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Original Research Article

Clinical profile of patients with acute organophosphorus poisoning in a tertiary care hospital

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ABSTRACT

Background: Organophosphorus compound poisoning episodes are relatively common in occurrence in this part of the world and are associated with high levels of morbidity as well as death, at times despite competent care. The present study was conducted to profile clinically the patients admitted with history of acute organophosphorus poisoning.
Methods: This prospective observational study was conducted between September 2017 and October 2019 at four hospitals with intensive care units in a city in central-west India region, wherein clinically relevant details of patients admitted with history of acute organophosphorus poisoning were noted and analysed.
Results: Out of 160 participants studied, males (58.75%) and those between 21-30 years age group (45.0%) were affected more. Suicidal attempt was the commonest mode (97.5%). Majority of the participants belonged to severity grade II (45%); with severity grades found directly related to longer hospital stay and death. Constriction of pupils (76.25%) was the commonest clinical sign observed. The death rate was calculated to be 21.25%, with monocrotophos (100%) and dicholorovas (66.63%) compounds being associated with very high mortality. Dimethoate was the commonest substance incriminated (18.75%).
Conclusions: Organophosphorus poisoning has affected the young, productive males prominently. Higher severity of the disease process at presentation leads to significant mortality. Selective prohibition of the riskier compounds causing higher proportion of deaths is recommended.

Keywords: Clinical profile, Mortality, Organophosphorus compound, Poisoning

INTRODUCTION

Organophosphorous (OP) compounds are the ones principally and very commonly utilised as pesticides. In developing countries like India, easy availability coupled with high levels of distress amongst the farmers who use them majorly, has increased the likelihood of suicidal poisoning episodes with these compounds amongst them. OP poisoning remains one frequent indication for hospital admission as an emergency in our country.[1] WHO estimates around three million pesticide poisoning episodes every year worldwide; leading to a minimum of 300,000 deaths annually.[2] The occurrences are reportedly higher amongst young adults who are economically productive, with overall mortality rates being as high as 4-30%.[3-5]

The planning of adequate and appropriate public health response is the preventive and prompt management of OP poisoning cases once in the hospital is the curative component of the comprehensive plan required to tackle the menace of OP poisoning. For achieving the above-mentioned desirables, it is essential to study and analyse the various clinically relevant factors and features associated with OP poisoning cases in the country.

Keeping this in mind, the present study was planned with the objective of conducting the clinical profile of OP poisoning cases admitted at our study centre.

METHODS

This prospective observational study was conducted between September 2017 and October 2019 (2 years and 2 months) at four hospitals (Vithai Hospital, Lotus Hospital, Aastha Hospital and Narayana Hospital) with intensive care units in Nanded (a city in central-west India region), Maharashtra. All the patients presenting to the emergency department with history of acute OP poisoning during the study period were enrolled. No sample size calculations were undertaken and sampling technique was not needed to be adopted, as all the eligible participants during the study period (as per below mentioned criteria) were included in the study.

Inclusion criteria

The inclusion criteria were history of OP poisoning within 24 hours prior to admission and presence of signs/symptoms of OP poisoning at the time of presentation.

Exclusion criteria

Those with history of consumption of other compounds along with organophosphates were excluded from the disease, as it may interfere with the clinical interpretation. A sample size of total 160 participants was thus achieved.

The participants were admitted via emergency department (ED). The decontamination steps in the ED included skin decontamination by removal of all clothing, washing skin and hair with soap and water and conducting gastric lavage. Organophosphorus poisoning was diagnosed on the basis of comprehensive history, thorough clinical examination and response to intravenous atropine. Severity of poisoning was classified by using modified Dreisbach criteria. All cases were treated with atropine and oximes wherever indicated during hospitalization. Suitable post-discharge follow-up was advised to the patients.

The study commenced only after the Ethics Committee approval. All the eligible participants were enrolled for the study after submission of written, informed consent. The information was noted via a pre-tested proforma. The data was analysed using SPSS version 18.0.

RESULTS

Significant male preponderance (58.75%:41.25%) for the incidence of OP poisoning was observed amongst the 160 study participants. The age group 21-30 years (45%) was the most commonly affected, followed by more than 40 years old (21.25%), less than 20 years old (17.5%) and 31-40 years old (16.25%); with the mean age of participants being 25.07 years.

Table 1: Distribution of participants according to occupation, educational status and region.

Variables	Number of cases (n=160)	Percentage
Occupation		
Farmer	48	30.0
Student	40	25.0
Labourer	32	20.0
Housewife	24	15.0
Unemployed	8	5.0
Businessman	4	2.5
Job (service)	4	2.5
Educational status		
Illiterate	78	42.5
High school	40	25.0
Primary school	24	15.0
Intermediate	22	13.75
Graduation	6	3.75
Region		
Rural	112	70
Urban	48	30

Most of the cases were seen in farmers (30%), illiterate people (42.5%) and those from rural areas (70%), with considerable overlapping (Table 1).

Suicidal poisoning attempt (97.5%) was the overwhelming reason amongst majority of the participants, with no attempted homicidal cases being brought to the hospital. Oral consumption was the commonest route of poisoning (97.5%), as all the suicidal cases had consumed OP compounds orally (Table 2).

Table 2: Mode and route of OP compound poisoning.

Variables	Number of cases (n= 160)	Percentage
Mode of exposure		
Suicidal	156	97.5
Accidental	4	2.5
Homicidal	0	0
Route of administration		
Oral	156	97.5
Through skin exposure	4	2.5

Majority of the patients belonged to grade II of clinical severity (45%), followed by grade I (30%) and grade III (25%). The hospital stay was observed to be directly proportional to the clinical severity of the poisoning, with the mean duration of hospital stay being 6.3 days. Expectedly, the mortality also had positive association with the severity of disease (33.3% in grade III severity) (Table 3).

