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Original Research Article

Clinical profile of organophosphorous poisoning in children admitted to tertiary care hospital

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ABSTRACT

Background: Organosphophorous compounds are the commonly available insecticides in households. Therefore, children are vulnerable to accidental poisoning. It is associated with significant morbidity and mortality. The aim of this study was to study the clinical profile of organophosphorous poisoning in children.
Methods: This was prospective study conducted over a period of two years from January 2018 to January 2020 in department of Pediatrics, Government Medical College Srinagar, Jammu and Kashmir, India. All the patients in the age group of 1-18 years with history and examination suggestive of organophosphorous poisoning were included in this study.
Results: In this study there were total of 54 patients. In majority of cases poisoning was accidental. Oral consumption was most common route of poisoning. The most common symptoms were excessive salivation (100%), vomiting (72%), abdominal pain (26%), diarrohea (13%), agitation (11%) and convulsions (3.7%). The most common signs were miosis (78%), bradycardia (59%), fasciculation (57%) and altered sensorium (13%). Respiratory failure and circulatory collapse were two main complications which contributed to mortality in this study.
Conclusions: Organophosphorous poisoning is one of the most common poisoning in children. Early diagnosis and treatment is of pivotal importance to prevent mortality.

Keywords: Accidental poisoning, Miosis, Organophosphorous compounds

INTRODUCTION

The most commonly used insecticides are organophosphates and carbamates; both are inhibitors of cholinesterase enzymes (acetylcholinesterase, pseudocholinesterase, and erythrocyte acetylcholinesterase). Most pediatric poisonings occur as a result of unintentional exposure to insecticides in and around the home or farm. Organophosphates produce toxicity by binding to and inhibiting acetylcholinesterase, preventing the degradation of acetylcholine and resulting in its accumulation at nerve synapses. If left untreated, organophosphates form an irreversible bond to acetylcholinesterase, permanently inactivating the enzyme. This process, called aging, occurs over a variable time period depending on the characteristics of the specific organophosphate. Afterwards, a period of weeks to months is required to regenerate inactivated enzymes. Clinical manifestations of organophosphate and carbamate toxicity relate to the accumulation of acetylcholine at peripheral nicotinic and muscarinic synapses and in the central nervous system. A commonly used mnemonic for the symptoms of cholinergic excess at muscarinic receptors is DUMBBELS, which stands for

diarrhea/defecation, urination, miosis, bronchorrhea/bronchospasm, bradycardia, emesis, lacrimation, and salivation. Nicotinic signs and symptoms include muscle weakness, fasciculation, tremors, hypoventilation (diaphragm weakness), hypertension, tachycardia, and dysrhythmias. Severe manifestations include coma, seizures, shock, arrhythmias, and respiratory failure.

Diagnosis of poisoning is based primarily on history and physical exam findings. Red blood cell cholinesterase and pseudocholinesterase activity levels can be measured in the laboratory. These are only helpful when compared to the patient's known baseline.[1]

METHODS

This was a prospective hospital-based study conducted in department of Pediatrics, Government Medical College Srinagar, Jammu and Kashmir over a period of two years from January 2018 to January 2019 after obtaining ethical clearance from ethical committee of GMC Srinagar. Prior consent was taken from parents.

Inclusion criteria

All patients in the age group of 1- 18 years with history of exposure to organophosphorous compounds within previous 24 hours with characteristic clinical manifestations of organophosphorous compound poisoning were included in study.

Exclusion criteria

- Patients with age less than 1 year or more than 18 years were excluded from study
- Patients with history of chronic exposure to pesticide / organophosphorous were excluded from study
- Patients who received treatment with atropine prior to admission were excluded.

Diagnosis was made on history and clinical examination. Findings of clinical examination like bradycardia, miosis, salivation, frothing, lacrimation, restlessness, altered sensorium and convulsions were noted. Routine monitoring of blood pressure, heart rate, pupillary size and $SP0_2$ was done. Data was entered in Microsoft excel spreadsheet analyzed using Epinfo. Categorical variables were summarized as frequency and percentage. Continuous variables were summarized as mean and standard deviation or as five number (minimum, 1st quartile, median, 3rd quartile, maximum). Baseline investigations were done in all patients.

RESULTS

This study included total of 54 patients out of which 29 were males and 25 were females. The majority of patients in this study were in the age group of 5-10 years. The age distribution of study population is depicted in table below.

In majority of cases poisoning was accidental in nature. Suicidal poisoning was seen in 7 cases. All these seven cases were more than 10 years old. Homicidal poisoning was seen in one 2-year-old patient as depicted in Table 1.

Table 1: Age distribution.

Age group (years)	No. of patients	Percentage
1-5	7	13%
5-10	32	59%
10-18	15	28%

In majority of cases poisoning was accidental in nature. Suicidal poisoning was seen in 7 cases. All these seven cases were more than 10 years old. Homicidal poisoning was seen in one 2-year-old patient as depicted in Table 2.

