Original Research Article

Study of clinical manifestations of patients presenting with acute organophosphorus poisoning

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Abstract

Background: India is predominantly a country of farming. Use of organophosphorus pesticide is widespread in India. Acute organophosphorus poisoning(AOP) is highly prevalent in Indian population causing huge morbidity and mortality.**Aim and objective:** To study the clinical profile and manifestation of patients with AOP.**Materials and methods:** Thirty-one patients with AOP were studied at Emergency Department of Sri Aurobindo Medical college and PG Institute, Indore, from December 2017 to May 2019. All the relevant medical, personal, and surgical history was obtained. All patients were subjected to complete blood count. serum cholinesterase levels, blood urea and serum creatinine, serum electrolytes, SGOT and SGPT, chest X-ray and ECG.**Results:** Majority of the patients with AOP were males (74.2%) with mean age of 38.42±16.31 years. Mean duration of reporting to hospital after poisoning was 73.23±56.96 minutes.Vomiting (96.8%) followed by salivation (90.3%), sweating (74.2%), respiratory depression (51.6%) and muscle weakness/fasciculations (35.5%), convulsions (22.6%) and diarrohea (16.1%) were the most common symptoms. Pupil size of majority patients (45.2%) was more than 2 millimeter. According to peradeniya organophosphorus (POP) scale, majority were mild cases (54.8%). Majority had serum Cholinesterase Level (KU/L) <1 (38.7% followed by 32.3% cases who had level >4.62.Response to pain in 11 cases (35.5) was found to be the most common level of consciousness. Majority had total hospital stay of 0-7 days (67.7%) and ICU duration of 0-7 days (90.3%). Total duration of ventilator support in 41.9% was found to be more than one week. Death was reported in 25.8%patients with AOP.**Conclusion:** AOP was common in male belong to working age group. A delay in presentation to hospital was reported. Vomiting, salivation, sweating, respiratory depression, muscle weakness/fasciculations, convulsions and diarrohea were the most common symptoms. Majority were mild cases as per POP scale with serum Cholinesterase Level (KU/L) <1. However, mortality is hight among the patients presented with AOP.

Keywords: Poisoning,organophosphorus compounds, suicide, serum cholinesterase

Introduction

The most common medico toxic emergency in India is Organo-phosphorus poisoning[1-3]. All over India, in majority of hospitals an essential indication for emergency admission is poisoning by organophosphorus compounds[4].Recent report of National crime bureau of India revealed 26.6% mortality in 2017 due to consumption of organophosphorus compounds.Accidental intake of organophosphorus compoundswere more common in males (n=1403) compared to females (n=812) in 18-30 years age group[3].Suicidal cases related organophosphorus poisoning is more common in Maharashtra(17,646) followed by 14,459 in Tamil Nadu and 12,014 in West Bengal[5].Patients with organophosphorus compounds poisoning present with multiple symptoms. In Indian set up majority of the patients comes unconscious and often brought by their relatives and neighbours leading to incorrect information regarding the nature of the poison. For such cases diagnosis of organo-phosphorus poisoning is usually confirmed on eth basis of clinical features as observed.The clinicalfeatures of poisoning will also help to determine the severity of poisoning which is of prognostic importance[6].The diagnosis is generally built with the help of Clinical features and Serum Cholinesterase levels. Serum cholinesterase levels usually decreases after organophosphorus poisoning and are easy to estimate.Peradeniya poisoning scale has also been used extensively in the past various studies to anticipate the requirement for ventilatory assistance and prognosis and outcome of the patients [6].Our study was directed to analyze the clinical profile of patients with AOP.

