



CLINICO-EPIDEMIOLOGICAL PROFILE OF PATIENTS WITH ORGANOPHOSPHORUS POISONING

General Medicine

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ABSTRACT

Background: Acute organophosphorus poisoning is common in developing countries due to easy availability and less awareness among the farmers. **Aim:** Present study is done to study the clinical features and epidemiological characteristics of these patients. **Methods:** A 2 year cross-sectional study was conducted among patients presenting with history of Organophosphorus poisoning at BMCRI, Bangalore. **Results:** A total of 90 patients were included in the study. Poisoning was most common among age group between 21-30 years (36.7%); Majority subjects 73 (81.1%) were Male patients; Most common mode of poisoning was Suicidal (96.7%); Poisoning was most common among farmer (32.2%) followed by coolie (21.1%). Most common poison consumed was chlorpyrifos (48.9%), followed by dichlorvos (14.4%). Most common symptom was Nausea and vomiting (92.2%) followed by abdominal cramps (60%). Most Common clinical sign is miosis (82.2%) followed by bradycardia (63.3%). **Conclusion:** Present study showed that majority of patients were of young age with males outnumbering females with suicidal intent more common than accidental. Chlorpyrifos was the most common type of poison. Nausea and Vomiting was the common symptom reported by the patients and miosis was the most common sign observed.

KEYWORDS

INTRODUCTION

Organophosphorus (OP) ingestion is one of the most common emergencies treated at poisoning centers in India. Mortality depends upon the type of compound ingested, amount of the compound ingested, route of ingestion, general health status of the patient and early diagnosis and timely management. Good outcomes are seen with early diagnosis, administration of atropine along with intravenous fluids and proper respiratory support including oxygen therapy and mechanical ventilation.¹

Worldwide, an estimated 3,000,000 people are exposed to organophosphorus and carbamate agents each year with upto 3,00,000 fatalities.² In Indian studies, the incidence of suicidal poisoning using OPC ranges from 10.3% to 43.8%.³ Occupational exposure to the organophosphorus compound accounts for about 20% of patients with mortality about 1%. Accidental poisoning accounts for 8-10% of the incidents and homicidal use (<1%) were other forms of poisoning.⁴

Organophosphorus compounds, because of their molecular mimicry binds to cholinesterase enzyme. They form a phosphate covalent bond to serine active sites of cholinesterases enzymes- acetylcholinesterase and pseudocholinesterase (serum cholinesterase). These cholinesterase are meant to hydrolyse Ach into choline and acetic acid. Thus due to cholinesterase inhibition there is accumulation of acetylcholine at the synaptic clefts and various muscarinic and nicotinic symptoms

Muscarinic manifestations⁵

Respiratory: Increased bronchial secretions, bronchospasm, chest tightness, dyspnoea, cough
Eyes: Blurred vision, conjunctival injection, dimness of vision, miosis
Gastrointestinal: Cramping, diarrhea, nausea, vomiting
Urinary: Incontinence
Cardiovascular: Bradycardia, hypotension
Exocrine glands: Hyperamylasia, increased salivation

Nicotinic manifestations⁵

Muscle fasciculation, cramping, weakness, diaphragmatic paralysis, respiratory failure, tachycardia, hypertension.

Thus a patient with OP poisoning presents with a wide variety of signs and symptoms. In India, unconscious patients are often brought by their relatives and neighbors who are unable to provide correct information regarding the nature of the particular poison to which the patient was exposed. In such cases the diagnosis of OP poisoning is based on clinical features as observed by the treating physicians. The clinical features also help to determine the severity of poisoning which is of prognostic importance. Present study is done to study the clinical features and epidemiological characteristics of these patients.

MATERIALS AND METHODS

Study design:

Cross sectional study. All consecutive patients presenting in the emergency department of the hospital with history and clinical evidence of OP poisoning during the study period were considered eligible for participation in the study.

Study period: December 2020 to May 2022

Place of study: Study was conducted in Hospitals attached to Bangalore Medical College and Research Institute.

