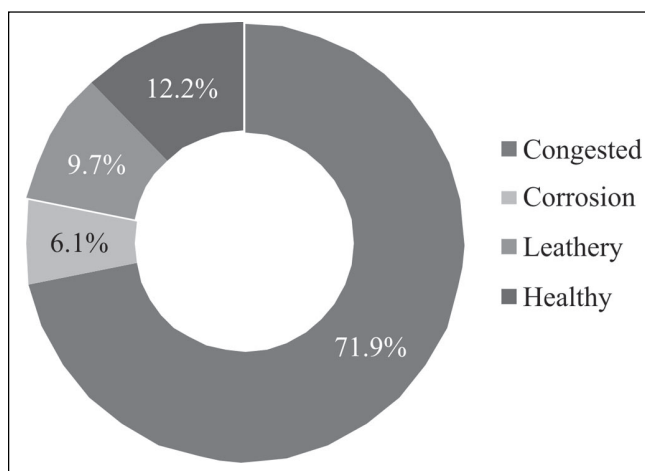
**Table 5: Season-Wise Distribution of Cases**

Season	Cases	
	Number	Percentage
Summer	32	38.73
Monsoon	27	33.80
Winter	23	27.47
Total	82	100

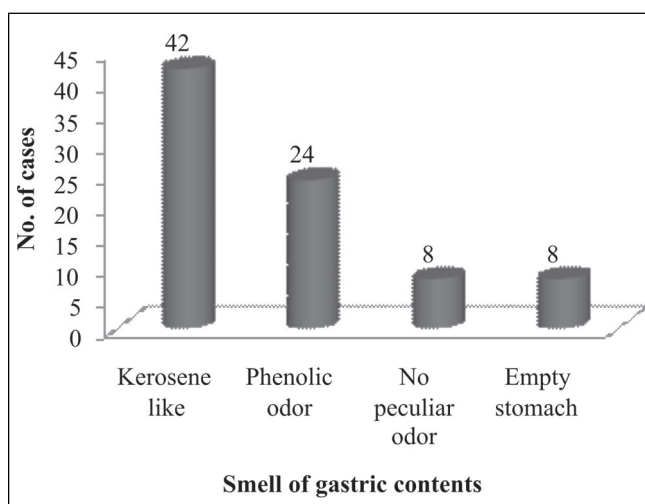
**Table 6: Distribution of Cases According to Poison Detection on Analysis**

Poison detected on analysis	Cases	
	Number	Percentage
Organo-phosphorus	42	51.21
Aluminium phosphide	24	29.30
Phenyl	8	9.75
Alcohol	3	3.66
Acid	5	6.10
Total	82	100

This study shows that in maximum cases (59/82, 71.95%), the mucosa of the stomach was congested (Figure 7). This study shows that in half of the cases, typical insecticidal or kerosene like smell were observed (Figure 8).



**Figure 7: Condition of Stomach Mucosa in Poisoning Cases**



**Figure 8: Smell of Gastric Contents in Poisoning Cases**

## DISCUSSION

In this study, incidence of poisoning was 8.02%, almost similar to the studies done by Kumar *et al.*<sup>[5]</sup> and Awasthi *et al.*<sup>[6]</sup> whereas Dhattarwal *et al.*<sup>[7]</sup>; Kapoor *et al.*<sup>[8]</sup>; Gupta *et al.*<sup>[3]</sup> and Zariwala *et al.*<sup>[9]</sup> showed 23.42%, 11.70%, 15.98% and 12.65% incidence of poisoning cases. Reason for this may be that trends of poisoning vary from place to place and sample size taken for study.

Our study showed higher incidence of poisoning in males and in married people which is similar to most of the studies done by various authors.<sup>[7,10,11,12]</sup> This may be due to the facts that males and married people have more

stress and strains, more family and social problems and more involvement in field works compared with their counterparts.

Maximum incidence was seen in age group 21–30 years and minimum at extremes of age groups taken in study. It coincides with the studies done by Kapoor *et al.*<sup>[8]</sup>; Gupta *et al.*<sup>[10]</sup>; Sharma *et al.*<sup>[12]</sup>; Dalal *et al.*<sup>[13]</sup> and Nigam *et al.*<sup>[14]</sup> This could be due to various factors like unemployment, stress, tension, failures in love, family problems, marital disharmony; and harassment related to dowry in cases of females and scolding from parents in young brigade.

This study observed that majority of victims belonged to Hindu community. Studies done by Zariwala *et al.*<sup>[9]</sup>; Kumar *et al.*<sup>[15]</sup> and Varma *et al.*<sup>[16]</sup> found similar results. Reason for this could be that Hindu community comprises of maximum percentage of population of Ajmer and Muslims consider suicide as sinful.