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Materials and methods

An observational study was conducted at Sri Aurobindo Medical college and PG Institute, Indore, a 1200 bedded tertiary care and referral center over a period of 18 months from December 2017 to May 2019. The hospital gets referral from a number of states surrounding Indore like Rajasthan, Haryana, Uttar Pradesh, Maharashtra, and other parts of Madhya Pradesh.Thirty-one patients with AOP who presented to Hospital Emergency Department were studied and analyzed according to inclusion criteria. The informed consent was obtained from patient's attenders.Purposive sampling (Non-probability sampling) technique was employed to recruit the desired samples from the population of patients with AOP.All cases with alleged history of consumption/ inhalational or exposure of organophosphorus compounds and those with presence of characteristic clinical signs and symptoms of organophosphorus compound poisoning were included. Patients/ attenders not willing for the study, cases with history of consumption/inhalation or exposure of an entirely different poison other than organophosphorus poison and patients who did not complete medical management were excluded. The patient/ attenders were explained about the complete treatment procedure, and complete information about study, its benefits, and its future prospects, in his/her own language and his/her willingness to undergo for the same was recorded in a consent form duly signed by him.All the patients were thoroughly investigated. All the relevant medical, personal, and surgical history was obtained.

The diagnosis of AOP was made on following criteria: history of consumption/ inhalation/ exposure with pesticide containing organo-phosphorus compounds;characteristic clinical signs and symptoms of organophosphorus poisoning and improvement of signs and symptoms after treatment with atropine and oximes (Pralidoximes). All patients were subjected to complete blood count. serum cholinesterase levels, blood urea and serum creatinine, serum electrolytes, SGOT and SGPT, chest X-ray and ECG. Patients were also categorized based on peradeniya organophosphorus (POP) poisoning scale as Mild (0-3), Moderate (4-7) and Severe (8-12).

Responses of frequencies were calculated and analyzed by using the raw data of 31 subjects. The raw data were entered into the computer database. Statistical software, SPSS version 17.0 Trial was used for analysis. Prevalence of an outcome variable along with 95% confidence limits was calculated. Both, descriptive and inferential statistics were used to study clinical profile and the clinical outcomes in patients with AOP. Descriptive statistic were used to depict the main features and characteristic of the collected samples of Acute Organophosphorus poisoning. Results on continuous measurements are presented on Mean ± Standard Deviation (Min-Max) and Results on categorical measurements are presented in numbers (%).

Results

Out of 31 AOP patients, three-fourth (74.2%) of the patients found to be male.The age of study cohort was in between 15 to 80 years with mean age of 38.42±16.31 years.The mean age in males was 41.30 years which ranged from 20 to 80 years was higher as compared to mean age of females (30.13 years) whichranged from 15 to 55 years.

Duration of reporting to hospital after poisoning of all patients was in the range of 15 to 300 minutes with mean duration of 73.23±56.96 minutes. However majority (67.7%) of patients reported within 80 minutes.Patients exposed to organophosphorus compounds had developed vomiting,sweating,salivation,diarrohea, muscle weakness/ fasciculation,respiratory depression,convulsions. Vomiting was the most common symptom detected in approximately all (96.8%) patients followed by salivation which was reported among 90.3% cases. Sweating was present in 74.2% cases making it third most common symptom.Respiratory depression was present in 51.6% and muscle weakness/fasciculations in 35.5% cases.Lastly, it was noted that the convulsions (22.6%) and diarrohea(16.1%) were found to be least common symptom in acute organophosphorus poisoning cases.Deep tendon reflexes were present in 23 cases i.e., in 74.2% of patients of AOP. Rest in 8 cases deep tendon reflex were Absent.Pupil size of large chunk (14, 45.2%) of population of patients was more frequently 2 millimeter.This was also noted that the pupil size among 10 (32.3%) patients found to be narrowed to 1 millimeter. Pupil size among 7(22.6%) patients was found to be 3 millimeter.

