

Original Research Article


A study of clinical profile of patients with organophosphorus poisoning

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Abstract

Background: In developing countries, the widespread use of organophosphorus compounds (OPCs) has been accompanied by increasing incidence of poisoning with these agents, both suicidal and accidental. This is attributed mainly to their easy availability, indiscriminate handling, storage and lack of knowledge about the serious consequences of poisoning. Of the various substance used for suicidal attempts in India, OPCs form a significant group. Since the clinical manifestation of OPC poisoning is diverse ranging from mild symptoms to fatal complications in the course of time, we need proper management of the situation.

Materials and methods: Present study included 42 patients with Organophosphorus poisoning admitted in B.J. Medical College, and Civil Hospital Ahmedabad. This study was carried out from June 2018 to June 2019. Patients were managed as per standard protocols of O P poisoning. We also checked for various parameters on like cholinesterase level, complete blood counts, renal function test with electrolytes, liver function test.

Results: In this study, majority of patients fell in 20-30 years of age group with male predominance. Most common clinical features were vomiting, miosis and giddiness. Majority of the patients belonged to mild grade. The average s.cholinesterase level was low as severity increases. More doses of PAM and atropine were required in severe poisoning. Most common complication was respiratory paralysis. Death was more in severe poisoning.

Conclusion: OPC is one of the most common poisoning in India. In patients of OP poisoning presenting symptoms and s.ChE level directly correlated with severity. Therapeutic required dose of PAM and atropine are different in different grade of severity. Survival amongst patients is definitely

better if atropine and PAM are being given with Mechanical ventilator support in cases of respiratory insufficiency.

Key words

Organophosphorus compounds, Poison, Cholinesterase level, Atropine, Pralidoxime, Respiratory paralysis, Intermediate syndrome.

Introduction

Poisons are known to mankind since the immemorial. The word 'poison' is derived from the Latin word 'Potio' meaning – 'a drink'. Poison is a substance that being in solution in the body either destroys life or impairs seriously the function of one or more organ of the body. Apart from naturally occurring poisons, rapid progress in industrial and agricultural fields has added many man-made chemicals in the environment that if handled improperly can prove to be lethal [1]. The organophosphorus poisoning helped greatly in the green revolution as a boom but also has added to the risk of poisoning by such compounds. Since the discovery of Parathion by Schroeder in 1944 organophosphorus have developed into the largest and most versatile group of pesticides in use today. The WHO estimates that each yearly nearly 1 million serious accidental and nearly 2 million suicidal attempts involving pesticides occur worldwide. In developing countries, the widespread use of organophosphorus compounds (OPCs) has been accompanied by an appreciable increase in incidence of poisoning with these agents, both suicidal and accidental. This is attributed mainly to their early availability, indiscriminate handling, storage and lack of knowledge about the serious consequences of poisoning. Of the various substance used for suicidal attempts in India, OPCs form a significant group [2, 3]. This seems to be peculiar to India as in the Western countries, 80% of suicidal attempts; sedatives attempts; sedatives, antidepressants and other such drugs are used. Since the clinical manifestation of OPC poisoning are diverse ranging from mild symptoms which may develop to fatal complications in the course of time, we need prompt laboratory diagnosis an addition to clinical features which help considerably in

proper management of the situation. In addition proper history regarding the type of poisoning is not always available. In the present study 42 cases of OPC poisoning were studied, various factors in identifying final outcomes were studied and also studied that whether plasma cholinesterase level do have any clinical correlation with it or not.

Materials and methods

This study was carried out from June 2018 to June 2019 for 12 months. All 42 Patients were admitted in medicine general ward, medical and intensive care unit of Civil Hospital, Ahmedabad.

Study procedure

All patients were treated as per standard treatment protocol. All information about diagnosis is based on clinical presentation, laboratory tests, and radiological findings. Duration of hospital stays and patient outcome in form of discharge and deaths were analyzed.

Inclusion criteria

All patients with age >12 years, history, signs and symptoms suggestive of organophosphorus poisoning.

