

Original Research Article

## To Study the Organophosphorus Poisoning in Hospitalized Subject at Krishna Hospital, Karad

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### ABSTRACT

**Introduction:** Organophosphate pesticide is common household insecticide used extensively by agricultural communities in the developing countries. Seasonal variations especially in the monsoon season results in financial crisis and drive farmers to suicide by ingestion of agricultural pesticides. Most of these pesticides are sold directly from shops due to lack of special rules and regulations regarding the use and sale of pesticides in countries like India. Early identification followed by effective management in the initial stages increases the rate of survival among organophosphorus (OP) patients.

**Methodology: Objectives** -To determine survival rate and incidence of organophosphorus poisoning in hospitalized subject. To find out causes, complications and ventilator requirement among the client admitted with organophosphorus poisoning. **Research Approach** - Evaluatory, **Research Design** - Retrospective research design. **Setting** - Krishna Hospital Sample -132 case papers of patient admitted in Krishna hospital during 2013-15. Structured too is developed, validated and used.

**Result:** Incidence Rate: = 1.16074569. Total no. of patients diagnosed or treated = 89.39%. Survival rate of the patients in the year 2013 = 91.66%. Survival rate of the patients in the year 2014 = 88.23%. Survival rate of the patients in the year 2015 = 94.44%.

**Conclusion:** The study concluded that mortality rate was low in patient with organophosphorus poisoning. The reason for good prognosis in year 2014 could be due to comprehensive management and good nursing care in the hospital by dedicated staff.

**Key words:** organophosphorus poisoning, Retrospective study, Incidence rate, survival rate, ventilator care.

### INTRODUCTION

A poison is any substance that can cause harm if it gets into the body. The word poison derived from a Latin word- 'portare' which means to drink. Organophosphorus (OP) compound are a diverse group of chemicals used in both domestic and industrial settings. OP compounds are divided into two groups carbonate group and phosphate group. The

examples of organ phosphorus compounds include insecticides and pesticides namely Malathion, parathion, diazinon etc. [1]

The primary mechanism of action of organophosphorus poisoning is Inhibition of carboxyl ester hydrolases, particularly acetyl cholinesterase (AchE). AchE is an enzyme that degrades the neurotransmitter acetylcholine (Ach) into choline and acetic acid. Ach is found in the central and

peripheral nervous system, neuromuscular junctions and RBCs<sup>2</sup> Organophosphorus inactivates AchE by phosphorylating the serine hydroxyl group located at the active site of Ache. Once acetyl cholinesterase has been inactivated, acetylcholine accumulates throughout the nervous system, resulting in overstimulation of muscarinic and nicotinic receptors. [2,3]

The clinical effects are increases tracheobronchial and salivary secretions, bronchoconstriction, bradycardia. Occupational, accidental, suicidal or homicidal poisoning is one of the common causes of morbidity and mortality in India. The mortality rates as much as lower if early treatment is started in organophosphorus poisoning cases. [3]

WHO estimated that three million cases of poisoning occur worldwide, mostly in the developing countries? Out of the estimated 50,000 deaths from self-harm in the region each year about 60% are due to pesticide poisoning. Pesticide poisoning is a significant problem in India. OP compounds are the most cause of self poisoning death in India. In the developing countries OP poisoning is the major cause of morbidity and mortality especially the patients admitted to the intensive care unit (ICU). [4-6]

### Need for study

In hospital based studies of India mortality rates associated with pesticides have been reported to be as high as 50-70%. A study conducted in the Christian Medical College and Hospital, Vellore, reported that OP poisoning accounted for 12% of ICU admission and 29% of total poisoning admission. Organophosphate pesticides are common household insecticide used extensively by agricultural communities in the developing countries. Seasonal variations especially in the monsoon season results in financial crisis and drive farmers to suicide by ingestion of agricultural pesticides. Organophosphorus poisoning is the commonest cause of poisoning accounting for over 60% in the northern and southern India states like

Maharashtra specially in Vidharbha among farmer. Most of these pesticides are sold directly from shops due to lack of special rules and regulations regarding the use and sale of pesticides in countries like India.

