Research Article

Clinical profile and outcome of organophosphate poisoning cases in a tertiary care hospital in central Kerala

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Abstract

Background and objective: DSH is a major problem in the developing world. Poisoning is one of the most common methods employed for the act of DSH. As far Asia is concerned, the wide availability and lack of rules and regulations for the sale of agrochemical pesticides resulted in widespread use of organophosphate as one of the most common poison used for DSH. The delay in attaining medical care and the lack of facilities in the rural areas have resulted in increased number of death due to OP poisoning. In this study, we aim to find out the clinical profile with respect to different OP compounds, prognosis and outcome of each patient in relation to the delay in getting medical attention. Our objective is to find out if there is any specific clinical finding which can predict bad outcome. **Methods:** 50 patients admitted to this hospital were enrolled into the study. After getting informed consent, detailed clinical examination was carried out. The incidence of complications and other measures of outcome were compared with respect to the clinical profile. **Results:** 33 males and 17 females were studied. 74% of the patients survived following poisoning while 26% expired. Chlorpyriphos was the compound consumed by most of the patients, followed by quinalphos. 50% death is due to chlorpyriphos poisoning. The most common symptom was vomiting followed by frothing. 12% patients had history of psychiatric illness. Crackleswas the most common clinical sign which was seen in 66% of the study population **Interpretation and conclusion:** From this study it is revealed that more the delay in getting medical care, higher the mortality is. Also altered sensorium, especially drowsiness may point towards grave prognosis. Majority of the patients who required mechanical ventilation had gross lung crackles at the time of presentation. The incidence of intermediate syndrome seemed to be a very important factor in the survival of the patient. In this study, all patients who developed IMS expired. Lung crackles, drowsiness and ventilator assistance were all high in the chlorpyriphos group when compared to other OP compounds.

Keywords: organophosphate poisoning.

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INTRODUCTION

Deliberate self Harm (DSH) is a major problem in the developing world. Poisoning is one of the most common methods employed for the act of DSH. The toxicity of the available poison and the paucity of medical services ensure that mortality from poisons throughout the tropics being both common and associated with high mortality rate[1]. Millions of people are exposed to danger by hazardous occupational practices and unsafe storage. However, it is deliberate self- poisoning that causes the great majority of deaths and the immense strain that pesticides put on hospital services, particularly in Asia. Many studies have shown that deliberate self- poisoning has a far higher mortality than accidental poisoning. Agrochemical pesticides are a major public health problem throughout the developing world. Organophosphate (OP) compounds have been used worldwide for pest control for over 100 years. They are the insecticides of choice in the agricultural world. Organophosphates are cholinesterase inhibiting chemical used predominately as pesticides. They are also used as chemical warfare agents. They are ubiquitous in the environment. Organophosphates are of significant importance due to their practical usefulness and chemical

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instability. The OP compounds are popular insecticides because of their effectiveness and non-persistence in the environment owing to their unstable chemical nature. They do not persist in the body or environment as do organochlorides and have become the insecticide group of choice replacing DDT, an organochloride compound.[2] There are no rules and regulations governing the purchase of these products, and they are therefore readily available "over the counter", despite them being a major cause of morbidity and mortality. Many subsistence farming households have stocks of pesticides readily available for impulsive acts. They are common agents of suicidal and accidental poisoning, as a result of their ready availability and easy accessibility. In the developing countries, organophosphates (OPs) still remain the most common suicidal poisons with high morbidity and mortality and account for a large proportion of patients admitted to intensive care units.[3] Most of the ill-health following exposure to organosphosphorus compounds has been attributed to the inhibition of choline esterases. The clinical features of organophosphate poisoning are characterized by a triphasic response involving an initial acute cholinergic phase, an intermediate syndrome (both associated with high mortality) and a disabling but non – lethal delayed polyneuropathy. The delayed polyneuropathy may occur in the absence of the cholinergic or intermediate phases. However, the current literature has justifiably challenged this view, as the inhibition of choline esterases by itself cannot account for the wide range of disorders that have been reported following organophosphorus poisoning. It is becoming apparent that, through inhibition of choline esterases plays a key role in the toxicology of organophosphates, individual susceptibility the inhibition of other enzyme systems and the direct effects of organophosphates on tissues are also important.[4] Treatment consists of decontamination, blockade of muscarinic hyperactivity with atropine, reversal of cholinesterase inhibition with oxime nucleophiles (pralidoxime) for organophosphorus compounds, and correction of metabolic abnormalities. The majority of patients with significant exposures to organophosphates and carbamates have a good prognosis. Those who develop organophosphorus – induced delayed polyneuropathy will have lasting sequelae.