Exclusion criteria

Patients with age <12 years and mix poisoning with more than one poison compounds were not included in this study

Clinical diagnosis of organophosphorus poisoning was established by detailed clinical examination, circumstantial history and smell of organophosphorus compound from body parts, clothes, breath and gastric aspirate obtained from stomach wash. All cases were medico legal

cases. Patients were initially stabilized and vitals were monitored. Ryle's tube insertion and lavage was done initially in each patient. Contaminated clothes were removed and skin was washed. Ryle's tube sample was taken for sample seal and blood sample was taken for plasma cholinesterase level and other routine blood investigations. A detailed clinical examination was done in each patient. Before specific therapy was started, blood for plasma cholinesterase level estimation (ChE level) was sent to laboratory. Then standard treatment of organophosphorus poisoning management was continued. Normal values of plasma cholinesterase level 2700-5800 IU/L by Ellaman G.L., et al. method. In mild poisoning plasma cholinesterase level is 20%-50% of normal value (ChE level: 2160-5280). In moderate poisoning plasma cholinesterase level is 10%-20% of normal value (ChE level: 1080-2180). In severe poisoning plasma cholinesterase level is less than 10% of normal value (less than 1080). According of all clinical symptoms and plasma ChE level, grading was done and patients were treated accordingly. Treatment of all the patients was guided by the clinical symptoms and the value of plasma cholinesterase level. Patients were categorized according to clinical severity in emergency medical ward. Stable patients managed at emergency medical ward. Critical patients according to clinical severity were shifted to medical intensive care unit for further management. Atropine and pralidoxime were given to stable patients. They were observed for complication. Serial cholinesterase level estimation was done according to need. If clinical improvement was observed, they shifted to medical ward. Psychiatric evaluation was done. Patients with respiratory muscle involvement were given ventilatory support in medical intensive care unit. Atropine and pralidoxime were given in each patient [4]. Complications and vitals were continuously observed. Serial cholinesterase level estimation was done. If death occurred during hospital stay in patients of organophosphorus poisoning postmortem examination performed for cause of death. If clinical improvement was observed,

patient was shifted to medical ward and was observed for delayed complications.

Results

Total 42 patients admitted in our institute with alleged history of consumption or inhalation of organophosphorus compound have been included in the present study.

Age wise distribution of OPC poisoning cases was as per **Table – 1**. Sex wise distribution observed in present study was as per **Table – 2**. Mode of intoxication was as per **Table – 3**. Clinical manifestations in case of OPC poisoning were as per **Table – 4**. Plasma Cholinesterase level (ChE level) in comparison with other study [5] was as per **Table – 5**. Atropine therapy in OPC Poisoning was as per **Table – 6**. Pralidoxime (PAM) therapy in Organophosphorus poisoning was as per **Table – 7**. Final outcome was as per **Table – 8**. Incidence of various complications observed in case of OPC poisoning was as per **Table – 9**. Incidence of patients on ventilator management was as per **Table – 10**.

Table - 1: Age wise distribution of OPC poisoning cases.

Age in years	Number	Percentage (%)
12-20	06	14.28
21-30	18	42.85
31-40	05	11.90
41-50	11	26.19
>51	02	04.76
Total	42	100

Table - 2: Sex wise distribution observed in present study.

Sex	Married	Unmarried	Total no. of cases	%
Male	28	4	32	76.19
Female	08	2	10	23.81

Table - 3: Mode of intoxication.

Mode of intoxication	No. of patients	%
Ingestion	40	95.23
Inhalation	2	04.76
Mix	0	0

Table - 4: Clinical manifestations in case of OPC poisoning.

Signs and symptoms	No. of patients	Percentage (%)
Muscarinic		
Vomiting	36	85.71
Miosis	30	71.42
Excessive secretions (salivatory/respiratory/lacrimation)	27	64.28
Hypotension	05	11.90
Bradycardia	04	09.52
Respiratory manifestations (significant crepitations, rhonchi, pulmonary edema)	12	28.57
Cyanosis	2	04.76
Nicotinic		
Tachycardia	16	38.09
Hypertension	2	04.76
Fasciculations	14	33.33
CNS manifestation		
Altered sensorium	14	33.33
Giddiness	22	52.38
Convulsion	2	04.76

Table - 5: Plasma Cholinesterase level (ChE level).

Clinical severity grading	S.cholinesterase Level	Kavya and Srinivas, 2013 [5]		Present study	
		Recover (%)	Expired (%)	Recover (%)	Expired (%)
Mild	>50% of normal value	94	6	90	10
Moderate	20% to 50% of normal value	78	22	75	25
Severe	<10% of normal value	00	100	12.50	87.50

Table - 6: Atropine therapy in OPC Poisoning.

