



ORIGINAL RESEARCH PAPER

General Medicine

STUDY OF CLINICAL PROFILE OF PATIENTS WITH ACUTE ORGANOPHOSPHORUS POISONING AT A PRIVATE HOSPITAL

KEY WORDS:

Organophosphate (OP) compounds, cholinergic syndrome, Peradeniya OP poisoning scale, OP poisoning

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ABSTRACT

Organophosphate (OP) compounds are widely used as pesticides in agricultural parts of the world. Acute cholinergic syndrome starts within few minutes of exposure and muscarinic or nicotinic features may be present. Present study was undertaken to clinical profile of patients with acute organophosphorus poisoning at a private hospital. Present study was single-center, prospective, observational study, conducted patients with history of acute organophosphorus poisoning of either sex and above 18 years of age admitted to hospital. In present study 35 cases of OP poisoning were studied. Majority were from 21-30 years age group (37.14 %), were male (71.43 %), had accidental poisoning (65.71 %) & ingestion was common mode of exposure (80 %). According to clinical features, common symptoms were excessive salivation (77.14 %) followed by nausea (62.86 %), vomiting (54.29 %), giddiness (37.14 %) & diarrhoea (31.43 %). While common signs were miosis (74.29 %), fasciculation (62.86 %), bradycardia (54.29 %), increased bronchial secretions (45.71 %) & oro-nasal frothing (25.71 %). In present study, chlorpyrifos (37.14 %) was most common compound observed, followed by monocrotophos (31.43 %), dimethoate (11.43 %), triazofos (5.71 %), profenofos (5.71 %), phorate (5.71 %) & quinalphos (2.86 %). According to Peradeniya OP poisoning scale, majority cases had mild OP poisoning (65.71 %). In present study, common complications observed were respiratory failure (25.71 %), electrolyte disturbances (22.86 %), convulsions (8.57 %), multisystem failure (8.57 %), aspiration pneumonia (5.71 %), circulatory collapse (5.71 %) & sepsis (2.86 %). 2 deaths (5.71 %) were observed in present study. The importance of rapid diagnosis, early and effective treatment should not be overlooked because patients who receive early & effective treatment generally will do better and have less complications and decreased morbidity & mortality rates.

INTRODUCTION

Organophosphate (OP) compounds are widely used as pesticides in agricultural parts of the world.¹ Organophosphorous pesticides poisoning can result from occupational, accidental or intentional exposure. Deliberate self-harm by suicidal poisoning is common all over the world.² OP compound's easy availability is responsible for increasing incidences of pesticide poisoning and it being a major cause of morbidity/mortality that poses public health problem in developing countries, including India.³ World Health Organization (WHO) and several other studies have estimated that OP pesticides were responsible for majority of self-attempted deaths in the developing world.^{3,4,5}

OP compounds inactivate acetylcholinesterase, resulting in the accumulation of acetylcholine in cholinergic synapses. OP poisoning causes acute cholinergic phase, which may occasionally be followed by intermediate syndrome or organophosphate induced delayed polyneuropathy.^{5,6}

Acute cholinergic syndrome starts within few minutes of exposure and muscarinic or nicotinic features may be present.^{1,3,6} Common muscarinic features are vomiting, diarrhoea, salivation, miosis, sweating, bradycardia, hypotension, bronchoalveolar secretions, bronchoconstriction and nicotinic features are fasciculation, paralysis, tachycardia, reduced ventilation, mydriasis.^{5,6,7} Present study was undertaken to clinical profile of patients with acute organophosphorus poisoning at a private hospital.

MATERIAL AND METHODS

Present study was single-center, prospective, observational study, conducted in Chhatrapati Shivaji Maharaj hospital, Chhatrapati Sambhajinagar, India. Study duration was of 3 years (January 2021 to December 2023). Study was approved by institutional ethical committee.

Inclusion Criteria

- Patients with history of acute organophosphorus poisoning of either sex and above 18 years of age admitted to hospital in study period, willing to participate

in present study

Exclusion Criteria

- Patients with chronic exposure to pesticide / organophosphorus poison
- Non-Organophosphorus compound poison inhalation/ exposure/ consumption.
- Brought dead cases were excluded.

