

# Organophosphorous Compound Poisoning in Western Odisha: A Five Year Retrospective Study

Manoj Kumar Jena

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## Abstract

**Background:** Organophosphorous (OP) compounds are extensively used in India as insecticides and most often misused for suicide purpose. **Aim:** The present study was undertaken to know the incidence of organophosphorous poisoning, socioeconomic status and nature of poisons in the southern region of Odisha state. **Material and Method:** The study group comprised 1514 OP poisoning cases admitted to the VSS Medical College Hospital, Burla. Retrospective analysis of hospital records, post mortem reports and inquest reports were made to study the determinants. **Result:** Organophosphorous poisoning cases constituted 65.31% of total cases. Maximum number of organophosphorous poisoning cases were between the ages of 21-30 years of lower socioeconomic status. Males were more affected than female. 66.63 % of the cases were from rural area. Commonest symptoms were nausea, vomiting, pupillary constriction, sweating and excessive salivation.

**Conclusion:** There is an increasing trend to use organophosphorous poison as a means of committing suicide among the rural population in western Odisha which needs urgent attention by appropriate authorities.

**Key words:** Organophosphorous (OP) compounds; Insecticides; Suicide.

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## Introduction

Organophosphorous (OP) compounds are used extensively in India to control insects so as to increase production of agricultural commodities. They are not only powerful inhibitors of cholinesterase but also act directly on cholinergic nerve endings [1-2].

Individuals consume insecticides for suicidal purposes owing to not only its easy availability but also its low price, and high toxicity. Hence, organophosphorous compounds are used most often for suicidal purpose in our country [3-4]. Illness or death of a person due to OP compound poisoning may present a difficult problem in diagnosis, as the signs and symptoms may be misleading. Postmortem appearances are frequently non-specific; and the analysis of gastric contents may not be helpful because of the treatment received by

the patients and absorption of poison through skin and lungs. The problem becomes even more difficult if the body is decomposed and the chemical examination of blood and viscera is negative in such cases.<sup>5</sup>

A substantial number of these deaths can be prevented with timely institution of antidotes and ventilatory support. A grade of severity of organophosphorous poisoning first proposed in 1970, and revised thereafter suggests that most cases can be managed in the intensive care unit.<sup>6</sup> Considering the above facts, the present study was undertaken in the western region of Odisha to know the type of and the incidence OP poisons and the demographic attributes of its poisoning.

## Material and Methods

This study was carried out from March 2007 to February 2012 (five years) in the VSS Medical College, Burla, western Odisha. Retrospective analysis of hospital records, postmortem examination and inquest reports of all the OP poisoning related cases were done in predesigned and pretested format. The

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**Authors affiliation:** Associate Professor, Forensic Medicine and Toxicology, VSS Medical College Burla, Dist-Sambalpur, Odisha.

**Reprints requests:** Dr. Manoj Kumar Jena, Associate Professor, Forensic Medicine and Toxicology, VSS Medical College Burla, Dist- Sambalpur, Odisha.

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cases were studied from the time of admission to the hospital, and followed up until recovery or death.

The records of all the patients admitted to the hospital with the history of consumption of OP compound of either sex irrespective of severity of poisoning were included in the study, patients with only the history of consumption but without any clinical picture of OP poisoning were excluded from the study.

The enquiry was made about the type and quantity of poison consumed, duration between consumption and onset of symptoms, occupation, employment, educational status and socioeconomic status of the patient. A

detailed history regarding the marital status, mental health of parents or dependents, any such attempts of poisoning among family members and conflicts in the family was collected. The presence of any suicidal or homicidal injuries over the body were also noted in all these cases.

## Results

In the 5 year study total 1,49,067 cases were admitted in the hospital, out of which 2318 cases were poisoning cases and 1514 were due to organophosphorous compound poisoning.

