

“A Study on Biochemical Parameters in Patients with Organophosphorus Poisoning”

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Abstract:

Introduction:- Acute poisoning is one of the most important emergencies in day to day medical practice. Insecticides are toxic compounds by chemical structure by and their consumption is a common cause of deliberate self harm in the developing world. Organophosphorus compounds are the most commonly encountered one among them accounting for about 80%of the pesticide-related hospitalizations It is estimated that the incidence of OP poisoning is about 750,000 and 3,000,000 worldwide and the estimation by WHO (World Health Organisation) is that it causes a death of about 300,000 every year

AIM :- To study clinical features and biochemical parameters in patients admitted with acute organophosphorus poisoning and their prognostic significance.

Materials And Methods:-

Study design-cross sectional study

Source of data:100 Patients presenting to the medical emergency department and admitted in tertiary care Hospital with a history of acute organophosphorus compound poisoning

Results:- The POP SCORING is one of the best scoring system to assess the need for ventilator care.APACHE II scoring is one of the better predictor of mortality.Blood parameters like Total Count, Random Blood Glucose, Blood Urea, Serum Creatinine, Serum Total Bilirubin, Serum transaminase enzymes, Serum Amylase, Serum Lactate Dehydrogenase were having positive correlation in assessing the severity of the Organophosphorus toxicity.Serum Choline Esterase levels had negative correlation in assessing the severity of the Organophosphorus toxicity

Keywords: Organophosphorus ,Poisoning POP Scoring,

I. Introduction

Acute poisoning is one of the most important emergencies in day to day medical practice. Insecticides are toxic compounds by chemical structure by and their consumption is a common cause of deliberate self harm in the developing world. Organophosphorus compounds are the most commonly encountered one among them accounting for about 80%of the pesticide -related hospitalizations(1). Organophosphorus compounds are being used as pesticides, petroleum additives and chemical warfare agents(2).The most commonly used OP insecticides are acephate, phorate, anilophos, chlorpyrifos, dichlorvos, diazinon, dimethoate, fenthion,fenitrothion, methylparathion, monocrotophos, dicrotophos, phenthoate ,pirimiphos, quinalphos, temephos,etc.

It is estimated that the incidence of OP poisoning is about 750,000 and 3,000,000 worldwide and the estimation by WHO (World Health Organisation) is that it causes a death of about 300,000 every year(3). OP poisoning can be an occupational exposure in people working in agriculture, accidental or intentional exposure in cases of deliberate self-harm. The incidence of poisoning is more in rural communities and is often a suicidal act. The reasons for such a high incidence of OP poisoning are it is easily available in our country, economically cheap for the farmers and many at times because of the lack of awareness about their dangers are stored in an improper manner(4). There is a 10-20% case fatality rate. OP poisoning is also of great threat to developed countries in danger of terrorist attack with nerve agents.

II. Aims & Objectives

1. To study clinical features and biochemical parameters in patients admitted with acute organophosphorus poisoning and their prognostic significance

III. Materials And Methods

The study was conducted in the Tertiary care Hospital , during the period of July 2015 to June 2016.

1.1 Study Design:

The study was one year cross sectional study on Patients presenting to the medical emergency department and admitted in Coimbatore Medical College Hospital with a history of acute organophosphorus compound poisoning

1.2 Source Of Data:

Patients presenting to the medical emergency department and admitted in Coimbatore Medical College Hospital with a history of acute organophosphorus compound poisoning , were enrolled in the study.

1.3 Sample Size:

A sample size of 100 patients were included in the study.

1.4 Selection Criteria:

1. Patients with a history of exposure to OP poison.

1.5 Exclusion Criteria:

1. Patients with OP poison mixed with any other poison
2. Patients with history of recent myocardial infarction
3. Patients who are chronic alcoholics
4. Patients with history suggestive of chronic liver disease and renal disease
5. Patients with history suggestive of myopathy
6. Patients with history of malignancy and autoimmune diseases
7. Non volunteering patients, minors, pregnant women, mentally challenged patients

1.6 Study Procedure

1. The clinical history includes history of consumption of organophosphorus compound and presentation to the hospital within 12 hours of consumption. Then the patients are graded as 1,2,3 according to the clinical findings based on Peredeniya Organophosphorus Poisoning (POP) scale. A score of 0-3 is assigned as mild, 4-7 moderate and 8-11 as severe poisoning. Blood samples are collected prior to the initiation of treatment for routine haematological and biochemical parameters like complete blood count, random blood sugar, blood urea, serum creatinine, total bilirubin, liver enzymes and other parameters like serum amylase, lactate dehydrogenase and cholinesterase. APACHE score is calculated for each patient which is an indicator of the degree of physiological derangement in critically ill patients. The prognostic significance of each parameter is then studied.

