

ORIGINAL ARTICLE

## Retrospective Analysis of Organophosphorous Poisoning Cases Between 2016 and 2020 in Urban India

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### ABSTRACT

#### INTRODUCTION:

**BACKGROUND:** Agriculture is one of the main source of income in rural India. Recent times have seen a lot of advancements in the chemicals used for pest control to improve the quality of crops. However, the ease of availability and the high toxicity of these chemicals has led to accidental as well as deliberate casualties due to poisoning.

**MATERIAL AND METHODS:** A retrospective study was conducted at VIMS Bellary between the years 2016 to 2020 by collecting data from the postmortem reports of deaths due to organophosphorus poisoning. The sample size of the present study constituted 725 poisoning cases. Information about the age and sex of the victims, the type of poison, chemical examiners report occupation, socio-economic and marital status were collected from the inquest reports furnished by the Investigating authorities.

**RESULTS:** In the present study it was found that the mortality was more in males compared to females and majority of cases was found in people involved in agricultural profession in rural areas under low income group.

**Conclusion:** The study concludes that organophosphorus poisoning is more common in rural India with lower socioeconomic status.

**KEYWORDS** | Organophosphorus; Poisoning; Insecticide; Mortality

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**Received on:** 16.03.2022

**Accepted on:** 20.05.2022



#### How to cite this article:

Gururaj Biradar, Pavanchand Shetty H, B Suresh Kumar Shetty, et al. Retrospective Analysis of Organophosphorous Poisoning Cases Between 2016 and 2020 in Urban India. *Indian J Forensic Med Pathol.* 2022;15(2):79-82.

### INTRODUCTION

Agriculture being one of the biggest source of economy in India has seen a lot of technological advancement to increase the production. There has been lot of scientific progress in relation to the various chemicals used for increasing the production of the crop and to stop the growth of crop destroying pests. The rampant use of chemicals in agriculture has led to accidental exposure of the farmers. The easy accessibility of chemicals has resulted in it being preferred

for suicide.<sup>1</sup> Voluntary exposure to poisonous chemicals with intent of suicide can be fatal. The reasons for the high toxicity and lethality of organophosphorous is due to its ease of absorption through all the routes that is respiratory, gastrointestinal, ocular, dermal etc. The government has tried to create awareness by proper labelling, regulating and by deploying various educational projects. The general public still remains unaware of the basic concept that the chemical can penetrate

the skin and cause toxic effects.<sup>2</sup> In general, suicidal poisoning is common because of its easy availability resulting in large number of deaths.<sup>3</sup>

**MATERIALS AND METHODS**

In India autopsy is mandatory for every case of poisoning death. The autopsy is conducted for poisoning death as law of the land makes it mandatory with the primary objective of ruling out any suspicion associated with the poisoning death. The present study is a retrospective analysis of the data collected from the postmortem reports of the poisoning cases conducted at VIMS Bellary between years 2016 to 2020.

A total of 725 autopsy reports due to death from poisoning were included in this study. Data was analyzed retrospectively in respect to the socio-demographic profile of poisoning cases in each age group, sex, Marital status, domicile pattern, Occupational wise and socio economic status. The qualitative analysis of the poisoning cases were done in Regional forensic science laboratory.

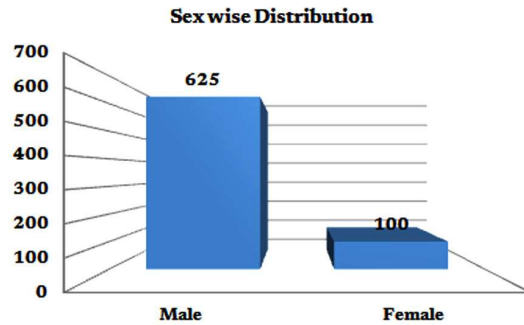
**RESULTS**

Total of 725 postmortem reports were analyzed and various required parameters were recorded and analyzed. In the present study maximum number of victims 342 (47.17%) were in the age group of 51-60 years, followed by 240 (33.10%) who were in the age group of 31-40 years ( Table 1)

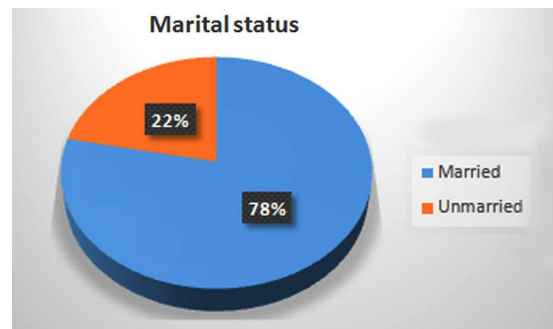
**Table 1:** Age wise Distribution.

Age (Yrs)	No of cases
11-20	06
21-30	29
31-40	240
41-50	76
51-60	342
61-70	28
>70	04
Total	725

Male preponderance was seen in gender wise distribution. The number of males were 625( 86.2%) and females were 100 (13.79%) of the total cases as shown in Fig.1. Cases reported were more in married as compared to unmarried individuals as shown in Fig. 2.