Grading of patients	Total atropine required (average)	Average plasma ChE level on admission (Iu/L)
Mild	28 mg	1652
Moderate	72 mg	924
Severe	106 mg	410

Table - 7: Pralidoxime (PAM) therapy in Organophosphorus poisoning.

Grading of patients	Average total PAM required	Average plasma ChE Level on admission (Iu/L)
Mild	8 gm.	1652
Moderate	12gm	924
Severe	20 gm	410

Table - 8: Final outcome.

Grade	No. of patients	No. of survived patients	Percentage (%)	No. of expired patients	Percentage (%)
Mild	10	09	90	1	10
Moderate	16	12	75	4	25
Severe	16	14	87.50	2	12.50

Table - 9: Incidence of various complications observed in case of OPC poisoning.

Complication	Total	Percentage (%)
Respiratory paralysis	5	11.90
ARDS	2	04.76
Cardiac arrhythmia	6	14.28
Aspiration pneumonia	5	11.90
Intermediate syndrome	3	07.14

Table - 10: Incidence of patients on ventilator management.

Grading of patients	No. patients put on ventilator	Recovered	Expired
Mild	2	1	1
Moderate	5	3	2
Severe	12	2	10

Table - 11: Age wise distribution in cases of OPC poisoning in various study.

Author study	Age group	Percentage (%)
S Gupta, 2006 [6]	21-30	63
SC Joshi, 2013 [7]	21-30	43.81
S Biswas, 2013 [8]	15-24	70.17
Present study	21-30	42.85

Table - 12: Sex wise distribution in various studies.

Author series	Male (%)	Female (%)
DRM Prasad, 2013 [9]	65.7	34.3
S Gupta, 2006 [6]	66	34
D. Patel, 2011 [10]	56	44
SC Joshi, 2013 [7]	55.10	44.9
Present study	76.19	23.81

Table - 13: Clinical manifestation in case of OPC poisoning comparisons to previous study.

Signs and symptoms	DRM Prasad, 2013 [9]	D. Patel, 2011 [10]	S. Biswas, 2013 [8]	Present study
Vomiting	94	88.18	82.20	85.71
Miosis	88	80	82.20	71.42
Excessive secretions	80	69	82.20	64.28
Altered sensorium	Not mention	21	7.93	33.33

Discussion

Age wise distribution in cases of OPC poisoning in various studies [6, 7, 8] was as per **Table – 11**. Sex wise distribution in various studies [6, 7, 9, 10] was as per **Table – 12**. Clinical manifestation in case of OPC poisoning comparisons to previous studies [8, 9, 10] was as per **Table – 13**.

This is a study of total 42 cases of OPC poisoning admitted in Civil Hospital, Ahmedabad from June 2018 to June 2019. In this study, majority of patients fell in 20-30 years of age group. Among total 42 patients 32 were male

and 10 were female. Organophosphorus poisoning is higher in male which is statistically significant. Most common clinical features were vomiting, miosis and giddiness. Grading of patients was done according to clinical signs, symptoms and s.cholinesterase level. Majority of the patients belonged to moderate and severe grade. The average s.cholinesterase level was 1652 Iu/l in mild, 924 Iu/l in moderate and 410 Iu/l in severe grade of patients. Requirement of average atropine in different grades were mild-28 mg, moderate-72 mg, severe-106 mg. Requirement of average pralidoxime in different

grades were mild – 8 gm, moderate – 12 gm, severe – 20 gm. Complications that observed during the study most commonly seen were respiratory paralysis, intermediate syndrome and aspiration pneumonia. 2 patients from mild grade, 5 from moderate and 12 patients of severe grade put on ventilator. Out of which 1 patient of mild grade, 2 patients of moderate grade and 10 patients of severe grade expired. Plasma ChE level was correlating with patient's symptoms at the time of admission. Plasma ChE level are reliable diagnostic markers with reference to severity of OPC poisoning.

Conclusion

OPC is one of the most common poisoning in India. Reason for poisoning is most commonly suicidal. It is common in male. In patients of OP poisoning presenting symptoms and s.ChE level directly correlated with severity. Therapeutic required dose of PAM and atropine are different in different grade of severity. Survival amongst patients is definitely better if atropine and PAM are being given. Mechanical ventilator support in cases of respiratory insufficiency is equally important for better outcome of the patients.

For the diagnosis of organophosphorus poisoning, we use clinical severity guidelines and plasma ChE level when less than 50% of normal. In severe grade of poisoning complications are more and mortality is high.

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