ORIGINAL ARTICLE

PROFILE OF ORGANOPHOSPHORUS POISONING IN SOUTH EAST RAJASTHAN IN MEDICAL COLLEGE HOSPITAL, JHALAWAR

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ABSTRACT: A number of Organophosphorus compounds have been introduced in Indian market as agricultural insecticides, being effective against wide range of insects and pests. But a number of these compounds have proved to be more toxic to humans than its utility as insecticides, pesticides. Organophosphorus compound poisoning is a very common toxicological emergency encountered in the rural agricultural workers in south eastern Rajasthan. A total 100 cases of organophosphorus compound were analysed during one year period in 2013 and 2014. The emphasis was given on age, sex, socioeconomic status, occupation, motive of poisoning, place, and the ultimate outcome. Young male population of rural background, particularly agricultural workers was the commonest patients. The most common cause of poisoning is accidental, suicidal in males and females. 85 patients recovered and fifteen expired. The major cause of death in these cases was respiratory failure followed by multi-organ failure, mitochondria as site of cellular oxygen consumption and energy production can be a target of OP poisoning. Atropine is the mainstay of therapy, and can reverse the life threatening features of this acute poisoning. Cholinesterase reactivators, by regenerating AChE, can reverse both the nicotinic and muscarinic effects.

KEYWORDS: Organophosphorus Compounds, Suicidal, Insecticide, Respiratory failure.

INTRODUCTION: Organophosphorus compound, a common pesticide used in agriculture for crop protection and pest control, is often implicated in accidental and suicidal poisoning in India. It's widespread use and easy availability has increased the chances of poisoning with these compounds.

Pattern of poisoning in any region depends on variety of factors such as availability of poisons; SE status of population, religious beliefs and cultural influences.[1,2] It is roughly estimated in India 5 to 6 persons per lakhs population die due to poisoning every year. The commonest cause of poisoning in India and other developing countries is organophosphorus compounds.

Acute poisoning by these agents is a major global clinical problem, with thousands of deaths occurring every year.[21]

Poisoning of these compounds is due to unsafe practice of its use, ignorance about toxicity of agents and lack of protective clothing may be accidental & suicidal.[1,3] Mortality varies from place to place depending on the nature of poison, availability of facilities and treatment by qualified persons.[4] Respiratory failure is a common complication of Organophosphorus poisoning which is responsible for a high mortality, so timely effective treatment patient who arrived within 6-8 hours usually survived.

Compounds are normally esters, thiol esters, or acid anhydride derivatives of phosphorus containing acids.Common dimethyl and diethyl phosphoryl compounds Parathion, Chlorpyrifos, Dichlorfenthion, Methyl parathion, Dichlorovos, Malathion.[5]

MECHANISM OF TOXICITY: It is a highly toxic compound and acts by inhibiting the enzyme cholinesterase, results in accumulation of acetylcholine at synapses and myoneural junction leading to cholinergic over activity.[6] The toxic mechanism of OP compounds is based on the irreversible inhibition of acetylcholinesterase due to phosphorylation of the active site of the enzyme. This leads to accumulation of acetylcholine and subsequent over-activation of cholinergic receptors at the neuromuscular junctions and in the autonomic and central nervous system. The rate and degree of ACE inhibition differs according to the structure of the OP compounds and the nature of their metabolite. These compounds may lead to Spontaneous reactivation of the enzyme at a slow pace. With time, the enzyme-OP complex loses one alkyl group making it no longer responsive to reactivating agents.

MATERIAL AND METHODS: In present study from 2013-2014 (1 years) – cases of organophosphorus compound poisoning came to SRG Hospital & medical college, Jhalawar Rajasthan. A total 100 cases of Organophosphorus compound poisoning were analysed during this period. The data was collected from Organophosphorus cases admitted through emergency or outpatient department, in a detailed proforma as per the history given by patient / attendant, with particular emphasis being given to age, sex, socio economic status, occupation, motive of poisoning, type of compound and final outcome. All data were analysed, documented and interpreted as per the laid down protocol.

OBSERVATIONS: A total 100 cases of Organophosphorus compound poisoning were registered during the study period, 2013 -2014. The age of Patients varied from 1- 50 years.

TABLE – 1: Organophosphorus compound poisoning – 100 cases. Majority of victims fall in 21-30 yrs – 39 cases, which is followed by 11-20 yrs – 21 cases. The least no. of cases, 6 were found in age group of more than 50 yrs.

