IS pH A PREDICTOR OF PROGNOSIS IN ORGANOPHOSPHORUS COMPOUND POISONING

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ABSTRACT

Background: The Organ phosphorus (OPP) compounds are the most commonly used pesticides in the world. Their wide spread availability and ease of access and low cost also added to risk of poisoning. In Indian perspective a very limited literature has documented for the prognosis of OCP compound .In this proximity of the research gap the present study aims to to check the validity of pH as an early prognostic indicator in OP compound poisoning.

Methods: A cross sectional retrospective Analytical study conducted over a period of 10 months during 2012 -2012. All confirmed patients brought to ED with history of exposure to OP compound and clinical features of OP poisoning were included for the study, demographic profile and history of the patients were documented at greater accuracy.

Results: A total number of 57 cases were considered. The prognosis of patients with normal (%) pH was better than patients with low pH who had higher morbidity and mortality .The specificity and sensitivity of the compound is 78.56 and 80.55% respectively with highest positive predicted values (85.63) and prognosis was statistically significant when compared to age group of the patients .

Conclusion: OP compound poisoning is one of the most common insecticide poisonings in the world. In OP compound poisoning, pH at the initial admission is a good predictor of morbidity and mortality. The specificity and sensitivity would encompass the predictors of the OPP -poisoning.

KEYWORDS: Organphosphorus Compound (OPP), pH

INTRODUCTION

The organ phosphorus compound have helped greatly with green revolution but has also added to the risk of poisoning. OP compound poisoning can be due to occupational, accidental or intentional exposure. It is estimated by World Health Organization (WHO) that around 0.3 million people die every year due to various poisonings[5] among them 3 million people are poisoned with OP and 25000 are killed every year, particularly in Asian countries[1]. Poisoning is the fourth most common cause of mortality in rural India[10].The OP compounds likely to have more adverse effects in developing countries like India due to low cost and its easy availability and less awareness regarding toxicity, delayed presentation in turn leading to high morbidity and mortality[6].The OP compound acts by inhibiting acetylcholine esterase enzyme at nerve endings and neuromuscular junction, causing overstimulation of acetylcholine receptors. Signs and symptoms of poisoning are mainly due to muscarinic, nicotinic and central nervous system (CNS) receptor over-stimulation.

Gastric mucosa is permeable to organophosphates, and is a classical way of absorption in suicidal cases. Liver is the organ where activation and detoxification of organophosphate compound takes place, but they are eliminated primarily through kidneys. A patient death is usually occurs due to cardiovascular and respiratory failure, paralysis of respiratory muscles and obstruction caused by bronchospasm and bronchial secretions. The patients who had symptoms and signs of OP compound poisoning were initially evaluated and managed in the Emergency Room by stabilizing the Airway, Breathing & circulation. Blood is drawn for Arterial blood gas analysis, then they were administered atropine 0.5 to 2mg depending on the secretions and heart rate was maintained above 90 beats /min. An initial bolus dose of 20 to 40 mg/kg body weight of Pralidoxime (PAM) was given, followed by which a thorough body and stomach wash was given. Then patients were transferred to Intensive care unit for further management. The pH of any fluid is the measure of the hydrogen ion (H-) concentration. The lower the pH, the more acidic the blood A variety of factors affect blood pH including what is ingested, vomiting, diarrhea, lung function, endocrine function, kidney function.

METHODS AND MATERIALS

The Cross sectional analytical based retrospective study was conducted in the department of Emergency Medicine, PESIMSR, Kuppam, All confirmed cases of who were presented with OP poisoning between may 2012 - dec 2012.The records were assessed in two groups, with Group 1 having data related to recovery, and Group 2 having data related to mortality. Arterial blood gases, duration of the hospital stay, clinical outcome, and death were recorded systematically with greater accuracy and lesser error. Statistical analyses were done using R software version (2014) Fisher Exact tests were used to analyse the differences in means and proportions between the groups. All patients brought to emergency room with history of OP compound exposure and clinical features suggestive of OP compound poisoning, all patients meet with inclusion and exclusion criteria, Inclusion Criteria; all patients brought to the emergency room with the history of emergency room with exposure of OP compound and clinical features suggestive of OP compound poisoning. Exclusion Criteria' Patients whose data in the file could not be verified or was inadequate, Patients in whom clinical features were not suggestive of OP compound poisoning and patients who left against medical advice from the emergency room Total of 57 patients were included in the study. The requirement of ventilator and length of stay were taken as indicators of morbidity. Percentages and frequencies were given as frequency measures non parametric test was applied to calculate P value, if the variables are categorical.