In developing countries there is a scarcity of skilled and trained medical professionals in regard to the rational use of antidote. There is also a scarcity of antidote which may be one the reason for higher mortality rates in poisoning management. The most common cause for death is respiratory failure. So this is an attempt to study OPP in hospitalized subjects. [3-6]

### Objectives

1. To determine survival rate and incidence of organophosphorus poisoning in hospitalized subject.
2. To find out causes, complications and ventilator requirement among the client admitted with organophosphorus poisoning.

### RESEARCH METHODOLOGY

**Research approach:** An evaluative research was considered and as benefiting approach to carry out the study.

**Research design:** A retrospective study research design-non-Experimental survey design.

**Research setting:** The study was conducted in Krishna Hospital, Karad. OPP registries monitor the rate and incidence of OPP cases from 1<sup>st</sup> Jan.2013- 31st Dec.2015 in Krishna Hospital, Karad.

**Population:** The study population was the previous records of OPP cases admitted in Krishna hospital, Karad, from Jan.2013-Dec. 2015.

**Sample:** The samples for the present study were the case file and records about OPP from Jan.2013-Dec.2015 which were available at the time of data collection in medical record office of Krishna hospital, Karad.

**Sample size:** 132 sampling technique-Purposive sampling technique Sample criteria-

**Inclusion criteria:** The study includes the case files of patient and records from

register available at the time of data collection. The patient's are- Who had consumed the OPP, who was admitted for the treatment of OPP.

**Exclusion criteria:** Data which are not available at the time of data collection.

**Tool:** The tool will be consisting of, Demographic data. Information related to poisoning.

**Data collection method:**

**Step 1:** Take the consent from the concerned authorities of the hospital.

**Step 2:** Introduce himself to the medical record room staff.

**Step 3:** Collecting data from the records.

**Step 4:** Avoid being biased in the data collection.

**Step 5:** Maintain confidentiality.

**Plan for data analysis:** Inferential statistic and by using the spreadsheet of excel and it's various tools and in stat software.

The data presented under the following heading, Demographic data, Information related to poisoning. Incidence rate is defined as the number of new cases during in a define population during a specified period of time.

**Data Analysis and Interpretation**

**Incidence Rate:** Incidence rate is defined as the number of new cases during in a defined population during a specified period of time.

$$\text{No. of new cases of specific disease during a given time period} = \frac{\text{Population at risk during that period}}{\text{Population at risk during that period}} \times 1000$$

$$= \frac{132}{113720} \times 1000$$

$$= 1.16074569$$

$$= 11.6074569/10000 \text{ population}$$

The incidence rate of OPP is 11.60/10,000population (hospitalized subjects)

Year wise distribution is  
 2013=3.1/10000population,  
 2014=.19.1/10000 population,  
 2015= 5.3/10000 population.

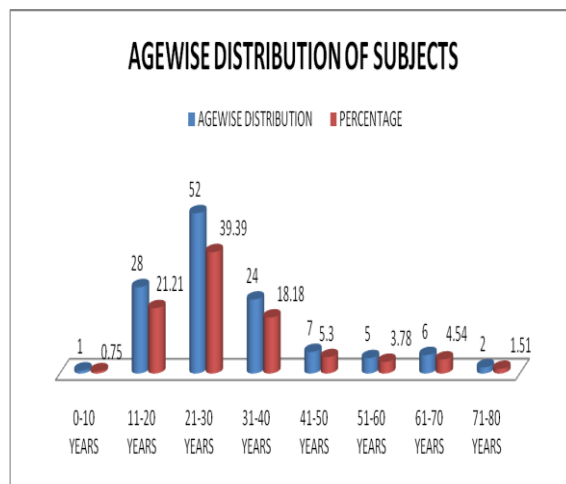
**Survival Rate:** It is the proportion of survivors in a group.

$$= \frac{\text{Total no. of patients alive after 3 years}}{\text{Total no. of patients diagnosed or treated}} \times 100 = 89.39\%$$

