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TREATMENT WITH PRALIDOXIME AND SERUM CHOLINESTERASE LEVELS AS PREDICTOR OF OUTCOME IN PATIENTS OF ACUTE ORGANOPHOSPHATE POISONING

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Abstract:

Objective: *To compare the results of acute organophosphate intoxication with and without pralidoxime treatment.*

Methods: *It is a retrospective study conducted at the Department of Medicine, Department of Pediatric Medicine and Department of Pathology Bahawal Victoria Hospital Bahawalpur from April 2019 to April 2020. It included 241 patients with acute PO poisoning. Blood urea, serum creatinine and cholinesterase levels were determined. One hundred and ninety-six patients were administered pralidoxime with atropine and the remaining 45 were treated with atropine alone. Data were analyzed using SPSS 17. A value of P <0.05 was considered significant.*

Results: *Most of the patients (60.6%) were 21-30 years of age. The male to female ratio was 2: 1. A total of 17 (7.0%) patients died. The shorter time interval from the onset of OP intoxication to initiation of treatment (p = 0.000) and the use of pralidoxime therapy (0.001) were associated with better survival of patients. Three of the 13 patients admitted to the ICU died, all with low serum cholinesterase levels*

Conclusion: *It was observed that the use of Pralidoxime significantly increases the survival of patients in acute organophosphorus poisoning, and low serum cholinesterase levels have a poor prognosis.*

Key words: *serum cholinesterase, pralidoxime, acute organophosphate intoxication.*

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INTRODUCTION:

Organophosphorus Compounds (OPCs) cover a wide variety of chemicals that are used as insecticides, herbicides, fungicides, and more. They are used all over the world in agriculture. The use of pesticides has increased food production in parallel with population growth in many parts of the world. In some countries they are used as chemical warfare agents. OPCs can cause acute or chronic poisoning after accidental or suicide exposure. It is the most common suicide measure in developing countries such as Pakistan. Toxicity usually results from accidental, intentional ingestion or exposure to pesticides used in agriculture. Early diagnosis and adequate treatment with atropine with or without oximes often save lives. The clinical course of OP intoxication may be quite severe and may require intensive care. The current study is being conducted to compare patient outcomes with and without Pralidoxime treatment for acute organophosphate poisoning. Low serum cholinesterase levels at the start of treatment are associated with poor prognosis. Glasgow's low coma rate during a hospital stay is also an indicator of poor prognosis.

PATIENTS AND METHODS:

It is a retrospective study conducted at the Department of Medicine, Department of Pediatric Medicine and Department of Pathology Bahawal Victoria Hospital Bahawalpur from April 2019 to April 2020. The diagnosis of OP intoxication was based on the history of exposure and clinical signs of OP intoxication, including hypersalivation, miosis, diarrhea, bronchospasm, bronchospasm, bradycardia, muscle weakness, and urination. Patients exposed to other poisons were excluded. All patients received standard treatment under the guidance of the hospital's consultants. Patients with OP poisoning divided into two groups. Group A included those patients who received rapid atropinization, with doubled doses of atropine at intervals of 5-10 min, starting with 1-3 mg, until the muscarinic symptoms resolved. Group B consisted of patients who received 1 g of pralidoxime chloride intravenously four times a day for 1–3 days with rapid atropinization. Data was sent to a structured Performa including demographic characteristics, clinical picture, laboratory test (complete blood count, blood urea, serum creatinine, serum cholinesterase levels) and result. Data was analyzed using SPSS-17. Frequencies and percentages were calculated for qualitative data such as gender and marital status. Chi-square was used to determine statistical significance. A p value of <0.05 was considered significant.

RESULTS:

The majority of patients (n = 166/241, 69%) were in the 15-25 age group as shown in Figure 1.

