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Original Research Article

To Correlate Glycemic Status in Acute Op Poisoning with Severity and Clinical Outcome

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Abstract

Background: Organophosphorus (OP) poisoning, in addition to its cholinergic manifestations shows metabolic derangements leading to hyperglycaemia. The present study aims to assess the glycaemic status of OP poisoned patients and its association with severity and clinical outcome. Random blood sugar (RBS) level is an important factor influencing the severity of organophosphorus (OP) compound poisoning. RBS and its association with POP Scale can be used as a prognostic and mortality indicator in OP compound poisoning. ***Objectives of the study****:* 1. To estimate Serum Pseudocholinesterase and Random blood glucose levels in Acute OP Poisoning. 2. To correlate with the clinical criteria described by the POP scale at initial presentation and the severity of poisoning. ***Methods:*** This is a prospective study done on 90 patients above 18 years of age admitted to hospitals attached to Bangalore Medical College and Research Institute with history of Acute OP poisoning from November 2018 to May 2020. They were categorized into 3 grades-mild, moderate and severe based on the Peradeniya Organophosphorus Poisoning Scale. The routine biochemical parameters along with serum cholinesterase and Random blood glucose level were estimated in the study group. ***Results:*** Hyperglycaemia (RBS>200) was observed in 18(20%) of patients. Mean age group of patients was 32.68. Out of 90 subjects, 18 subjects had RBS levels above 200 and 72 subjects had RBS levels less than 200. Out of 18 subjects, 7 had mild POP scale, 8 had moderate POP scale and 3 had severe POP scale. Out of 18(100%) subjects having RBS scores of above 200, there were 7(38.9%) mortality noted (2-mild, 2-modertae and 3 severe POP scale). Out of 72(100%) subjects having RBS scores less than 200, there were 2(2.8%) mortality noted (1-modertae and 1 severe POP scale).Chi- square test showed significant association between POP scale and mortality in group having above 200 RBS levels($p<0.05$). ***Conclusions:*** Glycemic status and POP Scale at the time of presentation in OP poisoning may play a role in predicting the need for ICU, Ventilator and Mortality in peripheral health centres in developing countries.

Keywords: Organophosphorous poisoning (OP), Peradeniya Organophosphorous Poisoning (POP).

INTRODUCTION

OP poisoning has become a significant cause of death in developing nations and is the most frequently used method of suicide. The incidence is higher in adolescent and young people with mortality rate ranges from 4-30% in Indian studies [1].

OP compound being an irreversible acetyl cholineesterase inhibitor increases the acetyl choline level at both the nicotinic as well as muscarinic receptors and produce symptoms at their respective sites [2].

Respiratory failure is most common complication leading to death. Early recognition and ventilatory support may improve survival. Owing to limitations all OP poisoning are not managed in ICU [3].

Mortality among organophosphorous (OP) poisoning patients despite advancements in its management is of concern. Of the various contributing factors, extremes and fluctuation in the glycemic status is a well-documented parameter affecting the outcomes in critical illness although studies with respect to OP poisoning are deficient. All varieties of glycemic changes from hypoglycemia to hyperglycemia and ketoacidosis in OP poisoning along with other toxicological effects are reported, studies corroborating these findings are only few [4].

Organophosphorus compounds inhibit cholinesterase allowing accumulation of acetylcholine at cholinergic sites resulting in continuous stimulation of cholinergic sites leading to marked increase in catecholamines which can lead to hyperglycemia [5].

The Peradeniya organo phosphorous poisoning scale assesses the severity of the poisoning based on the symptoms of presentation and it is simple to use POP Scale includes pupil size, respiratory rate, heart rate, fasciculation, level of consciousness &seizures [6]. At admission patients are classified based on POP score into mild, moderate or severe. The serum Pseudocholinesterase and Random blood sugar levels are measured on admission. The outcome in each group in terms of need for ventilatory support and mortality were noted.