S. No	Age	No. of Cases
1	1-10	00
2	11-20	21
3	21-30	39
4	31-40	26
5	41-50	08
6	50 & Above	06

Table 1

S. No		No. of Cases
1	Urban	12
2	Rural	88

TABLE 2: Out of 100 total cases, 88 were from rural area and only 12 from urban area

S. No	Gender	No. of Cases
1	Male	66
2	Female	34

TABLE 3: Majority of the victims were male, 66 while 34 were female

S. No	Manner	No. of Cases
1	Accidental	79
2	Suicidal	21
3	Homicidal	0

TABLE 4: In present study 79 cases were accidental, 21 were suicidal

S. No	Outcome	No. of Cases
1	Survived	85
2	Expired	15

Table 5: Out of 100 cases, 85 cases improved and 15 expired. Respiratory failure was the leading cause of death in our study, along with multi-organ failure

No. Of Patients	Put on ventilator	Survived	Expired
100	19	04	15

Table 6: Out of 100 cases, 19 patients on ventilator, 04 cases improved and 15 expired

DISCUSSION: Acute Organophosphorus compound poisoning is one of the commonest cause of acute poisoning in South East Rajasthan with high mortality. Particularly poisoning is among the agricultural and labour class workers. The probable cause of poisoning high mortality are depending on the variety of factors such as easy availability of the poison, large group of agricultural population, socioeconomic status of the population, particularly of youth. In our study majority of patients were male (66) and they were in age group of 21 to 30 years (34); similar observations were noted in other studies.[7,8] According to the WHO, three million acute poisoning cases with 2, 20, 000 deaths occur annually and of these 90% of fatal poisoning in developing countries, particularly among agricultural workers.[1]

Male victims were commonly observed in present study (66.00%) than female (34.00%). Because spraying of insecticide is done by males.[10,11] Age group 11-30 yrs was commonly affected and this finding correlates with the other workers also.[14,15,9,12,13]

Availability of different types of compound differs from area to area and information about consuming agent depend on education of victims. They do not give proper information about exact compound consumed but mostly used compound Parathion, Malathion, Dichlorovos, Chlorpyrifos, Dichlorfenthion and Diazinon.

Use of the organophosphorus compounds is more in rural areas that in urban because of their utility as insecticides, pesticides and fungicides to protect the crops.[16,17]

Because of its easy availability from market organophosphorus compound remains one of the commonest poisons taken with suicidal intent.[11,14]

In this study among the Organophosphorus compounds, Dichlorvos was the most commonly consumed Poison (40.86%), although Diazinon was the most commonly used compound in another study as reported by Singh et al.[18] In present study the commonest motive of poisoning was with a Suicidal intention and the maximum number of victims were agricultural workers (69), residing specifically in rural areas. This finding was similar to that of Gupta et al,[20] because use of the Organophosphorus compound as an insecticides, pesticides and fungicides was more in rural areas than urban.

Our patients came to the hospital with in 2 to 3houres of ingestion of poison and supportive treatment started as air way cleaning and IV Fluids started. The skin and clothes of these patients are frequently contaminated with poison and vomiting. The clothes removed and the skin vigorously washed with soap and water.

Atropin has been the cornerstone in the management of our patients. It acts competitively at the peripheral and central muscarinic receptors and antagonizes the parasympathetic effects of excess ACh at these sites. It reverses life threatening features from poisoning. We use an initial bolus of 3-5 ampoules of atropine (Each ampoule containing 0.6 mg) with subsequent doses doubled every 5 minutes until atropinization is achieved.[19]

Pralidoxime is given to most of the patents with recommended 30mg/kg bolus IV followed by continuous infusion.

Patients admitted with respiratory distress with very low oxygen saturation were put on ventilator support. In this study 19 patients put on ventilator and out of which 15 expired and 04 survived. Patients came very late after ingestion could not be survived with ventilator support also.

CONCLUSION: Organophosphorus poisoning is one of the most common poisonings in the rural areas of south east Rajasthan, predominantly in the young population with a male predominance in farmers, labours of rural population. Mostly the poisoning is accidental and suicidal. Suicidal because of easy availability of poison. Motive of suicide is Poverty and stressful life.

Similarly strict implementation of the pesticide act and involving a new policy by the government to educate the public and youth in large about the dangerous, life threatening effects of Organophosphorus compounds could help amelerioating the harmful effects of such poisoning.

- Sex ratio (M: F) is 2:1 and about 40.00% in 21-30 yrs of age group which is commonly affected.
- Most of the cases belong to rural area about 88.00% and due to low education and lack of awareness regarding spraying process.
- All these facts highlight that there are many unanswered questions and controversies in the management of OP poisoning and there is an urgent need for research on this aspect of this common and deadly poisoning.

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