

## Research Article

# Clinical Profile of Organophosphate Poisoning at a Tertiary Care Teaching Hospital

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## ABSTRACT

**Background:** The major occupation in India is cultivation, where pesticides are regularly used for farming. Consumption of organophosphate compound in developing countries like India causes severe adverse effects leading to morbidity and mortality due to their effortless availability and lack of knowledge. To control pests, weeds, or plant disease organophosphorus compounds are used as insecticides. **Aim:** To study the clinical profile of organophosphate poisoning (OP) on different organ systems of the body. **Material and Methods:** The present study is prospective observational study carried out in AMC ward of MGMH Warangal, 102 subjects were recruited for the study. **Results:** Pesticide poisoning was more common in males (75%) than females (25%). Majority of the patients were between the age group of 21-30. The most commonly involved OP compound was Chlorpyrifos. Among 102 patients, 54 patients experienced mild symptoms, 46 patients experienced with moderate symptoms and 2 patients were experienced with severe symptoms. **Conclusion:** OP poisoning is a serious debilitating condition in AMC requires intensive supportive care, treatment with antidote is necessary as it is affecting different organ systems of the body. As the severity of poisoning in patients of our work is mild to moderate, no extrapyramidal effects were observed.

## 1. Introduction

The exposure of the organophosphorous compounds (OPCs) are highly prevalent in the developing countries and they are chiefly used as a pesticide. The toxic effects of these compounds cause a clinical problem throughout the world because they are significantly associated with the mortality and the morbidity. There are certain factors which plays a major role in making the OPCs as a choice of self-poisoning tools, which includes their ease of access and the socio-cultural factors.<sup>[1-3]</sup> OPCs poisoning is considered to be the most common medico toxic emergency in India. They were first developed by the Schrader Shortly before and during the World War-2. Initially they were used as agricultural insecticides and later as warfare agents.<sup>[4]</sup> According to the estimation of the WHO, approximately 3 million pesticide poisonings are occurring annually throughout the world

and causing more than 2,20,000 deaths. Death and toxicity reports are at a alarmed rate in developing countries like India and Srilanka.<sup>[5,6]</sup> In Indian studies it is observed that the frequency of the mortality increases at a rate of 4-30% with the OP compounds.<sup>[7]</sup> The fatality rate of intentional poisoning by the OP compounds found to be higher in the southern and the central India.<sup>[8]</sup> Throughout the world, thousands of tons of acetyl cholinesterase enzymes (AChEs) inhibiting organophosphates (OP) pesticides and carbamates are used for agricultural purposes as insecticides. The toxicity associated with these compounds are caused due to their ability to inhibit AChE which ultimately inhibit the activity of neurotransmitter agent acetylcholine (ACh).<sup>[9]</sup> The symptoms which are exhibited by the patients due to the involvement of the muscarinic and nicotinic receptors depends on the severity of the compounds. Symptoms like nausea, diarrhea, sweating, vomiting, salivation, urination and stool incontinence, bradycardia and miosis are caused due to muscarinic involvement and signs

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such as convulsions, muscular weakness, fasciculation, paralysis and coma are due to the nicotinic receptors.<sup>[10]</sup> OPC leads to both the acute and as well as chronic complications. Acute complications includes- acute respiratory distress syndrome (ARDS), acute respiratory failure, paralysis of type I and II, sudden cardiac death, resecretions and aspiration pneumonitis whereas chronic complications like-polyneuropathy, depression, anxiety, coma and paralysis.<sup>[11]</sup> There are certain factors on which the mortality rates depends, which includes the type and the amount of the compound have consumed, patient condition on hospital arrival and delays in the respiratory management and also diagnosis and treatment. In developing countries like India there is always a correlation between the period of prehospitalization, management type and compounds type or nature, which is used for reduction of the mortality rates.<sup>[12]</sup> The treatment for the OPCs poisoning includes the resuscitation with oxygen in the earlier period, management and protection of the airways, intravenous fluids and drugs includes the muscarinic antagonists like atropine and activators of AChE like PAM.<sup>[11]</sup> Apart from these, gastric lavage which have a significant role in the condition is considered only if the patients are at stable state. After stabilization patients are carefully monitored for the changes in the needs of atropine, worsening of the respiratory functions due to the intermediate syndrome (IMS) and recurrent cholinergic features which are associated with the OP compound of fat-soluble nature.<sup>[13]</sup>