Table 3: Correlation of severity of poisoning, hospital stay and mortality.

Clinical grade	Number of cases		Duration of hospital stay	Number of deaths	
	Cases	%		Deaths	%
Grade I	40	25.0	4 days	6	15.0
Grade II	72	45.0	6 days	12	16.6
Grade III	48	30.0	9 days	16	33.3
Total	160	100	6.3 days	34	21.25

Pupillary constriction (76.25%) was the most common symptom, followed by excessive secretions (57.5%), fasciculations (42.5%), depressed consciousness (36.25%), diaphoresis (31.25%), diarrhea (30%), abdominal pain (28.75%), fever (28.75%), and respiratory failure (26.25%).

Table 4: Association of time to arrive and OP compound consumed with mortality.

Factors associated with deaths	No. of cases	No. of deaths	Percentage
Time to arrive to the health care facility			
<3 hours	40	6	15.0
3-6 hours	72	12	16.7
>6 hours	48	16	33.3
OP compound consumed			
Dimethoate	30	14	46.67
Diazinon	20	2	10.0
Chlorpyriphos	18	6	33.3
Metacid	16	0	0
Paraoxan	16	0	0
Malathion	14	0	0
Dimecron	14	0	0
Mevinphos	12	0	0
Monocrotophos	8	8	100.0
Dichlorvos	6	4	66.67
Quinalphos	4	0	0
Fenthion	2	0	0
Total	160	34	21.25

It was observed that, the time taken to arrive to the health care facility affected the outcome adversely and significantly ($p< 0.05$). The severity of organophosphorus poisoning as well as mortality increased with the increased duration of arrival. As for the various OP compounds consumed and their relationship with case fatality, dimethoate was the commonest substance incriminated (18.75%) with 46.6% of those consumed having succumbed. monocrotophos (100%) and dicholorovas (66.63%) compounds were found associated with very high mortality (Table 4).

DISCUSSION

The present study was aimed at provision of meaningful insight into various clinically relevant parameters of acute OP poisoning cases presenting to the hospital, so that the same may be reviewed for appropriate preventive and curative measures, both immediate/short-term and long-term. A total of 160 cases were enrolled and data were analysed.

The male gender and the young adults (21-30 years) were found relatively majorly affected in the present study. The age group affection was in line with the observations of Guven et al, who reported the mean age of participants to be 24.1 years.[6] Similarly, Dassanayake et al had documented 91% of their cases to be under the age of 30 years.[7] The male gender predilection is consistent with the 54% skew reported in their study by Sungur et al.[2]

In India, the major usage of OP compounds is in farming, which takes place majorly in rural areas and largely involves illiterate persons or those with some education. Hence the farmers, illiterate persons and those belonging to rural areas getting comparatively more affected is on the expected lines for our country. These findings are consistent with the observations of Otto et al in a German study and Gorea et al in a North Indian study.[8,9]

Suicidal mode of OP poisoning (via oral route) being observed to be responsible almost in all the cases is not surprising, given the rampant usage and the free availability of and ease of access to the compounds in India. Sungur et al reported the suicidal mode to be responsible in two third of cases, while Saadeh et al reported the figure at 68%.[2,10] The difference could be due to the farmers being distressed while having the hazardous OP compounds freely available at their disposal.

The clinical severity of poisoning, assessed and classified by using modified Dreisbach criteria, was found to be directly proportional to length of hospital stay as well as mortality, with the longest average hospital stay as well as morality reported from the grade III group. This is corroborative of findings of Arup in his study from West Bengal.[11] The mean duration of hospital stay in the present study was 6.3 days, which is again in line with the previously similar studies.[2,9-11]

Pupillary constriction was the commonest symptom, affecting three fourth of the participants. Thunga et al had also observed constriction of pupils to be the commonest sign consistent with acute OP poisoning.[12] But the most common presenting clinical feature has seen to be varying across studies, ranging from excessive secretions, altered sensorium, abdominal pain, diarrhea etc., with some studies reporting it to be linked to the compound consumed.[13-15]

The time taken to arrive to the health care facility was seen to be affecting the outcome adversely in the present study, both in terms of prolonged hospitalisation as well as death. This is in line with the pathophysiology of the disease process in OP poisoning as well as consistent

with previously similar studies which have studied the time taken to reach the health care facility.

Dimethoate was the commonest compound responsible (18.75%) in the present study. In the Sri Lankan study by Dassanayake et al, dimethoate was the most common organophosphorus compound consumed in Sri Lanka.[7] But the study conducted by Sungur et al had reported dichlorvos to be accounting for 51.1% of the cases.[2] Selection of specific compound could be because of the wide variations in the cost and ease of local availability of compound according to crops grown in that area, or local industries producing such compound. Like in the present study, monochrotophos has been reported to be almost universally fatal in other previously similar studies as well. The overall mortality of 21.25% is comparatively slightly on the higher side though; lack of robust primary health care network may be one of the reasons, apart from lack of awareness amongst the society.

Majority of the patients belonging to relatively rural area and the limited sample size are the mentionable limitations of present study and bigger study with more diverse study population is recommended.

CONCLUSION

Organophosphorus poisoning apparently affects the young, economically productive males more. Delayed reporting and higher severity of the disease at presentation leads to significant mortality. Selective prohibition of the riskier compounds causing higher proportion of deaths is recommended, apart from work towards making the primary health care services in the rural area more responsive and effective.

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