Survival rate of the patients in the year 2013 = 91.66%

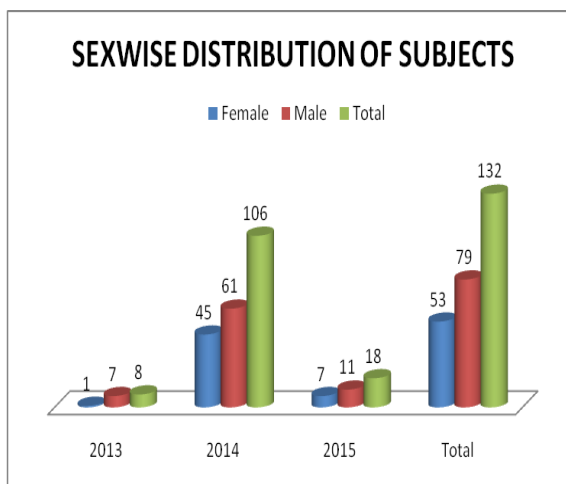
Survival rate of the patients in the year 2014= 88.23%

Survival rate of the patients in the year 2015 =94.44%



Graph no.1: Age wise distribution of subjects n=132

The data presented in graph 1<sup>st</sup> indicates that maximum number 52 (39.39%) of patient belongs to age group 21- 30 Years and minimum number 1 (0.75%) of patients belongs to age group 0-10 years.



Graph No.2: Distribution of subjects according to sex

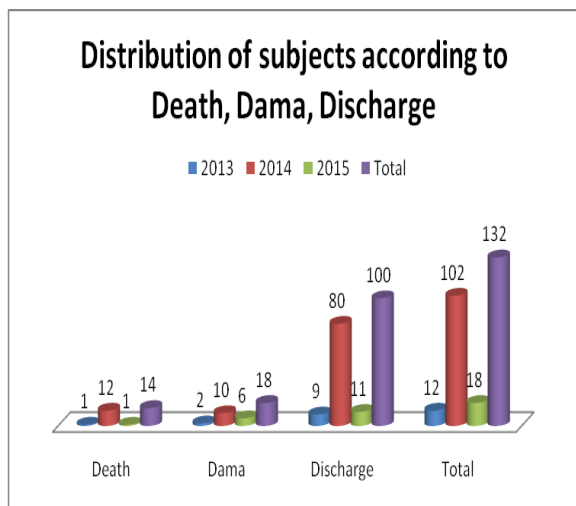
The data presented in graph 2 indicates that the maximum number of males 79 (59.84%) and minimum number of females 53(40.15%) admitted in the hospital.

The data presented in table 1 indicates that maximum number 52 (39.39%) of patients were hospitalized for

0-3 days and minimum number 1 (0.75%) of patients were hospitalized 30- 32 days.

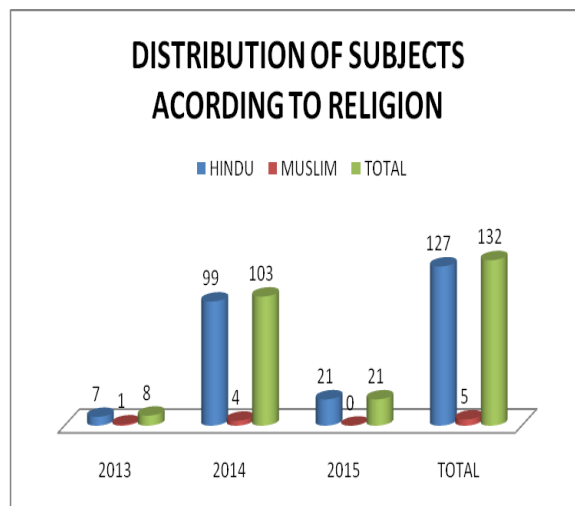
Table no. 1: Total stay in hospital

Year	0-3 days	4-6 days	7-9 days	10-12 days	13-15 days	16-18 days	30-32 days	36-38 days	Total
2013	0	2	1	1	1	3	0	4	12
2014	41	24	10	10	10	2	1	1	99
2015	11	7	2	0	1	0	0	0	21
<b>Total</b>	<b>52</b>	<b>33</b>	<b>13</b>	<b>11</b>	<b>12</b>	<b>5</b>	<b>1</b>	<b>5</b>	<b>132</b>