AIMS OF THE STUDY

1. To assess the variations in outcome of the patient with respect to the clinical profile of patients admitted with OP poisoning.
2. To determine the common OP compounds used for poisoning.
3. To obtain the percentage of ventilator-supported cases with respect to clinical profile.

MATERIALS AND METHODS

Type of study: Descriptive Study

Duration of study: 5 months from 01.09.2014 to 20.02.2015.

METHODOLOGY

Study setting: AmalaInstitute of Medical sciences, Thrissur

Study Objects: All acute Organophosphate poisoning

Inclusion Criteria: Acute poisoning cases with evidence of OP compound.

Exclusion Criteria

1. All cases of OP poisoning brought dead or dying within hours following hospitalization.
2. Those cases which could not be investigated fully.
3. Patients below 12 years of age.

Patients included in the study and the bystanders will be interviewed for history of neuro-psychiatric illnesses and a detailed clinical examination will be done after getting written consent from the patient/bystanders. The basic streamlined investigations will be carried out for confirming the diagnosis for the benefit of the patient which include measuring plasma pseudocholine esterase levels. The diagnosis of OP poisoning was based on the compound brought to the hospital. We could not confirm the diagnosis by sending the molecule for toxicology assessment since these are not done in our hospital and due to financial constraints it could not be done from outside as well. The following details also were enquired into including the circumstances of poisoning, identity of the insecticide, route of contamination, medical treatment prior to hospital admission, preadmission decontamination of the GI tract. Personal details and demographic profile was noted. The treatment protocol was not influenced at any point of time.

Clinical features: Seizure activity, agitation, confusion, salivation, lacrimation, sweating, abdominal pain, diarrhea, vomiting, urinary incontinence, level of consciousness, pupil size; Heart rate, BP, respiratory rate, chest expansion, hypotonia, reflexes, including the plantar responses, fasciculations, hypertension, hypotension, bradycardia, and tachycardia were defined.

Investigations and Treatment: CBC, blood sugar, blood urea and creatinine, liver function tests, serum electrolytes, electrocardiogramand pulse oximetry done on admission and repeated as necessary.

Complications and mortality: Seizures; coma (defined as GCS<8) brady/ tachyarrhythmias; shock (defined as hypotension responsive to either fluid or inotropic therapy) respiratory failure [defined as presence of apnea, persistent cyanosis, persistent tachypnea, (RR >35/mt) deranged 02 saturation ($SP0_2$<80%) on pulse oximetry that's not improving with supplemental 02]; duration of

ventilation; duration of hospital stay; time to death in non survivors, intermediate syndrome and mortality. No major ethical issues are involved in this study such as invasive procedures or costly investigations. This study did not have financial support from any source and the study did not cause any additional financial burden to the patient. The statistical analysis was done by using SPSS16th version. The chi-square test was used to compare sensitivities and specificities. In a similar fashion, values for outcome were calculated.

RESULTS

Table 1: Age wise distribution

Age group	Number of patients	Percentage
10 to 20 years	5	10
20 to 30 years	18	36
30 to 40 years	15	30
40 to 50 years	5	10
50 to 60 years	03	7
60 to 70 years	03	5
70 to 80 years	01	2
80 to 90 years	0	0
Total	**50**	**100**