Table 2: Nature of poisoning.

Nature of poisoning	No. of cases	Percentage
Accidental	46	85.18%
Suicidal	7	12.9%
Homicidal	1	1.85%

Oral routine of poisoning was seen in 52 (96.3%) patients. Among these patients, 45 patients had ingested poison and 7 patients had inhaled poison. Cutaneous exposure was seen in 2 patients as depicted in Table 3.

Table 3: Route of poisoning.

Route of poisoning	No. of patients	Percentage
Oral	52	96.3%
Cutaneous	2	3.7%

Out of 54 patients, 25 patients reported to hospital more than six hours after consumption of poison. Seventeen patients reported between 3- 6 hours of consumption of poison and twelve patients reported within three hours of consumption of poison as depicted in Table 4.

Mortality was seen in patients who reported after more than six hours of consumption of poison.

Table 4: Time of arrival.

Time of arrival	No. of patients	Percentage
<3 hours	12	22%
3-6 hours	17	32%
>6 hours	25	46%

The most common symptom in this study was excessive salivation followed by vomiting, abdominal pain and diarrohea. Least common symptoms were convulsions and agitation as depicted in Table 5.

The most common sign was miosis (78%) followed by bradycardia (59%), fasciculation (57%), altered sensorium (15%) and oro-nasal frothing (9%) as depicted in Table 6.

Table 5: Symptoms.

Symptom	No of patients	Percentage
Excessive salivation	54	100%
Vomiting	39	72%
Abdominal pain	14	26%
Diarrohea	7	13%
Agitation	6	11%
Convulsions	2	3.7%

Table 6: Signs.

Sign	No. of patients	Percentage
Miosis	42	78%
Bradycardia	32	59%
Fasciculation	31	57%
Altered sensorium	8	15%
Oro- nasal frothing	5	9%

Complications were seen in nine patients. Most common complication was respiratory failure. Respiratory failure was seen in six patients. Similarly, aspiration pneumonia was seen in two patients and circulatory collapse in one patient as depicted in Table 7.

Table 7: Complications.

Complication	No. of patients	Percentage
Respiratory failure	6	11%
Aspiration pneumonia	2	3.75%
Circulatory collapse	1	1.85%

Out of 54 patients, 50 patients were successfully treated and discharged from hospital. Four patients died, three patients died because of respiratory failure and one patient died of circulatory collapse. All these four patients reported to hospital more than 6 hours after consumption of poison.

DISCUSSION

In this study majority of cases had accidental poisoning. This is in contrary to studies done in adults where majority of cases are suicidal. This is because of the fact that children tend to eat whatever comes their way without knowing the nature of substance. In this study oral consumption was the main route of poisoning. Cutaneous exposure was seen in two cases only. Similar results were reported by Dayanand R et al.[2] The most common symptom was excessive salivation present in all (100%) patients. Similar results were reported by Chintale K et al, Khan FY et al, and Singh S et al.[3-5] Vomiting was seen in 72% patients. Similar results were reported by Doshi et al and Kamat et al.[6,7] Abdominal pain was seen in 26% patients which is similar to studies done by Dayanand R et al, Chintale KN et al and DG Gannur et al.[2,3,8] Diarrohea was seen in 13% patient. Doshi et al, reported diarrohea in 12 % patients.[6] Agitation was seen in 11% patients. Similar results were seen in study done by DG Gannur et al and Chintale K et al.[3,8] Convulsions were seen in 3.75% which is similar to study done by Dayanand R et al.[2] The most common sign was miosis present in 78% patients. Similar results were reported by Chintale K et al, Thunga G et al, DG Gannur et al and Dayanand R et al.[2,3,8,9] Bradycardia was seen in 59% patients. Chintale K et al, reported bradycardia in 57% patients.[3] Shilpa Anand et al reported bradycardia in 40% patients.[10] Fasciculation were seen in 57% patients which is similar to study done by Chintale K et al, Dayanand R et al, reported fasciculation in 42% patients.[2,3] Altered sensorium was seen in 13% patients. DG Gannur reported altered sensorium in 17% patients.[8] Chintale K et al reported altered sensorium in 8% patients.[3] Oro-nasal frothing was seen in 9% patients similar to study by Chintale K et al.[3] Complications like respiratory failure was seen in 11% patients, aspiration pneumonia in 4 % patients and circulatory collapse in 2% patients. Similar results were reported by Chintale K et al.[3]

CONCLUSION

Organophosphorous is the most commonly available pesticide in households. Therefore, children have high vulnerability of accidental ingestion of organophosphorous compounds. Excessive Salivation, miosis, fasciculation and bradycardia are the common clinical manifestations of organophosphorous poisoning. Respiratory failure and circulatory collapse are the two important complications which contribute to mortality in organophosphorous poisoning. Early diagnosis and treatment is of pivotal importance.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee of GMC Srinagar, India

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