

Clinico-Epidemiological Characteristics of Patients Presenting with Organophosphorus Poisoning

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Abstract

Background: Organophosphorus (OP) poisoning is a major health problem all over the world, particularly in the developing countries. **Aim:** The present study aims to explore the clinical and epidemiological features found in patients presenting with OP poisoning. **Materials and Methods:** A 1-year cross-sectional study was conducted on patients presenting with clinical features of OP poisoning in a tertiary care medical college. **Results:** A total of 968 patients presented during the study period. Poisoning with suicidal intent (82.02%) was more common than the accidental one (17.98%). Majority of the patients were housewives (42%) followed by farmers, shopkeepers, laborers, students. Methyl parathion was the most common poison consumed by the patients (35.74%) followed by diazinon, chlorpyrifos, dimicron. 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 septicaemia. **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.

Keywords: Clinico-epidemiological characteristics, organophosphorus poisoning, study

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Introduction

Poisoning with organophosphorus compounds (OP) is a global problem. World Health Organization estimates that one million serious unintentional poisonings occur every year and an additional two million people are hospitalized for suicide attempts with pesticides.^[1] India is a predominantly agrarian country where pesticides are routinely used for farming. According to data available from National Poison Information Centre India, suicidal poisoning with house-hold agents (OPs, carbamates, pyrethrinoids, etc.) is the most common modality of poisoning.^[2] Recent data from National crime bureau of India shows suicide by consumption of pesticides

account for 19.4% and 19.7% of all cases of suicidal poisoning in the year 2006 and 2007 respectively.^[3]

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.^[4] Common clinical features of OP poisoning include the following:

Muscarinic manifestations^[5]

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

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Nicotinic manifestations^[5]

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

Thus we can appreciate that a patient with OP poisoning presents with a 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.

A literature search was conducted which consisted of a Medical Literature Analysis and Retrieval System Online (MEDLINE) database search (accessed on 16.4.2009) and a World Wide Web search (Search engine: Google, accessed on 16.4.2009) using the following keywords: "Organophosphorus poisoning, clinico-epidemiological features, study". The search revealed that only a few studies have considered the clinical and epidemiological features of OP poisoning.^[6-11] Our study was conducted in this backdrop to explore the clinical features and epidemiological characteristics of patients presenting with OP poisoning.

Materials and Methods

Study setting

The study was conducted in a tertiary care medical college and hospital in West Bengal, India.

Ethics

The study was approved by institutional ethics committee.

Study design

A cross-sectional, study was conducted to address the study objective. 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 procedure

Patients attending the emergency department with history of exposure to OP compounds 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 careful

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, standard deviation (S.D.). A two-tailed *P*-value less than 0.05 was considered to be statistically significant.

Results

A total of 968 patients presented in the emergency department of the institute during the study period with the clinical features of OP poisoning. The demographic characteristics of the patients are shown in Table 1. Mean age of the persons presenting in the emergency with clinical features of OP poisoning is 34.47 years (Mean±S.D.: 34.47±9.21). The females outnumbered males with male: female ratio of 1:1.38. Poisoning with suicidal intent was more common (82.02%) than the accidental one (17.98%) (*P*-value < 0.0001). Majority of the patients were housewives (42%) followed by farmers (33.99%), shopkeepers (9.93%), laborers (8.14%), students (6.2%). The mean interval between poison consumption and admission to hospital was 4.4 hours (Mean±S.D.: 4.4±2.29). Regarding the type of poison consumed by the patient, methyl parathion was the most common poison consumed by the patients (35.74%) followed by diazinon (28.62%), chlorpyrifos (19.52%), dimicron (16.12%). The signs and symptoms with which the patients presented are enumerated in Table 2. In the present study, nausea and vomiting is the most common symptom reported by 85.02% of patients followed by abdominal cramps (47.93%), while miosis is the most common sign observed in 91.94% patients. Following admission, a total of 56 (5.78%) patients died during their hospital stay. Respiratory failure was the primary cause of death in 21 patients (37.5%) followed by CNS depression (33.92%), cardiac arrest (21.44%), and septicemia (7.14%).