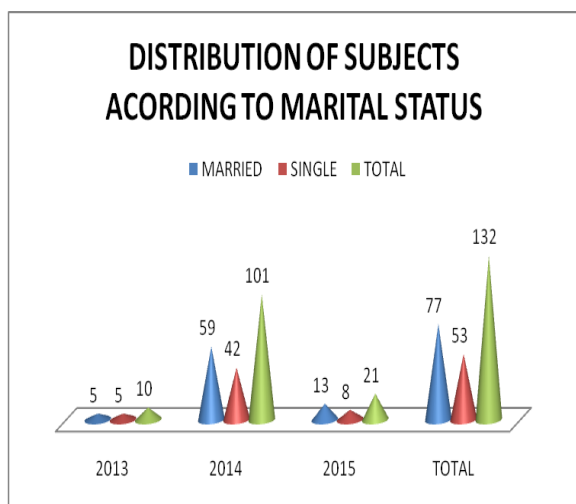
Graph No.3: Distribution of subjects according to Death, Dama, and Discharge.

The data presented in graph 3 indicates that the maximum number of discharge 100 (75.75%) of patients admitted in hospital, the minimum number of Dama 18 (13.63%).



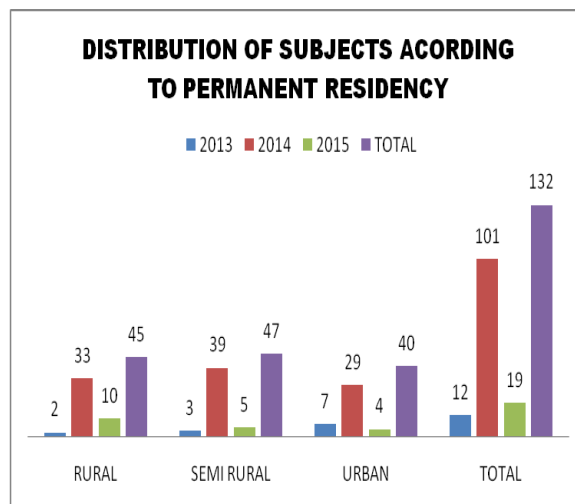
Graph No.5: Religion.

The data presented graph 5 indicates the majority of patients 127 (96.21%) belongs to Hindu religion and 5 (3.78%) patients belongs to Muslims religion.



Graph No.4: Distribution of subjects according to marital status.

The data presented in graph 4 indicates that maximum number 77 (58.33%) of patients were Married and minimum number 53 (40.15%) of patients were single.



Graph No.6: distribution of subjects according to permanent residency.

The data presented in graph 6 indicates that 45 (34.09%) patients belong to rural residence, 47 (35.60%) patients belong to semi urban residence, and 40 (30.30%) patients belong to urban residence.

**Table no. 2: Distribution of subjects according to education**

Year	No formal education	Below s.s.c	S.s.c	H.s.c	Diploma	Graduate	Total
2013	0	3	15	3	1	0	22
2014	9	17	11	38	8	9	92
2015	1	5	4	5	0	3	18
<b>Total</b>	<b>10</b>	<b>25</b>	<b>30</b>	<b>46</b>	<b>9</b>	<b>12</b>	<b>132</b>

The data presented in graph 8 indicates that maximum number 46 (34.84%) of patients education is H.S.C and minimum number 9 (6.81%) of patients education is diploma.

**Table no. 3: Occupation**

Year	Farmer	Housewife	Self employed	Service	Unemployed	Total
2013	1	1	1	1	7	11
2014	23	25	9	19	27	103
2015	6	2	2	1	7	18
<b>Total</b>	<b>30</b>	<b>28</b>	<b>12</b>	<b>21</b>	<b>41</b>	<b>132</b>

The data presented in graph 9 indicates that maximum number 41 (31.06%) of patients occupation is unemployed and minimum number 12 (9.09%) of patients occupation is self employed.

The data presented in table no 4 indicates that maximum number 87 (65.90%) of patients type of family is joint and minimum number 7 (5.30%) of patients type of family is extended.