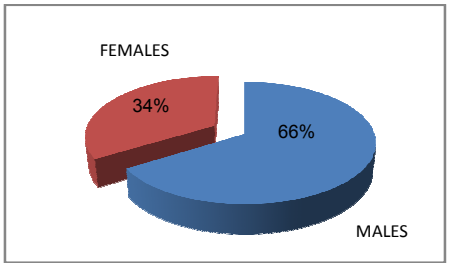

Figure 1: Sex distribution of patients

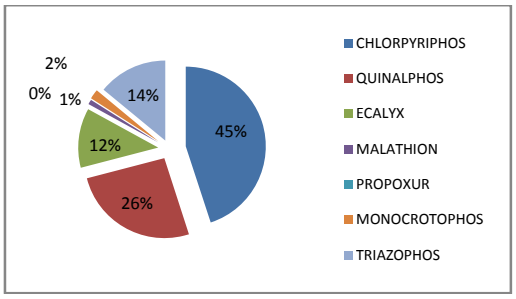

Figure 2: Compound Consumed

Table 2: Symptomatology

Symptom	Percentage
Vomiting	75%
Frothing	74%
Defecation	50%
Tremor	44%
Sweating	44%
Urination	41%
Drowsiness	38%
Fasciculation	38%
Delerium	22%
Lacrimation	22%
Respiratory distress	19%
Abdominal Pain	13%
Loss of consciousness	10%
Seizures	5%

Table 3: Clinical Examination Findings

Finding	Percentage
Crackles	66%
Miosis	60%
Fasciculation	38%
Rhonchi	34%
Extensor plantar	32%
Tachycardia	24%
Hypertension	20%
Cyanosis	17%
Hypo/Areflexia	17%
Clubbing	12%
Hypopnoea	7%
Pallor	5%
Bradycardia	25%
Hypotension	5%
Jaundice	3%
GCS<8	9%
GCS>8	91%

Table 4: Complications

Variable	Percentage
Respiratory failure	14%
Atropine psychosis	33%
Intermediate syndrome	7%
Icterus	7%
Pneumonia	15%
Seizures	3%
Upper GI bleed	1%
Arrhythmias	0%
Exposure keratitis	2%
Coma state	0%

Table 5: Treatment given

Variable	Frequency
Gastric Lavage	100%
Magnesium sulphate	80%
Activated charcoal	100%
Antibiotics	48%
Mechanical ventilation	17%
Sedation	60%

Table 6

0	67%	16%	83%	0.001
1	3%	14%	17%	
Total	**70%**	**30%**	**100%**	

Table 7: Ventilator

Gastric Lavage > 1hr	0%	1%	Total	P
0	75%	8%	83%	
1	8%	9%	17%	0.001
Total	**83%**	**17%**	**100%**	

Table 8: IMS Gastric Lavage >1hr

Gastric Lavage >1hr	0	1	Total	p
0	80%	3%	83%	0.015
1	13%	4%	17%	
Total	**93%**	**7%**	**100%**	

Table 9: CNS symptoms and outcome

Symptom	Response	Recovered	Expired
Drowsiness	Yes	27%	11%
	No	59%	3%
Delerium	Yes	13%	9%
	No	52%	12%
Seizures	Yes	0%	5%
	No	84%	11%
Loss of consciousness	Yes	3%	7%
	No	76%	14%

Table 10: Clinical features and outcome

Feature	Response	Total No:	Expired
Pupil	Constricted	38%	24%
	Normal	52%	2%
	Mid-dilated	10%	0%
	Fully dilated	0%	0%
Fasciculations	Present	46%	19%
	Absent	64%	7%
GCS	<8	30%	21%
	>8	70%	5%
Blood Pressure	Hypotensive	28%	19%
	Normotensive	53%	6%
	Hypertensive	19%	1%
Respiratory rate	<12	3%	3%
	12-30	50%	18%
	>30	47%	5%
Plantar	Flexor	73%	14%
	Extensor	14%	11%
	No response	13%	1%

Table 11: IMS

Expired	0%	1%	Total	p
0	74%	0%	74%	0.001
1	19%	7%	26%	
Total	**93%**	**7%**	**100%**	

Table 12: SLUDGE

Expired	0	1	Total	p
0	20%	54%	74%	0.001
1	6%	20%	26%	
Total	**26%**	**74%**	**100%**	

Table 13: Nicotinic

Expired	0%	1%	Total	p
0	47%	27%	74%	0.001
1	16%	10%	26%	
Total	**63%**	**37%**	**100%**	

Table 14: Seizures

Seizures				
Expired	**0%**	**1%**	**Total**	**p**
0	74%	0%	74%	0.001
1	21%	5%	26%	
Total	**95%**	**5%**	**100%**	