Table 1: Measurement of severity of organophosphorus poisoning

Measurement of Severity of Poisoning	Grading	Frequency	Percent
Grading on POP Scale	0-3 (Mild)	17	54.8
	4-7 (Moderate)	8	25.8
	8-12 (Severe)	6	19.4
Serum Cholinesterase Level (KU/L)	<1.00	12	38.7
	1.00-4.62	9	29.0
	>4.62	10	32.3

According to POP scale, majority were mild cases (54.8%). Majority had serum Cholinesterase Level (KU/L) <1 (38.7% followed by 32.3% cases who had level >4.62.Normal findings on chest X-ray were more frequently reported among 21 (67.7%) patients. Incidences of consolidation or infiltration in the lung was the second most common chest X-rays finding documented among five (16.1%) patients.Acuterespiratory distress syndrome was diagnosed among 3 (9.7%) patients in chest X-ray findings as compared to Two (6.5%) patients observed with pleural effusion.However, electrocardio-graphic analysis revealed that the incidence ofventricular tachycardia was reported only in 1 (3.2%) case whereas rest 30 (96.8%) cases had normal findings.Response to pain in 11 cases (35.5) was found to be the most common level of consciousness occurred among patients as compared to other levels of consciousness followed by conscious and alert level in 9 cases (29%). 7 cases (22.6%) were responding to verbal commands and the least level of consciousness was unconscious level found in 4 patients (12.9% of cases).

Table 2: Assessment of duration of hospitalization, quantity of poison consumed and serum cholinesterase levels in cases with poisoning

Parameter of Patients		N	Scatter	SE	Range
Duration	Total Duration (Day)	31	7.03± 7.76	1.39	1-44
	Ward Duration (Day)	23	2.52± 1.31	0.27	1-5
	Duration of ventilatory support (Day)	16	6.00± 9.52	2.38	1-40
Severity of poisoning in patients	Poison quantity consumed (ml)	31	73.71± 51.14	9.18	10-200
	Serum cholinesterase (KU/L)	31	3.25± 2.92	0.52	0.05-8.83

KU/L; kilo unit per liter, SE; standard error

Table 3: Assessment of pulse rate, respiratory rate, systolic and diastolic blood pressure andelectrolytes in cases with acute organophosphorus poisoning

Parameters	Scatter	Standard Error	Range
Pulse Rate(per minute)	88.71± 21.72	3.90	40-120per minute
Respiratory Rate(per minute)	24.03± 6.51	1.17	16-38per minute
SBP (mmHg)	123.55± 31.47	5.65	60-230 mmHg
DBP(mmHg)	75.48± 19.29	3.47	0-100 mmHg
Sodium(meq/L)	144.23± 4.77	0.86	132-154 meq/L
Potassium(meq/L)	3.75± 0.68	0.12	2.6-4.8 meq/L
Chloride(meq/L)	109.23± 5.46	0.98	95-118meq/L

SBP; systolic blood pressure, DBP; diastolic blood pressure

Table 4: Assessment of duration of hospitalization in cases of AOP

Type of Stay	Duration of Hospitalization	Frequency	Percent
Total Hospital Stay	0-7 days	21	67.7
	7-14 days	8	25.8
	≥14 days	2	6.5
Duration of ICU	0-7 days	28	90.3
	7-14 days	1	3.2
	≥14 days	2	6.5

