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Original Research Article

Clinical Profile and Outcome of Organophosphorus Poisoning at Tertiary Care Hospital in Muzaffarpur, Bihar

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Abstract:

Background: In the developing world, acute organophosphorus (OP) pesticide poisoning is common. Since the nation is mostly an agricultural one, pesticides and insecticides are widely employed in agriculture, and the general public has easy access to these hazardous chemicals. The objective of the study was to identify the nature of the demographic profile, type of compound, clinical manifestations, and outcome of organophosphate poisoning presenting to a tertiary care hospital in Muzaffarpur, Bihar.

Methods: Between June 2023 and November 2023, a cross-sectional study including 100 patients diagnosed with OPC poisoning at Sri Krishna Medical College and Hospital Muzaffarpur, Bihar, was carried out in the general medicine department. The diagnosis of OP poisoning was established on the basis of the patient's medical history or any evidence of exposure to the OP chemical within a 24-hour period. Symptoms such as fasciculations, miosis, excessive salivation, and improved signs and symptoms after atropine treatment were noted. IBM SPSS version 22 was used for statistical analysis.

Results: Eighty percent of the subjects were male. The bulk (66%) belonged to the 21–40 year old age range. Methyl parathion was the most often ingested OPC (27%) and was followed by chlorpyrifos (22%). Abdominal pain/cramps accounted for 100% of the significant GIT problems, with nausea and vomiting coming in second with 83%. In 40% of the individuals, mechanical ventilation was required, and 25% of the subjects had reported death.

Conclusion: Males in their economically productive stages of life are disproportionately affected by OP poisoning. Given the high death rate, it is imperative that health services be adequately strengthened, particularly at the primary level.

Keywords: Organophosphorus, Pesticides, Muscarinic Manifestations, Nicotinic Manifestations, Poisoning.

Introduction

In many developing nations, acute organophosphorus (OP) poisoning is the most prevalent type of poisoning and varies depending on the location. One million illnesses and 200,000 deaths were predicted to result from occupational and accidental exposures [1]. Compounds containing organophosphorus (OP) are employed as nerve gasses, herbicides, and chemical warfare agents. Since the nation is primarily an agricultural one, pesticides and insecticides are widely utilized in farming, and the general public has easy access to these toxic chemicals [2]. There are already about a hundred distinct OP chemicals in synthesis. Since highly toxic pesticides are easily accessible at stressful times, the majority of OP pesticide poisoning cases and the deaths that follow happen in developing nations as a result of intentional self-ingestion, especially in young, productive age groups. Malathion, parathion, fenthion, diazinon, dimethoate, chlorpyrifos, paraoxon, and soman are the most well-known [3]. Organophosphorus chemicals are anti-acetylcholine sterases that cause toxicity by preventing acetylcholine, a neurotransmitter that is vital to the autonomic and central nervous systems, from acting normally. By blocking the cholinesterase enzyme, OP causes acetylcholine to build up at synapses and myoneural junctions, which in turn causes cholinergic over activity [4]. Although there is variation in the clinical symptoms and indications according on the type of chemicals, amount consumed, severity, time interval between exposure, and hospital admission, respiratory

failure and lung injury account for the majority of patient deaths.

Owing to the limited availability of resources, all OP poisoning patients are not managed in ICUs in the Indian setup. In view of this, a study was conducted to assess the nature of the compound, profile of clinical manifestations, and outcome of organophosphate poisoning presenting to a tertiary care teaching hospital in Muzaffarpur, Bihar.

Materials and Methods

This cross-sectional study conducted at Department of General Medicine, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar from June 2023 to November 2023.According to the study by Banerjee et al.[5], the sample size was determined assuming that 35.74% of cases of OP poisoning would result in a negative outcome. The sample size calculation also took into account a 95% confidence level and 10% absolute precision. A sample size of 88 would be necessary. To accommodate a non-participation rate of around 10%, the sample size will be increased by an additional 8 participants. As a result, the ultimate needed sample size would be 96, rounded to 100 participants.