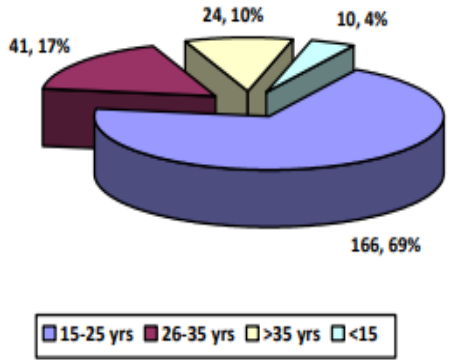

Fig1: Age distribution of patients presenting with OP poisoning

In terms of gender, there was a male advantage (n = 158, 65.6%). The calculated male to female ratio was 2: 1. About half of the patients (n = 134, 55.6%) were married and the rest were unmarried. Most of the patients (n = 157, 65.1%) were hospitalized within the first three hours after exposure to organophosphates. Due to the time of arrival, the patients were divided into two groups. Group 1 included those who achieved within six hours of exposure. These were 196 patients (81.3% of the total) treated with the combination therapy (pralidoxime and atropine). Group 2 consisted of 41 patients who reported more than six hours and were treated with atropine alone. Table 1 shows the comparison of the results based on the time of arrival which significantly influences the result (p = 0.0001). Patients who received treatment with pralidoxime and atropine showed excellent results with a recovery rate of 97.45% and a mortality of 2.55% compared to patients who received treatment with atropine alone, the recovery rate was 73.4% and the mortality rate was 26.6% as shown in the table. -2, which is statistically significant (p = 0.0001), 13 patients were admitted to the ICU and their serum cholinesterase levels were measured. Four patients had low serum cholinesterase levels. In total, 3 out of 13 patients admitted to the ICU died. All patients who died had low serum cholinesterase levels. Glasgow Coma Score (GCS) was <7 in all patients who died.

Table 1: Time of arrival and outcome of OP poisoning (n=241)

Time	Recovery	Death	Total	%age
< 6 hours	194	6	200	3
> 6 hours	30	11	41	26.8
Total	224	17	241	7.0

Table 2: Comparison of outcome on basis of treatment (n=241)

Therapy	Recovery	Death	Total	%age
Atropine+ Pralidoxime	191	5	196	2.55
Atropine only	33	12	45	26.6
Total	224	17	241	7.0

Table 3: Association of serum cholinesterase levels with mortality in ICU patients (n=13)

	Total	Deceased	%age
Low serum cholinesterase	4	3	75
High serum cholinesterase	9	0	0
Total	13	3	23.1

DISCUSSION:

The main mechanism of action of organophosphates is the inhibition of acetylcholinesterase. Organophosphates inactivate acetylcholinesterase by phosphorylation of the hydroxyl group of serine in its active center. They inhibit both the activity of red blood cell acetylcholinesterase and pseudocholinesterase (plasma cholinesterase). Inhibition of acetylcholinesterase causes an accumulation of acetylcholine at the synapses with the resulting central and peripheral nervous system. Over time, the organophosphorus compound of acetylcholinesterase undergoes a conformational change which renders the enzyme irreversibly resistant to reactivation by the antidote. The clinical signs of OP poisoning are due to excess acetylcholine at the muscarinic and nicotinic receptors. Symptoms of a cholinergic crisis result from stimulation of the muscarinic and nicotinic receptors: nicotine symptoms include increased or decreased muscle strength and skeletal muscle contractions. Muscarinic symptoms include salivation, miosis, diarrhea, bronchospasm, bronchospasm, bradycardia and urination. PO poisoning is a serious problem in agricultural areas. It has high morbidity and mortality. In various parts of the world, the mortality rate is 6-24%. The mortality rate in our study is also 7.0%. The outcome in patients with OP poisoning depends on various factors such as type of poison OP, amount of poison ingested, time between exposure and arrival at hospital, treatment with or without oxime, Glasgow Scale. Low serum cholinesterase levels are a poor prognostic indicator of outcome. In our study, the results were good for patients who arrived at the hospital within six hours than for patients who arrived after six hours. The result was also good in those patients given the oximes, not just in the atropine group. Low serum cholinesterase levels in patients with OP poisoning were associated with high mortality.

CONCLUSION:

It has been observed that the use of Pralidoxime significantly increases the survival of patients in acute organophosphorus poisoning. Thus, all patients who are hospitalized with exposure to OP compounds within six hours should receive pralidoxime together with atropine. Low serum cholinesterase concentration at the time of admission to the hospital indicates a poor prognosis.

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