DISCUSSION

50 consecutive patients who satisfied the inclusion criteria were studied from SEPTEMBER 2014 to February 2015. The mean age of the patients was 34 with standard deviation of 13.3. The minimum age was 12 years and maximum age was 74 years. 66% of the patients were males and 34% of the patients were females. Chlorpyriphos was the compound consumed by most of the patients, followed by quinalphos. The most common symptom was vomiting followed by frothing from mouth. Central nervous system manifestations included delirium (22%), drowsiness (38%) and even seizures. Vomiting was the most common symptom in 75 % of the patients in this study. This correlates with the studies done by OP Gupta *et al*, Sarjit Singh *et al* and Goel *et al*. Vomiting was probably due to chemical gastritis. Generalised fasciculations was another feature which requires more attention in this study. It was seen in 38 % of the cases, where as studies done by Goel *et al* and Sarjit Singh *et al* showed that 55% and 100% of patients had fasciculations. Crackle was the most common clinical sign which was seen in 66% of the study population followed by miosis and moderate fasciculations. Atropine psychosis was the most common complication observed among the study population. Intermediate syndrome was noted in 7% of the patients, the commonest presentation being respiratory failure which was seen in 7 patients. One patient developed respiratory muscle paralysis and required mechanical ventilation. 17% of the study population needed to be intubated for respiratory muscle weakness either due to primary affection or intermediate syndrome. Sedation was given with lorazepam keeping a watch over oxygen saturation, in 60% of the patients. 74% of the patients survived following poisoning while 26% expired. Early decontamination of the OP poisoning helped in the outcome of the patient. This study showed that more delay in the decontamination of the OP compound resulted in bad prognosis. Out of 17% who arrived with late stomach wash, 82% had low GCS. Similarly, patients admitted with delayed stomach wash had higher chance

for ventilator support; either immediately or during subsequent days. Out of 7% patients who developed IMS, 57% patients had stomach wash done only 1 hour after the consumption of the OP compound. This reveals that early gastric lavage can be helpful in preventing the occurrence of intermediate syndrome. All the patients who developed seizures in the due course of time inside the hospital, expired. Low GCS, extensor plantar response, fasciculations and miosis are associated with poor prognosis and outcome. The incidence of intermediate syndrome seemed to be a very important factor in the survival of the patient. In this study, all patients who developed IMS expired. Among the 74% patients who had any of the SLUDGE symptoms, 27% expired. Patient with any single feature of SLUDGE was included in the list. Among the 37 patients with nicotinic symptoms, 10 expired. All the 5% patients with seizures expired during the study period. Development of seizures seemed to be an important factor in the survival of the patient.

CONCLUSIONS

1. Of the 50 consecutive patients admitted following organophosphorous poisoning, the majority of the patients were between 20-30 years.
2. Males constituted the majority of the patients, when compared with females, in the ratio of approximately 2:1. 66% of the patients were males and 34% of the patients were females.
3. There was a statistically significant difference in the age difference between males and females. Males were older when compared to females (p=0.009).
4. Chlorpyriphos was the most common compound to be consumed by most of the patients.
5. Patients with significant lung crackles fared badly and they have increased chance of ventilator assistance, intermediate syndrome and death.
6. The most common symptom was vomiting -seen in 75% followed by frothing from mouth, seen in 74% of the patients. 19% of the patients had respiratory distress at the time of presentation.
7. CNS manifestations included - drowsiness in 38%, delirium in 22%. 10% of the patients presented with loss of consciousness. Tremor was seen in 44% of the patients.
8. The most common clinical sign was crackles (66%) followed by constricted pupil andfasciculations (60% each). Tachycardia was more common than bradycardia. Extensor plantar response was elicited in 32% of the patients, Coma defined as GCS<8 was seen in 9% of the patients.
9. Respiratory failure was the most common complication seen in this study (14%). Intermediate syndrome occurred in 8% of the cases. Pneumonia occurred in 5% of the patients.
10. 96% of the patients received some form of gastric lavage. Stomach wash was the most common mode of gastric lavage followed by Ryle's tube wash.
11. The mortality rate during the study period was 26%.
12. Gastric lavage prior to hospitalization (early decontamination), time taken to reach the hospital, development of seizures had influenced the mortality while the compound ingested didn't succeed to show any correlation with the outcome. Seizures (at the time of presentation or during hospital stay), drowsiness, loss of consciousness, abdominal pain and presence of all of the SLUDGE symptoms were associated with a statistically significant risk of increased morality.
13. 8% of the patients showed some features of intermediate syndrome the commonest manifestation being respiratory failure.

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