All patients in whom a provisional diagnosis of OPC poisoning was made based on the patient's clinical presentation/history as recorded from the patient's attendant/details of poison containers were included in the study. Multiple compound/ tablet poisoning, contradictory diagnosis regarding the compound, patients with a history of bronchial asthma/cardiac illness or neuromuscular diseases, Patients who died within few minutes of hospitalization even before the initial treatment could be given were excluded from the study.

Soon after admission, a thorough medical history was obtained in accordance with the proforma, and a systemic and general physical examination was conducted. At the time of admission, laboratory tests included a complete blood count, a random blood sugar test, a renal function test, and a liver function test. The patients were routinely observed until the conclusion. The diagnosis of OP poisoning was based on the patient's medical history or any evidence of exposure to the substance within 24 hours. Symptoms of OP poisoning include fasciculations, miosis, excessive salivation, and signs and symptoms that improve when atropine is administered. Frequency and descriptive analysis are done using IBM SPSS version 22 statistical software.

Results

A total of 100 subjects were included in the final analysis. The majority of the subjects were males (80%) with maximum belonging to the age group of 21-40 years (66%)(Table 1).

Table 1: Descriptive analysis of age and gender distribution (N=100)

Parameter	Number of patients	Percentage
Age group		
<20	9	9%
21-40	66	66%
41-60	23	23%
>60	2	2%
Gender		
Male	80	80%
Female	20	20%

The most common OPC to be consumed was Methyl parathion (27%), followed by Chlorpyrifos (22%). The least common compound was Phorate (4%) (Figure 1).

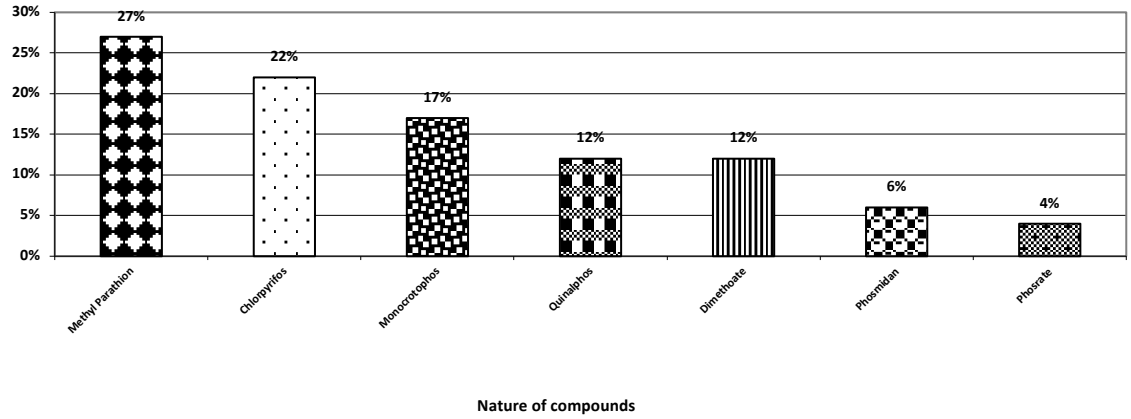

Figure 1:

Out of all the muscarinic manifestations, 100% of subjects had abdominal pain or cramps, while 83% experienced nausea and vomiting and 18% experienced diarrhea. Of the subjects experiencing respiratory system problems, 27 (27%) had oronasal foam, 26 (26%) had pulmonary edema, and 8 (8%) experienced cyanosis. 36 (36%) and 7 (7%) of the patients experienced bradycardia and hypotension, respectively, in relation to cardiovascular problems. A total of 72% of subjects experienced miosis, 28% had normal pupils, 60% sweated more than usual, and 21% had incontinence in their bladders. Of those who had nicotine's symptoms, 40 (40%) suffered paralysis and 28 (28%) had fasciculations in their skeletal muscles. Of the patients with autonomic nervous system problems, 4 (4%) experienced hypertension and tachycardia. Among the CNS consequences were altered consciousness in 48 (48%) cases, coma in 18 (18%) cases, and intermediate state in 5 (5%) cases.