Discussion

In the present study, majority of the patients belonged to the young age group (Mean±S.D.: 34.47±9.21). Females show a clear preponderance over male with a male (M): female (F) ratio of 1:1.38. This finding is in agreement with studies conducted in Turkey (M: F=1:1.47),^[6] Nepal (M: F=1:2).^[7] However, in the study conducted in Chennai by Shivaprasad *et al.*, (2001),^[8] male patients (74%)

outnumbered female (26%). Majority of the affected patients in our study are housewives (42%) which is at par with the study conducted in Turkey (housewives 47.3% of total sample).^[6]

Table 1: Baseline demographic parameter of the patients of OP poisoning (n=968)

Baseline characteristics	Subcategory	No. of patients (%)
Age (years)	Mean±SD	34.47±9.21
Time of presentation since exposure(hours)	<6 hours	499 (51.54)
	6-12 hours	365 (37.72)
	>12 hours	104 (10.74)
	Mean±SD	4.4±2.29
Sex	Male (M)	401 (41.43)
	Female (F)	567 (58.57)
	M:F	1:1.38
Religion	Hindu	540 (55.79)
	Muslim	424 (43.80)
	Christian	4 (0.41)
Occupation	Housewife	404 (41.74)
	Farmer	329 (33.99)
	Shopkeeper	96 (9.93)
	Laborer	79 (8.14)
Mode of poisoning	Suicidal	794 (82.02)
	Accidental	174 (17.98)
	Students	60 (6.2)
Type of poison consumed	Methyl parathion	346 (35.74)
	Diazinon	277 (28.62)
	Chlorpyrifos	189 (19.52)
	Dimicron	156 (16.12)

In the present study, poisoning with suicidal intent was more common (82.02%) than the accidental one (P -value<0.0001). 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. The mean interval between poison consumption and admission to the hospital was 4.4 hours (Mean±S.D.:

Table 2: Clinical features of patients suffering from OP poisoning at presentation

Clinical features	No. of patients	Percentage
Symptoms		
Nausea and/or vomiting	823	85.02
Abdominal cramps	464	47.93
Excessive salivation	348	35.95
Cough	310	32.02
Urinary incontinence	271	27.99
Diarrhea	232	23.96
Chest tightness	135	13.94
Convulsion	76	7.85
Signs		
Miosis	890	91.94
Bradycardia	360	37.19
Tachypnoea	340	35.12
Altered sensorium	271	27.99
Fasciculation	97	10.02
Hypertension	87	8.98
Tachycardia	80	8.26
Hypothermia	58	5.99

Table 3: Comparison of the clinical features observed in the present study with the studies held before

Clinical features	Present study (%)	Reddy K.S. <i>et al.</i> (2008) ^[9] (%)	Rehiman <i>et al.</i> (Nepal 2004) ^[7] (%)	Chugh <i>et al.</i> (2005) ^[10] (%)	Doshi <i>et al.</i> (1964) ^[11] (%)
Symptoms					
Abdominal cramps	48	12	42	NC	52
Chest tightness	14	NC	NC	NC	12
Convulsion	8	4.92	NC	26.6	NC
Cough	32	42	NC	NC	NC
Diarrhea	24	17	NC	NC	12
Excessive salivation	36	68	NC	40	28
Nausea and/or vomiting	85	80	80	80	76
Urinary incontinence	28	NC	NC	40	NC
Signs					
Altered sensorium	28	17	30	NC	8
Miosis	92	74	60	100	NC
Hypothermia	6	NC	NC	NC	NC
Hypertension	9	NC	NC	6.6	NC
Bradycardia	38	NC	52	NC	NC
Tachycardia	8	NC	NC	6.6	NC
Tachypnoea	34	NC	34	NC	NC
Fasciculation	10	11	8	40	NC

NC = Not considered

4.4±2.29). In studies conducted at Chennai,^[8] maximum patients (89.69%) presented within 6 hours. Regarding the type of poison consumed by the patient, methyl parathion was the most common poison (35.74%) followed by diazinon, chlorpyrifos, dimicron., carbamates. In a study conducted in Nepal,^[7] methyl parathion (64.62%) was the most common one followed by Baygon spray, malathion, dichlorvos. Methyl parathion was also the most common poison in studies conducted in Chennai.^[8] However, in a study conducted in Turkey,^[6] dichlorvos was the most common one. This variation in the type of poison consumed can be attributed to the regional availability of pesticides in different countries.

Clinical presentation depends on the specific OP involved, the quantity absorbed, and the type of exposure. In our study nausea and vomiting was the most common symptom (85.02%) while miosis (91.94%) was the most common sign. A comparison between the clinical features as observed in our study with earlier studies has been listed in Table 3. The mortality rate in our study was 5.78% which is comparable to the study done in Turkey (9.1%).^[6]

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.

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