**Table no. 4: Type of family**

Year	Extended	Joint	Nuclear	Total
2013	0	4	8	12
2014	6	66	28	100
2015	1	17	2	20
<b>Total</b>	<b>7</b>	<b>87</b>	<b>38</b>	<b>132</b>

The data presented in table 5 that 123 (93.18%) patients were suicidal cases, 9 (6.81%) patients were accidental cases.

**Table no. 5: Types of poisoning**

Year	Accidental	Suicidal	Total
2013	5	7	12
2014	3	99	102
2015	1	17	18
<b>Total</b>	<b>9</b>	<b>123</b>	<b>132</b>

**Table no.6: Number of patients consuming poison.**

Year	Chemical	Drugs	Insecticide	Pesticide	Others	Total
2013	1	1	3	3	1	9
2014	10	17	23	50	5	105
2015	1	0	6	10	1	18
<b>Total</b>	<b>12</b>	<b>18</b>	<b>32</b>	<b>63</b>	<b>7</b>	<b>132</b>

**Table no. 7: Time between poisons consumed and admitted in hospital**

Year	15 min back	30 min back	45 min back	1 hr back	2 hr back	3 hr back	4 hr back	7 hr back	8 hr back	9 hr back	Total
2013	1	1	0	2	4	1	2	0	0	0	11
2014	1	4	2	46	27	12	5	1	1	1	100
2015	1	1	1	8	5	3	2	0	0	0	21
<b>Total</b>	<b>3</b>	<b>6</b>	<b>3</b>	<b>56</b>	<b>36</b>	<b>16</b>	<b>9</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>132</b>

The data presented in table no 6 indicates that the maximum number of poison consuming pesticide 63 (47.72%) of patients admitted in hospital and minimum number of poison consuming.

(45.45%) of patients were unknown reason for consumption and minimum number 1 (0.75%) of patients were some issues with fellow mates reason for consumption.

The data presented in table no 7 indicates that maximum number 56 (42.42%) of patients were one hour back admitted in hospital and minimum number 1 (0.75%) of patients were 7,8 and 9 hour back admitted in hospital.

Ventilator requirement in the year 2013 = 10 (7.57%), year 2014 = 103 (78.03%), year 2015 = 19 (14.39%) in table 18.

The data presented table no 8 indicates that maximum number 60

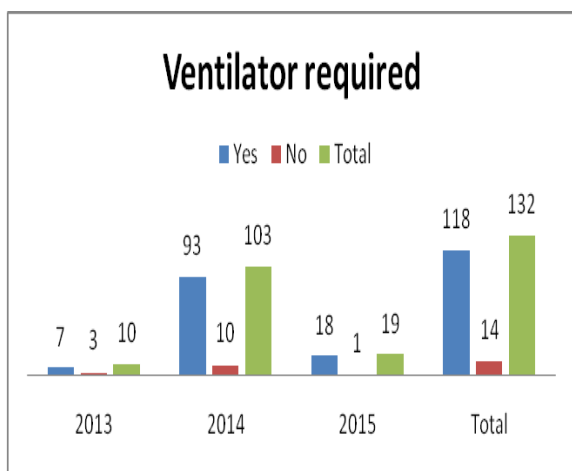
Majority of the patients 118 (89.39%) were required ventilator support while 14 (10.60%) were not required the ventilator support.

Table no. 8: Immediate cause/reason for consumption

Year	Exam stress	Family problem	Quarrel with brother	Quarrel with family	Quarrel with husband	Quarrel with mother	Quarrel with son	Quarrel with wife	Job stress	Some issues with fellow mates	Un known	total
2013	1	1	1	1	1	1	1	1	1	0	3	12
2014	7	32	1	4	4	1	1	1	1	1	48	101
2015	1	4	0	0	1	2	0	0	1	0	10	19
<b>Total</b>	<b>9</b>	<b>37</b>	<b>2</b>	<b>5</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>60</b>	<b>132</b>