Table 2: Descriptive analysis of clinical presentation in the study population (N=100)

Clinical manifestations			
Muscarinic manifestations		Nicotinic manifestations	
GIT	Number (%)	Skeletal muscle	Number (%)
Nausea and vomiting	83 (83%)	Fasciculations	28(28%)
Abdominal pain/cramps	100(100%)	Paralysis	40(40%)
Diarrhea	18 (18%)	Autonomic nervous system	
Respiratory system		Tachycardia	4(4%)
Oronasal froth	27 (27%)	Hypertension	4(4%)
Cyanosis	8(8%)	CNS manifestations	
Pulmonary edema	26 (26%)	Altered consciousness	48(48%)
Cardiovascular system		Coma	18(18%)
Bradycardia	36 (36%)	Intermediate syndrome	5(5%)
Hypotension	7(7%)	OPIDPN	0(0%)
Eyes			
Miosis	72 (72%)		
Normal pupil	28 (28%)		
Exocrine glands			
Increased sweating	60 (60%)		
Urinary bladder			
Incontinence	21(21%)		

Out of 100 patients included in the current study, 40 (40%) required mechanical ventilation. Out of 100 patients included in the current study, 25 (25%) met with mortality, and the remaining 75 (75%) of the patients recovered.

Discussion

Organophosphates are widely applied. With the synthesis of nearly 50,000 organophosphorus compounds since Clermont's first one in 1857, pesticides can cause significant morbidity and mortality. With a mortality rate ranging from 10 to 22%, the clinical signs include the typical cholinergic syndrome, flaccid paralysis, and intractable seizures [6].

Two thirds (66%) of the poisoning cases in the current study involved people between the ages of 21 and 40. Selvaraj et al. [7] and George et al. [6]

conducted investigations. With a peak incidence between 21 and 30 years old, 60–80% of patients belonged to the 21–40 age group. It is said that during this stage of life, individuals in this age group are the most emotionally fragile, stressed, and prone to small arguments, setbacks, or disappointments. According to the current study, OP poisoning is more common in men. Males were more likely than females to become poisoned (80% versus 20%). In the current study, the male to female ratio was 4:1. When the male to female ratio is 1.2:1, Padmanaba et al. [8] and Joshi et al. [9] also noticed a similar pattern. This could be because men make up the majority of those working in outdoor fields; that is, they are more likely to be the ones spraying crops in farms. In this study, methyl parathion was ingested more frequently than any other toxin (27%) and chlorpyrifos (22%) came second.

The most frequent toxin found in Banerjee et al. research [5]. In Banday et al. research, dimethoate was most frequently found [7]. The geographical availability of pesticides in various areas can be the reason for this variance in the toxin type ingested. Among the muscarinic manifestation, 100% of subjects experienced abdominal pain or cramps, which were followed by nausea and vomiting (83%), diarrhea (18%), and vomiting (18%). An respiratory complication of Oronasal froth affected 27 (27%) of the subjects. 36 people (or 36%) suffered bradycardia, 72% had miosis, and 60% sweated more than usual. Of those with nicotinic symptoms, 40 (40%) had paralysis and 28 (28%) experienced fasciculations in their skeletal muscles. One of the CNS consequences was altered consciousness in 48 (48%) cases. Similar to the current study, Khan S et al. [10] investigation similarly found that the most typical symptoms were 100% excessive salivation, agitation (87.5%), disruptions of awareness (75%), stomach pain (62.5%), and cramping in the abdomen (50%).

According to Chintale et al. [9], the most frequent symptom seen was excessive salivation (72.05%), which was followed by fasciculation (63.23%), miosis (71.32%), increased bronchiolar secretions (39.70%), bradycardia (57.35%), neck muscle weakness (16.91%), and oronasal foaming (10.29%). Meiosis (82%), excessive salivation (70%), decreased consciousness (70%), agitation (58%), fasciculation (42%), tachycardia (25%), and muscle weakness (22%), were all noted by Noshad et al. [10].

Forty percent of the subjects in the current study were using mechanical ventilation. According to Singhal A et al. [11], 51% of the patients in the study were receiving mechanical breathing. In the current study, 25% of participants died and 75% of them recovered from organophosphorus poisoning. GV Rao et al. found similar findings, observing a 27% a mortality rate [12]. According to Banerjee et al., 5.78% of the participants passed away from respiratory failure, which was followed by septicemia, cardiac arrest, and CNS depression [5].