## 2. Results & Discussion

102 patients were admitted with the history of consumption of OP and treated in MGM Hospital, Warangal, Telangana. The patients were fulfilling the inclusion and exclusion criteria were included in the study. Among 102 patients 77 were males and 25 were females shown in **Figure 1**. The mean age was  $38.26 \pm 14.042$  years with a range 18 to 80 years. Majority of the patients were in the 21-30 age group, which is shown in **Figure 2**. The significant hospital stay was 7 days, 2 patients were died. In most of the cases suicidal intentions were major cause. 8 patients had a history of previous suicidal attempt. After ingestion (90%) patients presented to us within 1 hour. Chlorpyrifos was the most common OP compound, which was implicated in 29 patients were shown in **Figure 3**. Based on Poisoning Severity Score, among 102 patients, 54 patients were experienced with mild symptoms, 46 patients were experienced with moderate symptoms and 2 patients were experienced with severe symptoms shown in **Figure 4**. The reason behind suicide attempt was Family issues in 66 patients, which is being the most common motive for OP consumption shown in **Figure 5**. We observed more muscarinic symptoms in which emesis is the most common symptom (95%), followed by miosis (60%) and then GIT cramps about (54%). Most of the patients had a history of psychotic illness shown in Figure 6. The parameters estimated to assess the kidney function are Blood Urea and Serum Creatinine and Serum electrolyte parameters are given in **Table 1**.

Organophosphorus poisoning is a common, rapidly progressive and potentially fatal clinical entity. Self-poisoning with OPCs is a major health problem worldwide. Through the inhibition of acetylcholinesterase, organophosphorous poisoning is characterized by clinical picture of acute cholinergic crisis.

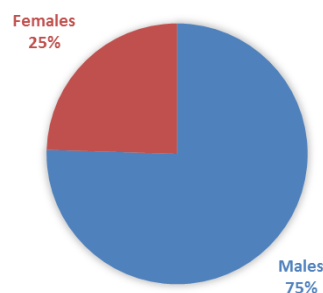
Ingestion route was most familiar mode of exposure found in 101 patients followed by dermal mode of exposure found in 1 patient and was rarest mode of exposure. This is comparable study done by Chintale et al., in 2016 in Maharashtra.<sup>[18]</sup>

The study showed male predominance in OP poisoning which was comparable to studies done by Khan et al and Raja et al., The reason behind this may be males are main working group in outdoor field, i.e. They are more involved in spraying crops in the farms.<sup>[19,20]</sup>

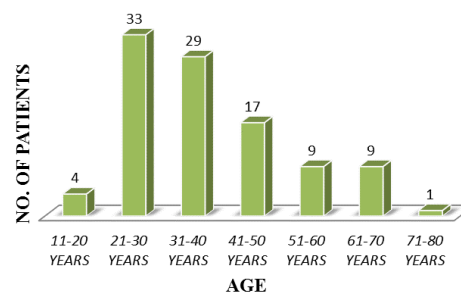
In study done by Chintale et al., in 2016, Higher incidence of poisoning was observed in young age group i.e in 16-30. This was comparable to present study. The reason may be that this was the main working age group and have the whole responsibility of their family and also exposed to organophosphorous compounds while working in farm.<sup>[18]</sup>

In this study of 102 patients of OPC- poisoning the mean age was  $38.265 \pm 14.042$  years. Most of the patients i.e. 32.35% were in 21-30 years of age. Common symptoms are vomiting (93.13%) followed by miosis (58.82), GIT cramps (52.94%). These results are comparable to the studies of Tripathy et al.,<sup>[21]</sup>

This study shows that muscarinic effects predominates and appears first and then nicotinic effects. Study by Emerson et al., shows that muscarinic symptoms were found in 92% while this study showed in 100% cases. This study is correlated with Mishra et al., that nausea and vomiting is present in 90% cases. We found that miosis was found in 60% cases in our study and 91% cases in the study done by Benerjee et al., So it is also comparable with our study. Nicotinic symptoms appear late, and that indicates progression of disease process. Fasciculation is a poor prognostic sign and in our study.<sup>[22-24]</sup>



**Fig 1: Distribution based on Gender**



**Fig 2: Distribution based on different age group**

**Table 1: The parameters estimated to assess the kidney function are Blood Urea and Serum Creatinine and Serum electrolyte parameters.**

S.No	Particulars	Values (Mean $\pm$ SD)
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Kidney function Test		
1.	Blood Urea	41.13 ± 34.436
2.	Serum Creatinine	1.48 ± 2.816
Electrolyte Test		
1.	Sodium	140.58 ± 10.237
2.	Potassium	4.69 ± 3.951
3.	Chloride	58.19 ± 16.317