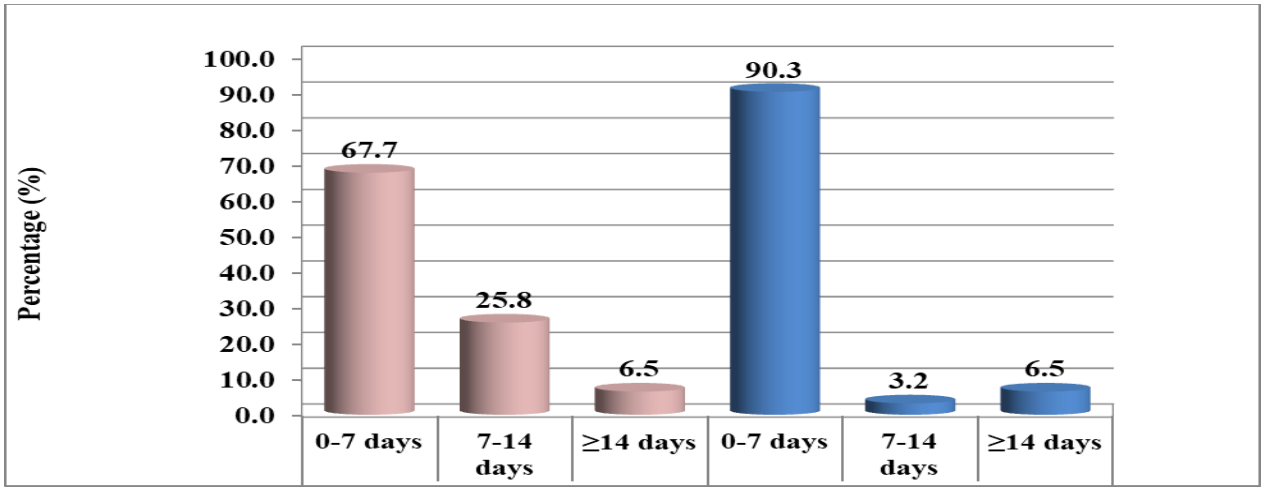

Fig 1: Bar diagram is depicting the duration of total hospital stay and duration of Intensive care unit of selected patients

Duration of hospital stay with respect to ventilator support was reported among sixteen (51.6%) patients.Statistical analysis showed that the total duration of ventilator support of large chunk (13, 41.9%) of population of patients was found to be more frequently of one week i.e., between 1 and 7 days. The duration of ventilator support of 2 (6.5%) patients was between 7 and 13 days and the total duration of ventilator support for more than or equal to 13 days was found only in One (3.2%) case.There was a large chunk (23, 74.2%) of population of patients with AOP were discharged. It was noted that the mortality occurred approximately among one-fourth of the cases of AOP. Death was reported in 8 (25.8%) patients with AOP.

Discussion

Organophosphate ingestion is one of the main causes of suicidal deaths in India.It may be because of rapid urbanisation, economic and social factors that contribute to depression and frustration in people. Those persons are the major victims of poisoning when they are not able to cope up with these stressful situations. Here, we tried to evaluate the clinical manifestation of AOP.In our study majority of patients (48.4%) were in age group of 15-35 years, with overall mean age of studied patient being 38.42±16.31 years. Out of 31 patients, majority were (74.2).This is in accordance with study done by Honnakatti et al in which most patients (51%) were in age group of 20-30 years and 60% of patients were male[7].Chaudhary et alshowed majority of patients (56.7%) were in age group of 20-40 years and had male predominance of 71%.[8]Another study done by Patel et al showed that majority of patients were in age group of 20-29 years with a mean age of 32.15 ± 0.71 years out of which 72% were males and 28% were females[8,9].Our study also showed that mean quantity of organophosphorus poison consumed by patients was 73.71 ± 51.14 milliliters which is similar to study done by Patel et al in which quantity of poison consumed by majority of patients 72 out of 100 was between 50-100 mililitres[9].Study done Twayana RS et al found in their study that mean quantity of poison consumed was 26.4 ± 31.6 ml with highest amount of 200 ml and lowest amount of 5 ml. Study done by Kang etalfound the mean amount of quantity consumed was 60ml[10,11].Out of 31 patients there was mortality in 8 patients (25.8%) and in all 8 patients' quantity of the organophosphorus poison consumed was more than 100 ml, this is in accordance to study done by Patel et alin which 20 patients out of 100 consumed more than 100 ml of poison and in those 20 patients, mortality was seen in 9 patients(45%)[9]In our study it was also seen that 21 patients (67.7%) who presented to Hospital were within 80 minutes and 3 patients died. It was also noted that as there was delay in reaching the hospital mortality percentage increased, as in our study there were 2 patients who presented after 3 hours and bothdied (6.8% mortality). This is similar to study done by Patel et alin which 72 patients reached the hospital within 2 hours of poisoning and out of 72 patients 2 died and patients who presented after 4 hours of poisoning had mortality rate of 25%.[9] Another study done by Kumar et alfound out that mortality rates were 11.2% in patients who were admitted after 2 hours of exposure as compared to 6% who were admitted within 2 hours[12].In our study majority of patients had vomiting as most common symptom in 30 patients (96.8%) followed by salivation in 28 patients (90.3%) followed by sweating in 23 patients (74.2%). It is similar to study done by Patel et alwho found that 95 patients out of 100 had vomiting as most common symptom followed by sweating in 94 patients. (Patel P 2016) However, study done by Rajeev H. etalfound commonest symptom was excessive salivation in 66% followed by vomiting in 60% of total 50 patients[13].We also found that 16 patients (51.6%) had respiratory depression and 11 patients (35.5%) had muscle fasciculations in our study which is in accordance with the study done by Rajeev H. et alwho found that 36% patients had fasciculations and 40% of total 50 patients had respiratory depression.[13]Study done by Patel et alshowedfasciculations were present in 59 patients out of 100 patients they studied.[9]Study done by Goel et alfoundfasciculations were seen in 55% of cases and Respiratory depression in 42% of cases[14].In our study 14 patients(45.2%) had pupil size of 2mm followed by pupil size of 1mm (32.3%) in 10 patients and 7 patients(22.6%) had pupil size of 3mm or more. It is in accordance with study done by Rajeev H. et alin which 21 patients(42%) had pupil size of 2-4mm, 18 patients(36%) had pupil size of 1mm or less