**Table I: Year wise distribution**

Groups (years)	Hospital admissions		Poisoning cases		OP poisoning cases	
	No.	%	No.	%	No.	%
2007 - 08	26,509	17.78	393	16.95	261	17.24
2008 - 09	28,018	18.79	429	18.51	279	18.43
2009 - 10	29,127	19.54	458	19.76	308	20.34
2010 - 11	32,234	21.62	491	21.18	324	21.40
2011 - 12	34,179	22.92	547	23.59	342	22.60
Total	1,49,067		2318		1514	

Table I shows that, in the year 2011 - 12, maximum number of cases were admitted in the hospital, i.e. 34,179 (22.92 %) and in the same year, maximum number of poisoning cases, i.e. 547 (23.59 %) and maximum number of organophosphorous poisoning cases, i.e. 342 (22.60 %) were admitted respectively. The share of OP poisoning cases compared to other poisoning is also increasing.

**Table II: Sex wise distribution**

Sex	Total		Died	
	No. of victims	% of total	No. of Death	% of affected
Male	549	59.42	187	34.06
Female	375	40.58	124	33.06
Total	924	100	311	33.66

Table - II shows that, there were 549 males (59.42 %) and 375 females (40.58 %) out of 934 cases observed with male: female ratio of 1.46: 1. The maximum number of deaths was observed in males (n = 187 deaths, 34.06 %).

**Table III: Age wise distribution**

Age Groups in Years	Total		Died	
	No.	% of total	No.	(%) of affected
< 10	3	0.003	1	33.33
11 - 20	234	25.32	59	25.21
21 - 30	363	39.28	119	32.78
31 - 40	138	14.93	47	34.06
41 - 50	98	10.60	41	42.27
51 - 60	68	7.35	32	47.06
61 - 70	16	1.73	9	56.25
> 70	4	0.43	3	75.00
Total	924	100	311	33.66

Maximum number of cases was observed in the 3<sup>rd</sup> decade i.e. between 21 to 30 years (Table III). There were 363 victims (39.28%) in this age group. The maximum number of deaths was also observed in the 3<sup>rd</sup> decade i.e. between 21 to 30 years. There were 119 deaths (32.78%) in this age group. In the extremes of ages, morbidity is found to be the least, but the mortality is high. There were only 4 cases (0.43%) above the age of 70 years, of which 3 died.

**Table IV: Distribution according to the residential status**

Area	Total		Died	
	No. of victims	(%) of the total	No. of Death	% of total affected
Urban	203	19.33	54	26.60
Rural	721	80.67	257	35.64
Total	924	100	311	33.66

Table IV shows that, most of the cases were from rural area. There were 721 victims (78.03%) from rural areas, while 203 victims (21.97%) were from urban areas. The maximum number of deaths was observed in the rural areas (n = 257 deaths, 35.64%).

**Table V: Marital status of victims (n = 631)**

Marital Status	Male				Female				Total			
	Total		Died		Total		Died		Total		Died	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Married	303	55.19	92	30.36	282	75.20	98	34.75	585	63.31	198	33.84
Unmarried	246	44.80	95	38.62	93	24.80	26	27.95	339	36.68	113	33.33
Total	549	59.41	187	34.06	375	40.58	124	33.15	924	100	311	33.65

Table V enumerates the relation of marital status with the distribution of OP poisoning victims. The above table shows that the maximum number of victims were married (n= 585, 63.31 %). Female victims were more frequently married (n = 282, 75.20 %) compared to males (n = 303, 55.19 %). Amongst the males, maximum (n = 95, 38.62 %) mortality was observed in the unmarried ones, and amongst the females, maximum (n = 98, 34.75 %) mortality was observed in the married ones.