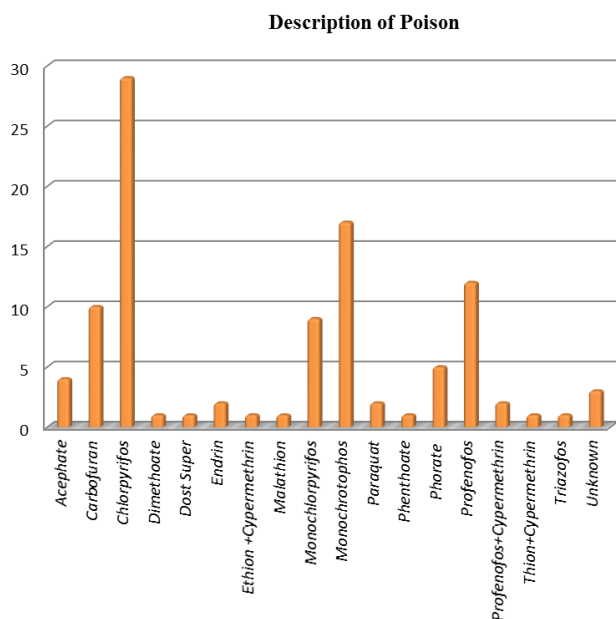


Fig 3: Distribution based on Description of poison

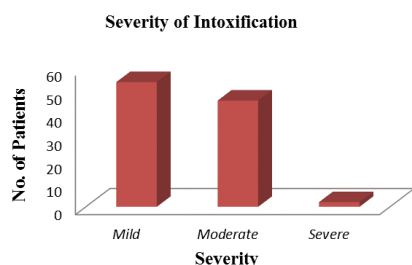


Fig 4: Distribution based on severity of intoxication

### Suicide Attempt Reason

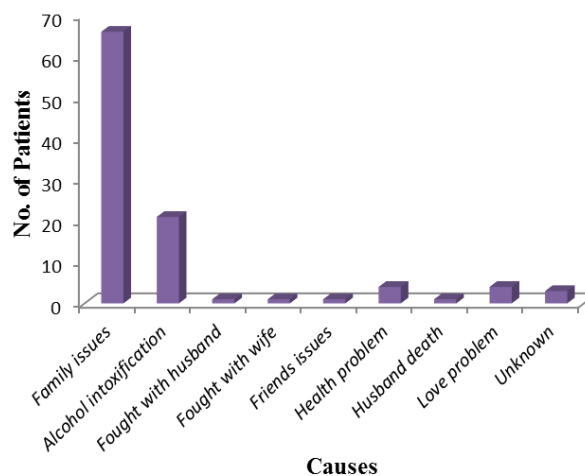


Fig. 5: Distribution based on suicide attempt reason

## 3. Materials & Methods

It is a Prospective Observational Study carried out in AMC ward of MGMH in which 102 subjects were recruited for the study and cases were followed up. An approval was obtained prior to the study from the Institutional Human Ethics Committee (KIEC/KMC/NCT/NIS/2019/P35) and informed consent was obtained from each patient after having been informed of all the aspects relevant to the study in their local language also.

Information concerning age, gender, conjugal, socioeconomic status, family history and also regarding poison such as name of poison, quantity, route, intention, mean time delay are examined. Complete Blood Picture, Renal function test, liver function test, electrolytes, ECG are performed for each case on admission and at the time of discharge. Poisoning Severity Score was performed for each case.<sup>[14]</sup> Extrapyramidal side effects were evaluated by Scaling.<sup>[15]</sup>

The scale was developed by selecting the relevant components of the Unified Parkinson's Disease Rating Scale<sup>[16]</sup> and the Tremor Rating Scale.<sup>[17]</sup> Each component (tremor, rigidity, dystonia and chorea-athetosis) was scored on a 5-point scale ranging from 0 (absent) to 4 (marked) for each of the six regions (face and eyes, mouth and tongue, head and neck, arm, trunk and leg) for a total maximum possible score of 80. Certain components in specific regions that would be difficult to assess in ventilated patients were excluded from this assessment.

**Inclusion criteria:** Patients who have alleged to consume OP poison. Not managed elsewhere (*i.e* patient presenting directly to our hospital and redirected/referral patients who were not treated at primary centre).

**Exclusion criteria:** Patients with indication of exposure to a different poison other than OP poison. Patients who were not prescribed with Atropine and PAM.

## 4. Conclusion

Organophosphate poisoning is a serious debilitating condition in AMC and requires intensive support and care, treatment with antidote is necessary as

it is affecting different Organ systems of the body. As the severity of poisoning in patients of our work is mild to moderate, no extrapyramidal side effects were observed. Most common OP poison used was Chlorpyrifos with most common motive for poisoning was familial problems. Further research must be carried out in more patient samples to evaluate the effect of poisoning and systems of the body. Serum amylase estimation can be used as a prognostic indicator along with the serum cholinesterase activity in assessing severity of OP Poisoning.

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## Conflict of Interest

The author(s) confirm that this article content has no conflict of interest.

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