IV. Results

Among the study population, majority of the patients were male accounting for 73% of the study population. Most of the patients were of younger age of less than 30 years - 52 in number and 5 patients were more than 60 years age showing that the younger population may be more stressed both emotionally and economically and also may be because of the lack of social support. The youngest patient was 13 years old and the oldest was 83 years old. With respect to the symptomatology, most of the patients presented with SLUDGE symptoms mainly profuse sweating, secretions like salivation, bronchial secretion, urination etc. The most common sign was miosis which was present in 87% of patients followed by bradycardia in 71%, tachypnoea in 57%, disturbance in sensorium in 41% and fasciculation either localised or generalised in a lesser number of patients accounting to 32%. Convulsions were present in 8 patients. The patients were categorised into mild, moderate and severe poisoning using Peradeniya Organophosphorus Poisoning (POP) scale. 27 patients whose POP score was 0-3 were graded as mild poisoning, 57 patients with a POP score of 4-7 were categorised as moderate poisoning and 16 patients had a POP score of 8-11 and were graded as severe poisoning. The mortality, ventilator care and other biochemical parameters were compared in each group and the prognostic importance of each parameter was compared. The ventilator care needed in these cases was studied. All the 16 patients graded in severe poisoning needed ventilator support; whereas none of them in mild poisoning needed it. Among patients with moderate poisoning 77% needed ventilator care and 23% did not. The result was comparable to the previous studies(5.) The major biochemical parameters were then studied. Haemoglobin level did not show much correlation with a p value of 0.127. Total count showed significant correlation with a mean value of 5525.93 cells/mm³ in mild poisoning and a count of 11656.25 cells/mm³ in severe poisoning. The considerably higher leukocytes count observed in severe poisoning signified the stimulation of the defence mechanism and body's immune system.

In our study the mean glucose level was higher in severe poisoning when compared with mild poisoning. Both hypoglycaemia and hyperglycaemia were reported in OP poisoning. In our study 3 patients showed hypoglycaemia and 1 patient was presented with diabetic ketoacidosis. We observed that the glycaemic changes were more commonly associated with worsening grade of poisoning. It shows that a positive correlation

exist between the glycaemic changes and the severity of poisoning as determined by POP scoring. Various studies have showed renal injury and abnormally elevated renal parameters in patients with OP poisoning. Our study also showed progressive increase in blood urea and serum creatinine levels from mild to severe poisoning. This shows the stress on the kidney due to OP poisoning.

There is a significant increase in liver function both total serum bilirubin and transaminases in OP poisoning. The mean values of both increases from mild to severe poisoning and the association were statistically significant. As liver is the organ where the metabolism of organophosphorus compounds happens, high doses of the compound can cause extreme injury to the liver which is reflected in the liver function. The difference between mean serum LDH levels in survivors and non survivors was also statistically significant suggesting that that it is a reliable indicator for prognosis. The elevated LDH points to both muscle and cardiac injury. The mean amylase level in our study showed an increasing trend as the severity of poisoning increased according to the POP score. It has been shown that mild elevation of serum Amylase is seen in patients with OP poisoning. Organophosphorus compounds act by irreversibly inhibiting the plasma and RBC Cholinesterase enzymes, and so a decrease in the enzyme levels is confirmatory of poisoning. In our study there is a negative correlation between the serum cholinesterase level and the severity of poisoning with a p value of 0.011. The mean value showed a significant difference in survived and non-survived patients. One of the studies dealing with the prognostic importance of the enzyme cholinesterase was conducted by Tsao et al and found that respiratory failure developed almost in all patients classified into moderate and severe poisoning on the basis of the decrease in serum cholinesterase level.

The APACHE II score in study showed a positive correlation with the severity of poisoning. The APACHE II prognostic index was beneficial for stratifying the patients into different grades according to the severity of their poisoning. The higher the APACHE II score, the greater the mortality. The mortality was higher in severe poisoning in which all the 16 patients succumbed to death whereas all the 27 patients in mild poisoning survived. Out of the 57 patients in moderate poisoning, 13 died and 44 survived. This was in accordance with the previous studies. Thus the classification into different grades by POP scoring correlated well with the clinical severity of the poisoning and the mortality in our study.

V. Discussion

The overall mortality in the study was 29%. As mentioned earlier the patients were graded into mild, moderate and severe poisoning according to POP scoring. According to our study the ventilator care and mortality were higher in severe poisoning which shows that POP scoring is a good clinical indicator for assessing the prognosis in patients with acute OP poisoning. The different biochemical parameters were compared in each group. Haemoglobin level did not show much correlation. The total count was significantly high in the severe poisoning. The blood sugar was also elevated when the toxicity was more. The renal parameters - blood urea and serum creatinine were also higher in the severe poisoning group compared to the mild poisoning. The higher liver transaminases and bilirubin levels in severe poisoning was also correlated in our study. Other biochemical parameters like elevated Lactate Dehydrogenase and Serum Amylase also showed a correlation in severe poisoning. In conclusion, most of the biochemical parameters mentioned above show an early elevation in severe OP poisoning; which, when tested, can be used as an early indicator of severity. The serum cholinesterase level in our study also revealed a significant negative correlation which shows that cholinesterase level can be used as a prognostic marker indicating severity of the poisoning. APACHE II score also correlated well with the severity of poisoning. As the score increased the mortality also increased. As it is an assessment at the time of admission, it gives an early idea about the prognosis of the patient. To conclude early diagnosis and prompt institution of treatment is of utmost importance in acute OP poisoning. The different biochemical parameters and different ICU scoring systems like APACHE II help in categorising the patients into different grades of poisoning depending up on the severity of toxicity. This early categorisation helps in early detection of severe cases, so that, timely interventions like ventilator care and other supportive measures can be instituted at the earliest

VI. Conclusion

This study on biochemical parameters in patients with organophosphorus poisoning revealed that POP SCORING is one of the best scoring system to assess the need for ventilator care. APACHE II scoring is one of the better predictor of mortality. Blood parameters like Total Count, Random Blood Glucose, Blood Urea, Serum Creatinine, Serum Total Bilirubin, Serum transaminase enzymes, Serum Amylase, Serum Lactate Dehydrogenase were having positive correlation in assessing the severity of the Organophosphorus toxicity. Serum Choline Esterase levels had negative correlation in assessing the severity of the Organophosphorus toxicity.

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