Study was explained to participants in local language & written informed consent was taken. A detailed history regarding age, occupation, residence, socio-economic status, approximate time of ingestion, circumstances leading to poisoning were recorded. A thorough clinical examination was carried out at the time of admission in each case with particular attention to the signs and symptoms attributed to OP compound poisoning. In all patients routine haemogram, urine examination, random blood sugar, blood urea, serum creatinine, serum bilirubin, serum alanine amino transferases (ALT) and aspartate amino transferases (AST) were done. Investigations like USG of abdomen, Fundoscopy, ECG, Echocardiography and Chest X-Ray were done if indicated.

Special attention was paid to the level consciousness, lung, cardiovascular system, and pupils. Each case was examined immediately on admission and was observed every 15 minutes interval for the first two hours. Subsequently they were monitored at two hourly intervals or oftener if required till the patient were atropinised.

Atropinisation was confirmed by dry secretions, dilated pupils and tachycardia. In all cases, standard treatment was started. Pralidoxime and atropine were used as antidote to OP compound poisoning. Patient was said to be atropinised with the following signs- dilatation of pupils, dry secretions and tachycardia.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

RESULTS

In present study 35 cases of OP poisoning were studied. Majority were from 21-30 years age group (37.14 %), were male (71.43 %), had accidental poisoning (65.71 %) & ingestion was common mode of exposure (80 %).

Table 1- General Characteristics

Characteristics	No. of subjects	Percentage
Age group (in years)		
18 to 20	1	2.86
21 to 30	13	37.14
31 to 40	8	22.86
41 to 50	7	20
51 to 60	4	11.43
>60	2	5.71
Gender		
Male	25	71.43
Female	10	28.57
Mode of poisoning		
Suicidal	11	31.43
Accidental	23	65.71
Homicidal	1	2.86
Mode of exposure		
Ingestion	28	80
Dermal + inhalation	4	11.43
Inhalation only	2	5.71
Dermal only	1	2.86

According to clinical features, common symptoms were excessive salivation (77.14 %) followed by nausea (62.86 %), vomiting (54.29 %), giddiness (37.14 %) & diarrhoea (31.43 %). While common signs were miosis (74.29 %), fasciculation (62.86 %), bradycardia (54.29 %), increased bronchial secretions (45.71 %) & oro-nasal frothing (25.71 %).

Table 2: Clinical Features

Characteristics	No. of subjects	Percent age
Symptoms		
Excessive salivation	27	77.14
Nausea	22	62.86
Vomiting	19	54.29
Giddiness	13	37.14
Diarrhoea	11	31.43
Abdominal pain	9	25.71
Breathlessness	5	14.29
Convulsion	2	5.71
Signs		
Miosis	26	74.29
Fasciculation	22	62.86
Bradycardia	19	54.29
Increased bronchial secretions	16	45.71
Oro-nasal frothing	9	25.71
Neck muscle weakness	6	17.14
Others	3	8.57
Altered sensorium	2	5.71

In present study, chlorpyrifos (37.14 %) was most common compound observed, followed by monocrotophos (31.43 %), dimethoate (11.43 %), triazofos (5.71 %), profenofos (5.71 %), phorate (5.71 %) & quinalphos (2.86 %).

Table 3- Type Of Compound

Compound	No. of cases	Percentage
Chlorpyrifos	13	37.14
Monocrotophos	11	31.43
Dimethoate	4	11.43
Triazofos	2	5.71
Profenofos	2	5.71
Phorate	2	5.71
Quinalphos	1	2.86

According to Peradeniya OP poisoning scale, majority cases had mild OP poisoning (65.71 %).

Table 4- Severity According To Peradeniya Op Poisoning Scale.

Severity scale	No. of cases	Percentage
Mild (<4)	23	65.71
Moderate (4-7)	9	25.71
Severe (>7)	3	8.57

In present study, common complications observed were respiratory failure (25.71%), electrolyte disturbances (22.86 %), convulsions (8.57%), multisystem failure (8.57%), aspiration pneumonia (5.71%), circulatory collapse (5.71%) & sepsis (2.86%).

Table 5- Complication

Complication	No. of cases	Percentage
None	23	65.71
Respiratory failure	9	25.71
Electrolyte disturbances	8	22.86
Convulsions	3	8.57
Multisystem failure	3	8.57
Aspiration pneumonia	2	5.71
Circulatory collapse	2	5.71
Sepsis	1	2.86

2 deaths (5.71 %) were observed in present study.