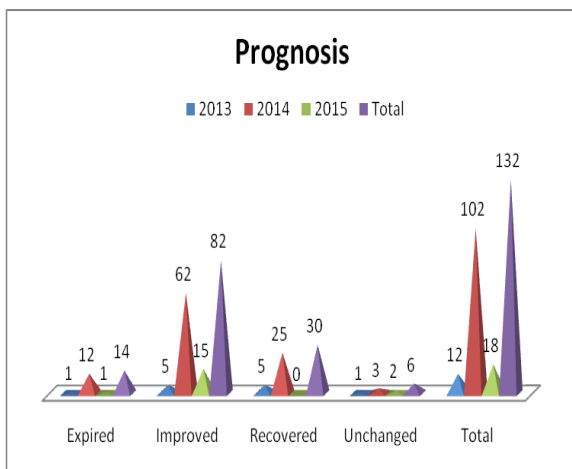
Table no. 9: If yes duration

Year	1 day	2 days	3 days	4 days	5 days	6 days	7 days	8 days	9 days	10 days	11 days	22 days	Nil	Total
2013	1	1	1	1	3	1	1	1	1	1	0	0	1	13
2014	34	20	7	4	4	5	5	5	3	1	3	1	9	101
2015	12	4	1	0	0	0	1	0	0	0	0	0	0	18
<b>Total</b>	<b>47</b>	<b>25</b>	<b>9</b>	<b>5</b>	<b>7</b>	<b>6</b>	<b>7</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>10</b>	<b>132</b>



Graph no. 7: Ventilator required

The data presented in table 9 indicates that maximum number 47 (35.60%) of patients were required 1 day ventilator support and minimum number 1 (0.75%) of patients required 22 days ventilator support.



Graph no. 8: Prognosis

The data presented in graph 8 indicates that 14 (10.60%) of patients were

expired, 82 (62.12%) of patients were improved, 30 (22.72%) of patients were recovered, 6 (4.54%) of patients were unchanged from hospital.

## DISCUSSION

Dr. Vikram Palimar Intermediate syndrome in organophosphorus poisoning 2001-2002 in this study Male patients were (71.1%) in age group 21-30 years. As compared to this study male patients were (59.84%) in this maximum cases belongs to age group 21-30 years from January 2013 to December 2015. [7]

Subash Chandra Joshi 2009-2011, total 372 cases of organophosphorus compound poisoning where analysed by, young male of population of rural background and, particularly agricultural workers was the commonest patients (54.07%). As compared to this study the total 132 cases of organophosphorus compound poisoning were analyzed by, young male of population of rural background and particularly unemployed were the commonest patients 41 (31.06%). [8]

Udit Narang and Purvasha Narang, Organophosphorus poisoning: A social calamity 2015, in this study about 1 million are Accidental cases and 2 millions are Suicidal poisoning cases from 2009-2011. As compared to this study total number of cases 132 in that majority of cases is suicidal 123 (93.18%) and accidental cases were 9 (6.81%). [9]

Chendake and Mohite: Study of Organophosphorus Poisoning In Hospitalized Subject. The study revealed that 82 acute poisoning patients were got admitted in the emergency department of these 64.63% were males and 35.36% females. The majority (43.90%) cases were from age group of 21 to 30 years. maximum no 40 (48.78%) of patients type of family is unknown and minimum no 18 (21.95%) of patients were nuclear family maximum no 61 (74.39%) of patients education is unknown and minimum no 1 (1.21%) of patients education is S.S.C and post graduate. 14 (17.07%) patients belong to urban residence, 10 (12.19%) patients belong to semi urban residence, 58 (%) patients belong to rural residence. <sup>[6]</sup>

## CONCLUSION

The study concluded that mortality rate was low in patient with organophosphorus poisoning due to respiratory complications. So management of respiratory complications, intensive care, and specific therapy with atropine and oximes were required to reduce the mortality rate and complications due to organophosphorus poisoning.

The reasons for good prognosis in year 2014 could be due to comprehensive management and good nursing care in the hospital by dedicated staff. There is need to work with client and their families to assess the needs and draw up individualized care plan for the client and should get social welfare professionals help to improve with basic living skill including meditation life style management skills and social activity to ensure that they lead a normal life as possible.

### Summary

A retrospective study was conducted on patients admitted with organophosphorus (O.P.)

Poisoning to Krishna Hospital from January 2013 to December 2015. Total number of cases admitted was 132, 118 of them were ventilated. 14 of them died during the course of the treatment. The various aspects of treatment, complications, drug options and uncommon problems were evaluated.

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