METHODOLOGY

A study was conducted on 90 Organophosphorous poisoning patients who were admitted in hospitals attached to BMCRI between November 2018 to May 2020. History was taken, general physical examination and a detailed systemic examination was done. On admission Random blood sugars and serum pseudocholinesterase levels were measured and assessment was also done based on POP scoring system. Need for ventilator support and clinical outcome including mortality was noted and results statically analyzed using P values.
Study design: Prospective Analytical study

Objectives of the study

1. To estimate Serum Pseudocholinesterase and Random blood glucose levels in Acute OP Poisoning.
2. To Correlate with the clinical criteria described by the POP scale at initial presentation and the severity of poisoning.

Inclusion Criteria

1. All patients above 18 years of age.
2. Patients willing to give informed consent.
3. Patient with alleged history of OP poisoning (ingestion/ inhalation/ contamination) & diagnosed to have consumed OP poison within 24 hrs of presentation.

Exclusion Criteria

1. Patients less than 18 years of age.
2. Patients with history of consumption of OP compound with other poison/drugs.
3. Patients with diabetes mellitus,chronic pancreatitis, chronic liver disease, chronic kidney disease.
4. OP Poisoning more than 24hrs prior to admission.
5. Patients who don't give informed consent.

STATISTICAL METHODS

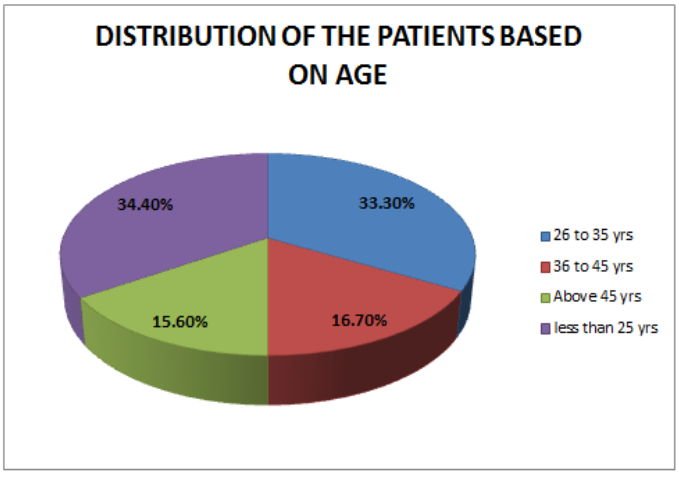
Based on previous study sample size was calculated and 90 patients were included the study. The data collected were analyzed statistically using descriptive statistics namely mean, standard deviation, percentage wherever applicable.

Correlation between the POP scale severity of poisoning and the Serum Pseudocholinesterase level and Glycemic status are evaluated using Pearson correlation co-efficient.

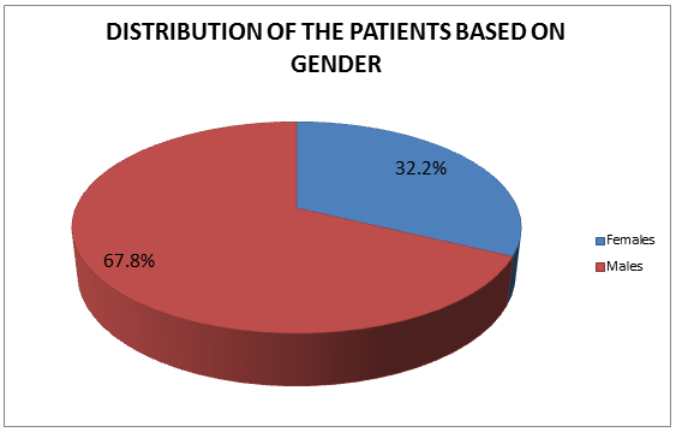
The Statistical softwares used for data analysis were namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1 Systat 12.0 and Microsoft word and Excel have been used to generate tables and graphs etc

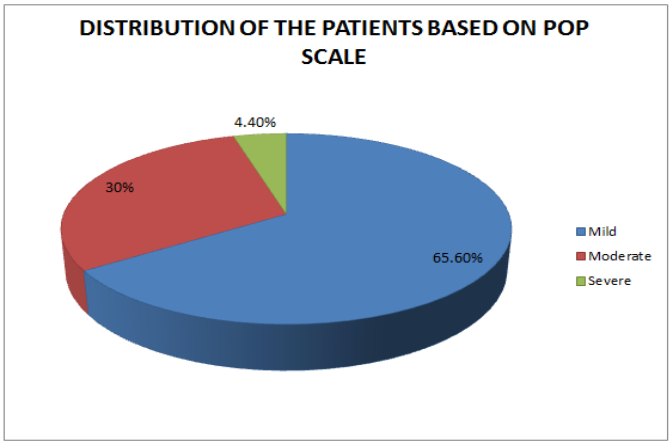
RESULTS

In this study 90 cases of OP poisoning admitted to hospitals attached to Bangalore medical college and research institute were considered. Commonest age group involved were less than 25 years. Males were the most common with male to female ratio of 2:1.