Sample size: 90

Study Procedure

Patients attending the emergency department with OP compound poisoning were initially evaluated and resuscitated for maintaining airway, breathing, and circulation. Informed consent was obtained from eligible patients/legally authorized representatives (if the patient was unconscious). After completing the medicolegal formalities, history was taken from the patients/legally authorized representatives (in case the patient was unconscious) following which clinical examination was carried out to determine the common clinical features of OP poisoning.

Statistical Analysis

Data collected were analyzed in computer by using the Statistical Package for Social Sciences (SPSS) program version 10. Data analysis was done by using descriptive and inferential statistical methods: frequency, percentage, means.

RESULTS

Organophosphorus poisoning was most common among age group between 21-30 years (36.7%) followed by 41-50 years (25.6%) 73 (81.1%) subjects were Male patients and 17 (18.9%) with Male:Female ratio of 4.2 Mode of poisoning being Suicidal (96.7%) followed by accidental (3.3%)

Most common occupation of subjects being farmer (32.2%) followed by coolie (21.1%). Among the OP poisoning patients, most common poison was chlorpyrifos (48.9%) second most common being dichlorvos (14.4%). This was followed in sequence by parathion (12.2%) and monocrotophos (7.8%).

Out of 90 (100%) patients with alleged history of OP poisoning who attended in-patient department of BMCRI, most common symptom was nausea and vomiting seen in 92.2% of cases followed by excessive salivation and abdominal cramps seen 65.6% and 60% respectively. This was followed in sequence by chest tightness, cough

seen in 32.2% and 17.8% respectively. Most common sign was miosis seen in 82.2 % followed tachypnea and bradycardia seen in 64.4% and 63.3% respectively. Other signs encountered during the course of our study included altered sensorium 47.8%, fasciculation 25.6%, seizure 10%, 43.3% patients had mild and moderate poisoning each while 13.3 % of patient developed severe poisoning.

DISCUSSION

Organophosphorus compound poisoning is a common health problem in third world countries. The major cause of morbidity and mortality in OP poisoning is respiratory failure. The World Health Organization (WHO) estimates that globally three million intentional or unintentional pesticide poisoning episodes occur annually and out of these a minimum of 300,000 die.¹ It seems these data represent only the tip of ice berg as most cases are not reported from developing nations.

Organophosphorus insecticides are arguably one of the commonest causes of morbidity and mortality due to poisoning worldwide, especially in developing countries like India due to its easy availability. The morbidity and mortality outcome depends on the time lag between exposure and the onset of management. So, it is cardinal to recognize the entire spectrum of the symptoms. Organophosphorus (OP) compounds inhibit acetyl cholinesterase and butyryl cholinesterase enzymes resulting in over stimulation at cholinergic synapses

Organophosphorus poisoning was most common among younger age group between 21-30 years with a predominance of Male patients. Comparing it with other studies, Karalliedde L., Senanayake N. et al of Srilanka documented 91% of their cases were under the age of 30⁵. Malik et al from Kashmir, revealed the predominant population affected were under the age of 25. In Mangalore, Karnataka, India, the most common age group to be affected between 20 – 30 (36.6%). Kuntal Battacharyya et al of Kolkatta reported the mean age of 25.5 years. In Mangalore and Srilanka the pattern of case series with male predominance. S. Shivakumar and K. Raghavan et al of Tamilnadu reported 165 cases of organophosphorus poisoning and sex distribution was with male predominance. Kuntal Battacharya et al from Kolkata showed male predominance.

Most common mode of poisoning was suicidal followed by accidental. This is in congruence with studies conducted in Nepal,^[7] Turkey,^[6] Gulbarga^[9] where poisoning with suicidal intent accounts for 95.24%, 75.9%, and 97.25% of total cases of OP poisoning respectively. Most common occupation of subjects being farmer followed by coolie.