**Table VI: Socioeconomic status of the victims (n = 631)**

Socioeconomic class	Total		Died	
	No.	(%)	No.	(%)
Lower	604	65.37	213	35.26
Middle	297	32.14	92	30.97
High	23	3.49	6	26.08
Total	924	100	311	33.66

Table VI reveals that the maximum number of victims was from lower socioeconomic classes. There were 604 victims (65.37 %) from lower socioeconomic classes, while only 23 victims (3.49 %) were from a higher socioeconomic class. The maximum deaths were observed in the lower socio - economic group (213 deaths, 35.26 %). The minimum deaths were observed in the higher socio - economic group (6 deaths, 26.08 %).

**Table VII: Intention behind OP Poisoning**

<b>Intention</b>	<b>No. of victims</b>	<b>% of total victims</b>
Suicidal	904	97.84
Accidental	17	1.83
Homicidal	3	0.32
Total	924	100

Table VII shows that most (n = 904, 97.84 %) of the cases had suicidal intention. Only 17 cases (1.83 %) were accidental. Only 3 victims gave a history of homicidal poisoning. The accidental cases were seen in agricultural workers, while spraying without proper protection and children.

**Table VIII: Cited reasons behind consuming poison**

<b>Reasons</b>	<b>No.</b>	<b>%</b>
Financial problems	637	68.93
Domestic problems	219	23.70
Unknown	68	7.35
Total	924	100

The main reason cited either by the patient or the relatives behind consuming poison in maximum number of cases was a financial problem (n = 637, 69.26 %) followed by domestic problems (n = 219, 18.86 %) Table VIII.

## Discussion

The study was carried out during a five year period from March 2007 to February 2012. The total number of inpatients admitted to the Government Hospital during this period was 1,49,067, of which, 2,318 cases were due to poisoning. Of the 2,318 poisoning cases, 1,514 were due to organophosphorous compound poisoning and out of which 311 (33.65) proved fatal.

In our hospital, males were more affected (n = 549, 59.42 %) than the females (n = 375, 40.58 %). The incidence of poisoning was more common among the age group between 11 to 30 years. The maximum number of cases was observed in the 3<sup>rd</sup> decade i.e. between 21 to 30 years. Similar observations were made by other researchers from India as well as from outside India.<sup>6,7,8,9,10</sup>

Our study shows that 34.78 % of patients were agricultural workers and labourers, and 18.74 % were unemployed. This could be due to easy availability and accessibility of poisons, particularly of insecticides by the agricultural workers. Accidental poisoning appears to be due to lack of knowledge, unsafe attitude and dangerous practices.<sup>11</sup>

The incidence of OP compound poisoning among married people (n= 585, 63.31 %) was higher than that of unmarried ones. Amongst the males, maximum (n = 95, 38.62 %) mortality was observed in the unmarried ones, and amongst the females, maximum (n = 98, 34.75 %) mortality was observed in the married ones. Similar observations were made by other researchers across the globe.<sup>5,6,12,13,14</sup>

In this study, most of the cases were suicidal (n = 904, 97.84 %) and only (n = 17, 1.83 %) of cases were accidental. The accidental cases were seen in agricultural workers, while

spraying without proper protection and children. This study shows that, most (n = 721, 78.03 %) of the cases were from rural area. The maximum number of deaths was observed in the rural areas (n = 257 deaths, 35.64 %). There were 604 victims (65.37 %) from lower socioeconomic classes, while only 23 victims (3.49 %) were from a higher socioeconomic class. The maximum deaths were observed in the lower socio - economic group (213 deaths, 35.26 %). The minimum deaths were observed in the higher socio - economic group (6 deaths, 26.08 %). This trend of suicidal poisoning by the rural population with low socioeconomic background is becoming common in developing countries, especially the Southeast Asian countries.<sup>7,8,11,13,14</sup>

### Conclusion

There is an increasing involvement of organophosphorus compounds as a means of committing suicide in western parts of Odisha. Adult males from rural backgrounds and from low socioeconomic strata are the most common victims. Married people are more frequently involved. Financial problems were the main reason cited for poisoning followed by domestic problems. Appropriate authorities should take urgent steps to counter this menace.

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