Out of 90(100%) patients, 31(34.4%) patients were less than 25 yrs followed by 30(33.3%) patients with 26 to 35 yrs, 15(16.7%) patients with 36 to 45 yrs and 14(15.6%) patients above 45 yrs. Out of 90(100%) patients, 61(67.8%) were males and 29(32.2%) were females



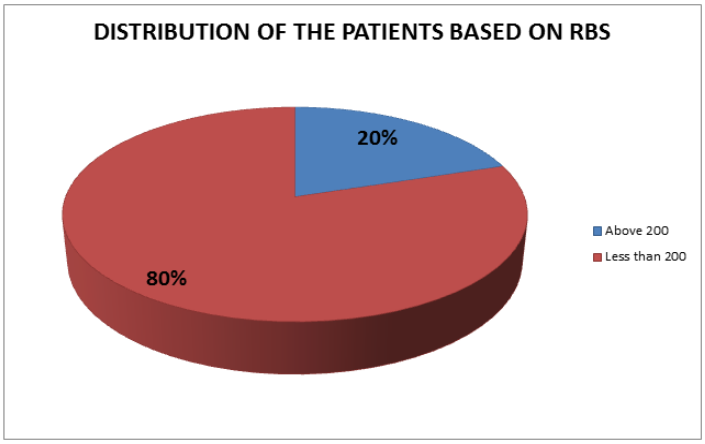


Out of 90(100%) patients, 59(65.6%) patients were having mild POP scale followed by 27(30%) had moderate POP scale and 4(4.4%) had severe POP scale

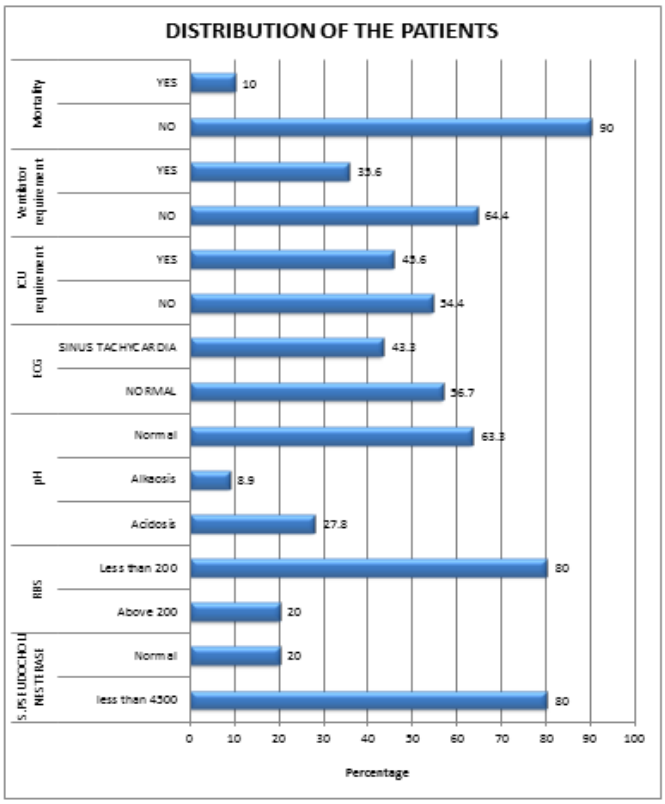
Table-1: Distribution of the patients based on s.pseudocholinesterase and rbs

	N	Minimum	Maximum	Mean	Std. Deviation
S.PSEUDOCHOLINESTERASE	90	25	10259	2280.14	2619.327
RBS	90	53	297	135.86	61.426

Mean serum Pseudocholinesterase was 2280.14 ± 2619.327 and mean RBS levels were 135.86 ± 61.426.