RESULTS

In present study, 57 cases of OP poisoning were admitted during the study period. In our study Patients with pH of <7.25 only 33.3% patients recovered completely and 66.7% patients deceased, (p value 0.01). Patients with pH of 7.25 to 7.35, 92% of patients recovered completely. Among pH of 7.35 to 7.45 normal range 95.8% recovered completely (table 1).

Table 1: Comparison of Ph with Varied Prognosis

SL	Variables Ph Count	Recovery			Total
		1	2	3	
01	1	2(33.33%)	4(66.70%)	0.0(0.0%)	06(100.0%)
02	2	23(92.0%)	01(4.0%)	01(4.0%)	25(100.0%)
03	3	23(95.80%)	0(0.00%)	01(4.20%)	24(100.0%)
	P-Value	0.00**	0.26ns	0.33ns	

** Significant at 1% level (p<0.00), ns-non significant

The present study Patients with pH of <7.25 there is 66.7% mortality and with pH of 7.25 to 7.35 there is 4% mortality. With the p value of <0.01 Table 2 All the patients with pH of <7.25 needed ventilatory support. Among patients with pH of 7.25 to 7.35, 36% of cases needed ventilator support with (p value 0.001) Table 3. ICU stay was prolonged of more than 7 days in patients with pH of 7.25 to 7.35 with p value of 0.065 Table 1. The mortality was analyzed by using Kaplan Maier model as per the analysis the mortality were found to be significantly associated with ph and prognosis (Negenkel R-Square value was 85.67) p<0.00

Table 2: Comparison of Ph WITH ICU Stay

Crosstab					
Count					
		ICU STAY			Total	P-Value
		1	2	3		
PH	1	0	0	6	6	0.11ns
	2	2	5	18	25	0.00**
	3	5	10	9	24	0.00**
	4	0	0	2	2	0.85ns
Total		7	15	35	57	

DISCUSSIONS

The normal blood pH is tightly regulated between 7.35 and 7.45. Plasma hydrogen ion concentration ($[H+]$) *is normally 40 nmol/L, corresponding to a pH of 7.4. Respiratory minute volume actually declines when pH decreases below 7.10[7]. The development of metabolic acidosis that drives the pH below 7.10 is likely associated with a very high risk of inadequate ventilation response[7]. Acidemia has numerous negative physiologic consequences that impair the function of enzymes as well as many different organs through mechanisms not yet well understood. Cardiac contractile function is reduced, likely due to impaired oxidative phosphorylation, intracellular acidosis, and alterations in intracellular calcium concentrations. The threshold for ventricular fibrillation falls as the defibrillation threshold rises. Hepatic and renal perfusion and systemic blood pressure decline, and pulmonary vascular resistance increases. The physiologic effects of catecholamines are attenuated, and when acidosis is sufficiently severe, vascular collapse may result. Many studies were conducted on OP poisoning, in one study pH values patients were observed to be similar among those who survived and those who died[8] where as in an another study pH values were significantly lower among those who had respiratory failure in comparision with those without respiratory problems.[9] Another study done in turkey during the period of April 2004 to April 2013, 296 patients were studied and found that presence of low pH is an independent predictor of mortality.[1] While our study reports a mortality rate of 66.7% with low pH. Present study pH values of patients were observed to be >7.25 among the survivors. Where as, the deceased patients with defined exposures of OP compound poisoning, pH is <7.25 with significant mortality was 66.7% (p=0.01). Analysis was also says that patients with low pH were having prolonged ICU stay for more than 7 days (p=0.65) and among patients who were deceased pH was <7.25 with (p=0.000).

CONCLUSIONS

The present study concludes that, among all the patients of insecticide poisoning presenting in casualty, majority of the cases were seen Organ phosphorus compound poisoning. The Patients with initial pH of <7.25 were observed to have prolonged hospital stay and well needed to be the mechanical ventilation as compared to pH >7.25. The Mortality would be higher among the patients with pH < 7.25.

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