This is in contrast to study by Banerjee et al where majority of the affected patients were housewives. Among the OP poisoning patients, most common poison was chlorpyrifos second most common being dichlorvos. This variation in the type of poison consumed can be attributed to the regional availability of pesticides in different regions. Kuntal Bhattacharyya et al also described the most frequent compound as Chlorpyrifos. In a study by Banerjee et al most common compound was malathion followed in frequency by diazinon and chlorpyrifos⁷

Most common symptom was nausea and vomiting followed by excessive salivation and abdominal cramps. Most common sign was tachypnea and bradycardia.

CONCLUSION

The present study showed that majority of the patients were of young age with females outnumbering males. Poisoning with suicidal intent was more common than accidental. Nausea and vomiting was the most common symptom reported by the patients while miosis was the most common sign observed by the treating physicians of the research team.

Table 1: Age distribution of subjects

		Count	%
Age	<20 years	5	5.6%
	21 to 30 years	33	36.7%
	31 to 40 years	16	17.8%
	41 to 50 years	23	25.6%
	51 to 60 years	5	5.6%
	>60 years	8	8.9%
	Total	90	100.0%

Table 2: Sex distribution of subjects

		Count	%
Sex	Female	17	18.9%
	Male	73	81.1%
	Total	90	100.0%

Table 3: Occupation distribution

		Count	%
Occupation	Auto driver	1	1.1%
	Business	7	7.8%
	Coolie	19	21.1%
	Delivery Boy	1	1.1%
	Driver	1	1.1%
	Engineer	1	1.1%
	Farmer	29	32.2%
	Food Delivery Boy	1	1.1%
	Garage Worker	1	1.1%
	Homemaker	11	12.2%
	Mason	1	1.1%
	Newspaper Delivery Boy	1	1.1%
	Retired	1	1.1%
	Shopkeeper	3	3.3%
	Student	10	11.1%
	Vegetable Vendor	1	1.1%
	Vendor	1	1.1%
	Total	90	100.0%

Table 4: Mode of Poisoning distribution

		Count	%
Mode of Poisoning	Accidental	3	3.3%
	Suicide	87	96.7%
	Total	90	100.0%

Table 5: Type of Poison distribution.

		Count	%
Type of Poison	Chlorpyrifos	44	48.9%
	Dichlorvos	13	14.4%
	Dicrotofos	3	3.3%
	Dimethoate	3	3.3%
	Ethephon	2	2.2%
	Glyphosate	1	1.1%
	Imidocloprid	1	1.1%
	Monocrotofos	7	7.8%
	Parathion	11	12.2%
	Profenofos	2	2.2%
	Phorate	1	1.1%
	Phenthoate	1	1.1%
	Quinalphos	1	1.1%
	Total	90	100.0%

REFERENCES

- Eddleston M, Buckley NA, Eyer P, Dawson AH. Management of acute organophosphorus pesticide poisoning. *The Lancet*. 2008;371(9612):597-607.
- Mancini F, Jiggins JL, O'Malley M. Reducing the incidence of acute pesticide poisoning by educating farmers on integrated pest management in South India. *International journal of occupational and environmental health*. 2009;15(2):143-51.
- Kamath SD, Gautam VK. Study of organophosphorus compound poisoning in a tertiary care hospital and the role of Peradeniya Organophosphorus Poisoning scale as a prognostic marker of the outcome. *J Family Med Prim Care* 2021;10:4160-7.
- Yurumez Y, Durukan P, Yavuz Y, Ikiçzeli I, Avsarogullari L, Ozkan S, Akdur O, Ozdemir C. Acute organophosphate poisoning in university hospital emergency room patients. *Internal medicine*. 2007;46(13):965-9.
- Paudyal BP. Organophosphorus poisoning. *J Nepal Med Assoc* 2008;47:251-8.
- Senanayake N, De Silva HJ, Karalliedde L. A scale to assess severity in organophosphorus intoxication: POP scale. *Human & experimental toxicology*. 1993;12(4):297-9.
- Banerjee I, Tripathi SK, Roy AS. Clinico-epidemiological characteristics of patients presenting with organophosphorus poisoning. *North Am J Med Sci* 2012;4:147-50.