Out of 90(100%) patients, 72(80%) were having less than 200 RBS scores and 18(20%) patients were having above 200.



Out of 90(100%) patients, 72(80%) patients had less than 4500 serum pseudocholinesterase levels, 18(20%) patients had RBS levels above 200, 25(27.8%) patients had acidosis, 39(43.3%) patients had sinus tachycardia, 41(45.6%) patients had ICU requirement, 32(35.6%) patients had ventilator requirement and 9(10%) had mortality.

Table-2: Distribution of the patients based on mortality

RBS	POP	ICCCU	Ventilator	Mortality	Frequency
Above 200(18)	MILD(7)	NO (2)	NO(2)	NO	2
		YES(5)	NO (1)	NO	1
			YES (4)	NO	2
				YES	2
				Total	4
	MODERATE (8)	YES(8)	YES (8)	NO	6
				YES	2
				Total	8
	SEVERE (3)	YES (3)	YES (3)	YES	3
Less than 200(72)	Mild (52)	NO (44)	NO (44)	NO	44
		YES (8)	NO (4)	NO	4
			YES (4)	NO	4
	MODERATE(19)	NO (3)	NO (3)	NO	3
		YES(16)	NO (4)	NO	4
			YES(12)	NO	11
				YES	1
				Total	12
	SEVERE(1)	YES (1)	YES(1)	YES (1)	1

Out of 90 patients, 18 patients had RBS levels above 200 and 72 patients had RBS levels less than 200. Out of 18 patients, 7 had mild POP scale, 8 had moderate POP scale and 3 had severe POP scale. There were 7 mortality (2-mild, 2-modertae and 3 severe POP scale) in above 200 RBS group. Only 2 mortality case noted in less than 200 RBS group which had moderate and severe POP scale each.

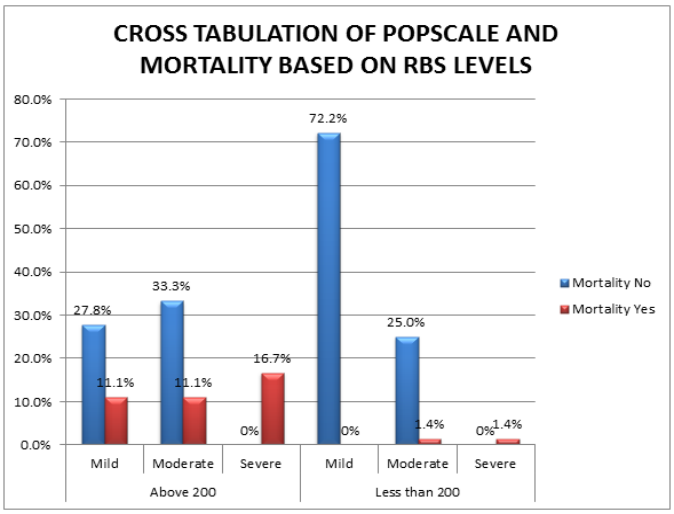
Table-3: Cross tabulation of popscale and mortality based on rbs levels

RBS	POP SCALE		MORTALITY		Total	Chi-square value	p value
			NO	YES			
Above 200	MILD	Count	5	2	7	20.8	<0.05*
		%	27.8%	11.1%	38.9%		
	MODERATE	Count	6	2	8		
		%	33.3%	11.1%	44.4%		
	SEVERE	Count	0	3	3		
		%	0.0%	16.7%	16.7%		
	Total	Count	11	7	18		
		%	61.1%	38.9%	100.0%		
Less than 200	MILD	Count	52	0	52		
		%	72.2%	0.0%	72.2%		
	MODERATE	Count	18	1	19		
		%	25.0%	1.4%	26.4%		
	SEVERE	Count	0	1	1		
		%	0.0%	1.4%	1.4%		
	Total	Count	70	2	72		
		%	97.2%	2.8%	100.0%		

*significant

Out of 18(100%) patients having RBS scores of above 200, there were 7(38.9%) mortality noted (2-mild, 2-modertae and 3 severe POP scale). Out of 72(100%) patients having RBS scores less than 200, there were 2(2.8%) mortality noted (1-modertae and 1 severe POP scale).