In their study, Sungur et al. [13] found that patients receiving mechanical ventilation had a 50% death rate, while individuals not receiving such treatment had a 21.6% rate. In their study, Shah et al.[14] found that the cases' complete recovery and mortality rates were, respectively, 66.47% and 16.47%.

The longer hospital admission wait time in the current study may be the cause of the elevated death rate. The majority of the time between the poisoning and the start of treatment was spent getting to the hospital and making transportation arrangements. Reducing the amount of time that passes between ingesting a poison and starting a certain treatment could potentially lower the risk of dying.

The primary weakness of the study was its cross-sectional and descriptive design, which hindered us from conducting any hypothesis testing. In several instances, bias would have been introduced if assumptions about the compound's nature had been made based only on its history and description. Because of the smaller sample size and smaller catchment region, the study's conclusions are not as broadly applicable.

Conclusion

It is evident that OP poisoning is more common in younger people (those under 40), with a preponderance of men. Most of them had a high death rate and a moderate degree of poisoning. When patients show signs of moderate to severe OP poisoning, it is considerably more crucial to administer an antidote promptly, even if the amount and duration are insufficient. Such individuals require close observation and monitoring along with high-quality supportive care.

The negative effects of such poisoning may also be lessened by stringently enforcing the Pesticide Act and implementing a new government program aimed at educating the general public and young people about the potentially fatal effects of organophosphorus chemicals.

Reference

1. Unnikrishnan B, Singh B, Rajeev A. Trends of acute poisoning in south Karnataka. Kathmandu Univ Med J. 2005;3(2)149-154.
2. Behere PB, Behere AP. Farmers' suicide in Vidarbha region of Maharashtra state- A myth or reality? Indian J Psychiatry. 2008;50(2)124-27.
3. Zawar S. Correlation between plasma cholinesterase levels and clinical severity of acute

organophosphate and carbamate poisoning. JAPI. 2001;149;91.
4. Aygun D, Doganay Z, Altintop L, Guven H, Onar M, Deniz T, et al. Serum acetylcholinesterase and prognosis of acute organophosphate poisoning. J Toxicol Clin Toxicol. 2002; 40(7): 903-910.
5. Banerjee I, Tripathi S, Roy AS. Clinicoepidemiological characteristics of patients presenting with organophosphorus poisoning. N Am J Med Sci. 2012;4(3)147-150.
6. Cherian M, Roshini C, Visalakshi J, Jeyaseelan L, Cherian A. Biochemical and clinical profile after organophosphorus poisoning A placebo-controlled trial using pralidoxime. J Assoc Physicians India. 2005;53;427-431.
7. Banday TH, Tathineni B, Desai MS, Naik V. Predictors of Morbidity and Mortality in Organophosphorus Poisoning- A Case Study in Rural Hospital in Karnataka, India. N Am J Med Sci. 2015;7(6)259-265.
8. Khan S, Kumar S, Agrawal S, Bawankule S. Correlation of serum cholinesterase and serum creatine phosphokinase enzymes with the severity and outcome of acute organophosphorus poisoning- study in rural central India. World J Pharmacy Pharmac Sci. 2016;5(4)1365-1373.
9. Chintale KN, Patne SV, Chavan SS. Clinical profile of organophosphorus poisoning patients at rural tertiary health care centre. Int J Adv Med. 2016;3(2)268-274.
10. Noshad H, Ansarin K, Ardalan MR, Ghaffari AR, Safa J, Nezami N. Respiratory failure in organophosphate insecticide poisoning. Saudi Med J. 2007;28(3)405-407.
11. Singhal A, Yang M, Sargent M, Cochrane D. Does optic nerve sheath diameter on MRI decrease with clinically improved pediatric hydrocephalus? Child's Nerv Syst. 2012; 29(2): 269-279.
12. Rao GV, Jyothsna M. Relation between Serum Cholinesterase and Mortality among Patients with OP Poisoning. Indian J ClinAnaesth. 2016;3(1)48-51.
13. Sungur M, Guven M. Intensive care management of organophosphate insecticide poisoning. Crit Care. 2001;5(4)211-215.
14. Shah SM, Asari PD, Amin AJ. Clinicoepidemiological profile of patients presenting with acute poisoning. Int J Curr Res Rev. 2016; 8(13):35-41.