Table 6- Outcome

Outcome	No. of cases	Percentage
Cured	33	94.29
Death	2	5.71

DISCUSSION

Organophosphorus poisonings is common in developing worlds and pose a major health threat. OP compounds inhibit acetylcholinesterase resulting in accumulation of acetylcholine (ACh) and overstimulation of cholinergic synapses. Patients die mostly from respiratory failure and lung injury, although there is variability in the clinical symptoms and signs depending on nature of compounds, amount consumed, severity, time gap between exposure, and presentation in the hospital.⁸ Increased severity of the poisoning according to POPS score at the time of admission is associated with higher dose of atropine for treatment, long duration of hospital stay, increased requirement of ventilatory support, increased rate of complications, and higher mortality. Individual parameters of the POPS score also correlate well with the clinical outcome.^{9,10}

Death usually occurs due to cardiovascular and respiratory failure due to paralysis of respiratory muscles and obstruction caused by bronchospasm and bronchial secretions.⁸ Early recognition, timely resuscitation and protocolized treatment have proven to decrease morbidity and mortality.^{9,10}

In study by Banday TH et al.,¹¹ Out of 133 patients, 132 (82.66%) patients ingested the compound, 23 (7.6%) & only three patients had dermal / inhaled exposure while spraying pesticides in rice fields. Female to male ratio in was 1:3.2, with mean age was 31.5 years. Most consistent clinical symptoms were miosis 93.6%, increased salivation 86.4%, anxiety and restlessness 82.7%, bronchospasm 78.1% and incontinence in 58%.

In another study by Mohammad B et al.,¹² among 400 patients, majority of patients (40%) were aged between 18–25 years. There was a significant female preponderance (82% vs. 18%; P=0.000). Suicide was the most common motive (93%) and ingestion was the most common mode of poisoning (99%). The muscarinic and nicotinic symptoms were common at the presentation. Seizures were present in 11% of patients. On the POP severity scale, mild, moderate and severe poisoning was

seen at 50%, 35% and 15%, respectively. Ventilator support was needed in 43% of the patients. An overall mortality of 18% was observed in the study. Similar findings were noted in present study.

In study by Chintale KN et al.,³ incidence of acute pesticide poisoning was 0.36% of total hospital admissions. Pesticide poisoning was more common in males (74.26%) than females (25.73%) with M: F ratio of 2.9:1.82. 35% were suicidal cases followed by accidental cases 13.97% and only 3.67 were homicidal. Incidence of suicidal and accidental poisoning was more common in married population (75.73%). History of social and domestic problems (50.80%), alcohol abuse (13.39%) and marital friction (11.60%) were common risk factors. Ingestion route of poisoning was most common (71.73%). Excessive salivation was the most common symptom observed in 72.05%.

In study by Banerjee I et al., poisoning with suicidal intent (82.02%) was more common than the accidental one (17.98%). Methyl parathion was the most common poison consumed by the patients (35.74%) followed by diazinon, chlorpyrifos, dimethion. Nausea and vomiting (85.02%) was the most common symptom while miosis was the most common sign observed in 91.94% patients. A total of 56 patients of OP poisoning died (5.78%) with respiratory failure being the primary cause of death followed by CNS depression, cardiac arrest, and septicemia.

Bhattad PH et al.,¹³ noted that males (58.75%) and those between 21-30 years age group (45.0%) were affected more. Suicidal attempt was the commonest mode (97.5%). Majority of the participants belonged to severity grade II (45%); with severity grades found directly related to longer hospital stay and death. Constriction of pupils (76.25%) was the commonest clinical sign observed. The death rate was calculated to be 21.25%, with monocrotophos (100%) and dichloroovas (66.63%) compounds being associated with very high mortality. Dimethoate was the commonest substance incriminated (18.75%).

Early identification and aggressive management are often lifesaving, and hence predictive prognostic features would be useful for the clinicians to stratify the patients according to their risk of deterioration. Many clinical and laboratory parameters have been used to assess the severity of poisoning and to predict the clinical outcomes in patients admitted with OPC poisoning.

CONCLUSIONS

The importance of rapid diagnosis, early and effective treatment should not be overlooked because patients who receive early & effective treatment generally will do better and have less complications and decreased morbidity & mortality rates. Good supportive & ICU care cannot only reduce the frequency of acute or chronic complications but will also decrease mortality rate in these cases. On-time diagnosis of OP poison ingestion and treatment with the antidote and symptomatic treatment could minimize the severity, morbidity, and mortality of the patients.

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