Chi-square test was applied to check the association between POP scale and mortality. Chi-square test showed significant association between POP scale and mortality in group having above 200 RBS levels($p<0.05$)



DISCUSSION

Organophosphorous compound poisoning is a common health problem in developing countries. The major cause of morbidity and mortality in OP poisoning is respiratory failure and patients may require ventilator support & ICU care. But in developing nations like India, where ICU facility may be limited, stratification of patients carrying high risk of developing respiratory failure and intense monitoring of those patients, play a crucial role in reducing mortality.

In the current study demographic details of the study participants were studied in which 61(67.8%) were males and 29(32.2%) were females. Similar male preponderance was observed by Rajeev H et al. also, in their studies [8]. In our study Mean age of the subjects is 32.68 ± 12.083 with minimum age of 18 yrs and maximum age of 68 yrs. In our study 31(34.4%) subjects were less than 25 yrs followed by 30(33.3%) subjects with 26 to 35 yrs, 15(16.7%) subjects with 36 to 45 yrs and 14(15.6%) subjects above 45 yrs. Studies done by Goel et al. [9] have shown that OPC poisoning is common in the age group of 21-30 years.

In our study 59(65.6%) subjects were having mild POP scale followed by 27(30%) had moderate POP scale and 4(4.4%) had severe POP scale. The study done by R Raghapriya et al. [4]. which had mild,

moderate and severe were 53%, 47% and 0% respectively.

In our study out of 90 subjects, 72(80%) were having less than 200 RBS scores and 18(20%) subjects were having above 200 which was similar to a study done by Raveendra K. R et al. in which patients were categorized into hypoglycemics (10%), euglycemics (75%) and hyperglycemic (15%) respectively. In this study out of 18 subjects, 7 had mild POP scale, 8 had moderate POP scale and 3 had severe POP scale. There were 7 mortality (2-mild, 2-modertae and 3 severe POP scale) in above 200 RBS group. Only 2 mortality cases noted in less than 200 RBS group which had moderate and severe POP scale each.

In our study out of 18 subjects having RBS scores of above 200, there were 7(38.9%) mortality noted (2-mild, 2-modertae and 3 severe POP scale). Out of 72(100%) subjects having RBS scores less than 200, there were 2(2.8%) mortality noted (1-modertae and 1 severe POP scale).Chi- square test showed significant association between POP scale and mortality in group having above 200 RBS levels ($p<0.05$). The present study showed that there was mortality of (39%) in patients with hyperglycemia which was statistically significant ($p<0.05$). It was comparable with the study done by Ravi B N et al. [5] where there was mortality of (33%) in patients with hyperglycemia.

CONCLUSIONS

Hyperglycemia (RBS > 200 mg/d)l along with POP Scale can be considered as a useful factor in predicting the need for ventilator, morbidity and mortality of in acute organophosphorus poisoning.Organophosphorus compounds inhibit cholinesterase allowing accumulation of acetylcholine at cholinergic sites resulting in continuous stimulation of cholinergic sites leading to marked increase in catecholamines which can lead to hyperglycemia [5]. The effect of stress hormones, Overproduction of proinflammatory cytokines, Pancreatic insufficiency, and Altered hepatic metabolism may also contribute to hyperglycemia[4].

Hyperglycemia in known to be deleterious in critical illness as they increase the overall complications, morbidity and mortality [10]. Hyperglycemia can lead to critical illness neuropathy which may cause respiratory failure, other complications,increased need and duration of mechanical ventilator support and mortality.

Since respiratory failure is most common complication leading to death in op poisoning,early recognition and ventilatory support may improve survival. The POP scale assesses the severity of the poisoning based on the symptoms of presentation and it is simple to use. It can be used in assessing severity of OP poisoning where serum Pseudo cholinestereise is not available. Random blood sugar levels can also be used in diagnosis or stratifying severity of acute OP poisoning as it is cheap and easily available. Hence Glycemic status and POP Scale at the time of presentation in OP poisoning may play a role in predicting the need for ICU, Ventilator and Mortality in peripheral health centres in developing countries.

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