**Fig. 1:** Sex wise Distribution.



**Fig. 2:** Marital status wise Distribution

In the present study, the distribution of domicile pattern of the victims showed that 659 (90.89%) were from rural areas and 66 (9.10%) cases were from urban area ( Table 2).

**Table 2:** Locality Distribution.

Locality	No of cases
Urban	66
Rural	659
Total	725

The exposure to poisoning and death was seen more in the rural population in comparison to the urban population.

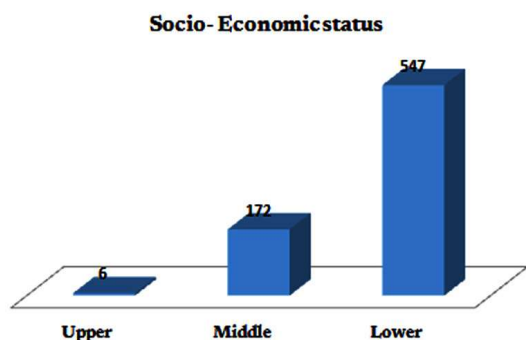
The number of deaths when tabulated based on the profession it was found that the most common profession exposed to poisoning by organophosphorus was agriculture. The

number of death from the agricultural background was 510 (70.34%) and lowest was among the homemakers as shown in Table 3.

**Table 3:** Occupation wise Distribution

Occupation	No of Cases
Employed	78
Un employed	63
Student	35
Agriculturist	510
Housewife	39
Total	725

As per the socioeconomic status the most exposed population was from the lower income group that is 547 (75.44%) cases and lowest cases were among high income group as shown in Figure 3.



**Fig. 3:** Socioeconomic Status wise Distribution.

### DISCUSSION

Organophosphorus insecticides are highly toxic chemicals. In developing countries pesticides are commonly used for committing suicide.<sup>4</sup> Globally death due to poisoning is of major clinical concern.<sup>5</sup> In the present study an attempt was made to study the demographic profile of organophosphorus poisoning. The present article examines the most vulnerable age group, socio economic status and the gender of the victims of poisoning.

In this study it was found that the most vulnerable age group was in the range of 51 to 60 years (Table 1, Fig. 1) which might probably be due to high level of stress in that particular age due to family and social responsibilities, similar observations were seen

in other studies.<sup>6,7</sup> Added to this males were the majority in overall comprising (86.2%) of the case load (13.79%) cases were of female. The high incidence may be because males are more exposed to stress, strain and occupational hazards compared to females. The reason for this can be attributed to the fact that males form a majority of the population going out for work, and since the burden of earning for a livelihood are on them. Our findings are in accordance with the study conducted by Vinod Go vsavi et al<sup>9</sup>, Kanchan T et al,<sup>10</sup> Gurudut K S et al,<sup>11</sup> Sanjeev Kumar et al,<sup>12</sup> Subash Vijaya kumar,<sup>13</sup> Shetty AK<sup>14</sup> and Andrew H et al.<sup>15</sup> Where as the study conducted in Moodabidri and Nepal by Sadananda Naik et al<sup>16</sup> and Amarnath Mishra et al<sup>17</sup> showed female predominance.

In the present study rural population (Table 2) was seen to be more involved in poisoning death which was similar to observations seen in studies conducted by Joshi et al and Dalal JS.<sup>6,8</sup> In the present study it was found that 75.44% were from lower income group and least in upper income group 0.827%. The suicides in the lower class may be due to various stress factors coming from financial, social, family problems, low level of education, immaturity, Easy availability of poisons, lack of knowledge about the deleterious effects of the pesticides make them easy victims also.

The present study also brings into focus that the most vulnerable profession is farming and in the lower income group, probable reason for this is the easy accessibility and availability of chemical in this profession which is undoubtedly the predominant profession in rural areas. (Table 3, Fig. 3). High prevalence in married individuals can be accounted for the increased stress due to family responsibilities and conflicts.

### CONCLUSION

The study suggests that organophosphorus poisoning is prevalent in rural farming population belonging to lower socio-economic status with preponderance in married males of late middle age. The reasons for the rise in cases may be the increased use of chemicals to increase the production thus increasing availability and accessibility. The government

and regulatory bodies need to make changes to reduce and regulate the rampant use of such toxic chemicals which will directly reduce the incidence of poisoning cases.

**Authorship contributor statement:** The authors GB, PSH, VY conceptualised the design of the study. GB and PSH acquired, analysed and interpreted the data, GB drafted the article, All authors revised it critically for

important intellectual content, All authors finally approved the version.

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**Conflict of Interest:**

The author has made no acknowledgment in this article.

**Ethical Clearance**

Taken from VIMS, Bellary

**Source of Funding:**

The author declares that this is a self-funded research project.

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