In this study, maximum cases encountered from rural area. Increased agricultural and domestic use of insecticides due to increased farming activities in rural areas, easy availability of deadly chemicals, and lack of knowledge how to handle them and delay in treatment and deficient emergency health set up in hospitals in rural areas may contribute to maximum fatalities. It coincides with the study done by various authors. [Dhattarwal *et al.*<sup>[7]</sup> (71.03%), Kapoor *et al.*<sup>[8]</sup> (61.46%), Gupta *et al.*<sup>[3]</sup> (62.88%), Singh *et al.*<sup>[11]</sup> (64%) and Sharma *et al.*<sup>[12]</sup> (62.76%)].

Season-wise variations were observed in this study with maximum incidence happened in summer season. Similar results were also reported by Gupta *et al.*<sup>[10]</sup> and Dash *et al.*<sup>[17]</sup> whereas Pawar *et al.*<sup>[18]</sup> showed maximum cases in winter season. Reason may be that this study period includes maximum summer months and summer days are longer compared with other seasons.

Most of studies<sup>[19,13,20,21,12]</sup> including this study show that suicide was most common mode of death. This can be due to increased stress, tension and strain in life and inability to cope up with modern standards of life and

society. Easy availability of poison, economical problems and low educational level can contribute as other factors for suicide.

This study shows home as most common place for exposure of poisoning. This can be due to agricultural insecticides used for suicidal act are easily available at home and having easy access to them. Study done by Varma *et al.*<sup>[16]</sup> also reported similar results.

This study observed that maximum incidence occurred at evening time. Study done by Tandon *et al.*<sup>[22]</sup> and Dash *et al.*<sup>[17]</sup> reported more cases during day time. The reason for different results compared with above mentioned studies may be that at evening time, emotional outburst, resulting from tiredness, disappointments and frustration, reaches at peak level.

Studies done by Zariwala *et al.*<sup>[9]</sup> and Guntheli *et al.*<sup>[23]</sup> along with this study reported oral route as the most common route of exposure in poisoning cases. The reason for this may be that majority of victims were laymen and oral administration is route of choice among people.

In half of cases in this study, typical insecticidal/kerosene-like smell was perceived. Study done by Prajapati *et al.*<sup>[24]</sup> showed insecticidal smell in 69.67% of cases. This study shows that stomach mucosa was congested in 71.95% cases. Almost similar results were observed in a study done by Job<sup>[25]</sup>.

Pattern and trend of poisoning shows a regional pattern. It depends on availability and accessibility of poisonous agents. For example, the organophosphates are most commonly used poisons in southern and western part of the country<sup>[26,27]</sup> whereas aluminium phosphide is most commonly used in Northern India<sup>[12,28]</sup>

This study shows that organo-phosphorus (51.21%) was most common poison detected on chemical analysis followed by aluminium phosphide (29.3%). Being an agricultural-based country, most commonly use and easily availability without restriction of these compounds can contribute to maximum involvement in poisoning cases.

## CONCLUSION

1. The incidence of poisoning was 8.02% with male's preponderance.
2. Maximum cases of poisoning were observed in third decade of life (21–30 years) with male dominance.
3. Maximum cases were observed in Hindu community and married persons with common place of exposure being home.
4. In majority of cases, victims belonged to rural areas.
5. Suicide was most common manner of death followed by accident.
6. Commonest route of exposure was oral while evening was most common time of exposure.
7. Season of summer accounted maximum cases of poisoning.
8. Organophosphorus poisoning was the cause of death in almost half of the cases followed by aluminium phosphide poisoning.

Poisoning is a serious problem of society causing detrimental effect on growth and development of society. This study has also highlighted this fact. Now a day's incidence of poisoning is growing upward due to easy availability, low cost, unrestricted sale and painless death caused by various poisonous agents. Legislative control on the sale and use of pesticides and stress management are recommended for reduction of poisoning cases. People's awareness regarding seriousness of problem would also be helpful in morbidity and mortality reduction in poisoning.

## LIMITATION

This study is confined to particular area. The information of the deceased is based on the history given by the police and relatives of the deceased and among treated cases by hospital case papers.

**CONFLICT OF INTEREST:** None.

**FUNDING:** None.

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**How to cite this article:** Abhijeet Soni, Mukesh Kumar Bansal, Priyanka Garg and Mukesh Yadav. Socio-demographic Profile of Poisoning Cases-An Autopsy Based Study. *Indian Internet Journal of Forensic Medicine & Toxicology* 2019; 17(1): 5-11.