and 11 patients(22%) had more than 4mm pupil size.[13]However it was refuted by the study done by Goel et alwho found miosis in 95% of cases they studied[14].In our study we found that 16 out 31 patients(51.6%) needed ventilatory support during their hospitalization. This finding is supported by study done by Rajeev H. et al, in which out of 50 patients they studied, 24 patients(48%) needed ventilatory support[13].Study done by Kumar et alshowed 28 out of 80 patients(35%) needed ventilatory support during course of their hospitalization[12].In our present study we used Peradeniya Organophosphorus Poisoning scale (POP) to grade severity of patients with AOP. In our study we found that 17 patients (54.8%) had mild grading (0-3 score) on POP scale, 8 patients(25.8%) in moderate grade (4-7 score) and 6 patients(19.4%) had severe grade (8-12 score). These results are in accordance with study done by Honnakatti et al in which out of 100 patients 55 patients (55%) had mild grade, 33 patients(33%) had moderate grade and 12 patients (12%) had severe grading on POP scale.[7]Study done by Chaudhary et alshowed that out of 150 patients studied 53 patients(35.33%) had mild grading, 75 patients(50%) had moderate and 22 patients (14.67%) had severe grading on POP scale.[8]Study done by Kumar et alshowed that out of80 patients 51(63.8%) had mild score, 22 patients(27.6%) had moderate score and 7 patients(8.8%) had severe score[12].Study done by Laudari et al found that out of 111 patients they studied 33.3% had mild grading 62.2% had moderate grading and 4.5% had severe grading on POP scale. [15]Another study done by Twayana RS et alfound that out of 110 patients studied 61% had mild score, 21% had moderate score and 18% had severe score on POP scale [10]. In our study we used serum cholinesterase levels for finding the severity of patients with AOP. We found that 12 patients (38.7%) had severe poisoning (i.e.,<1.00 Kilounit/litre level of S. Cholinesterase), 10 patients(32.3%) had mild poisoning(>4.62 Kilounit/litre) and 9 patients(29%) had moderate poisoning(1.00-4.62 Kilounit/litre). Study done by Chaudharyetalshowed out of150 patients 23 (15.33) had severe poisoning(<1.00 KU/L), 77 patients (51.33) had moderate and 45 patients(30%) had mild poisoning[8]. Study done by Honnakatti et al showed 7% patients had severe poisoning, 16% had moderate and 29% had mild poisoning[7].This difference across all studies in literature may be attributed to sample size chosen for the study because of which there are differences in percentages in every study.

Conclusion

AOP mainly affect male population having age less than 40 years. A delay in presentation to hospital can lead to severe consequences. Though majority of the victims were mild poisoning cases with serum cholinesterase Level (KU/L) <1, we record high mortality. Govt. should strictly implementation pesticide act and educate the public and youth regarding the consequences of using organophosphorus compounds.

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