

## Correlation of Serum Pseudocholinesterase Level And Peradeniya Organophosphorus Poisoning Scale In Acute Organophosphorus Poisoning Admitted In Medical College, Trivandrum

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### **STRUCTURED ABSTRACT:**

#### **INTRODUCTION:**

Organophosphorus (OP) compounds are commonly used for suicide in rural India. The rate of OP poisoning as a suicidal agents ranges from 10.3% to 43.8% in various studies in India. So present study was done to find the correlation of serum Pseudocholinesterase level and Peradeniya Organophosphorus Poisoning scale with the severity and in hospital outcome of acute organophosphorus poisoning.

#### **OBJECTIVES:**

To find the correlation of serum pseudocholinesterase level and Peradeniya Organophosphorus Poisoning scale (POP) in cases of acute organophosphorus poisoning admitted in Government Medical College, Thiruvananthapuram. To assess the clinical outcomes and severity in acute op poisoning.

#### **MATERIALS AND METHODS:**

This was a Hospital based descriptive, observational study carried out in department of internal medicine, medical college Thiruvananthapuram. The study was carried out for 1 year from June 2020 to June 2021 After obtaining institutional ethics committee clearance, 70 patients was enrolled to my study – all those who satisfy the inclusion criteria and consent to take part in the study. For all statistical interpretations,  $P < 0.05$  was considered the threshold for statistical significance Data analysis was done using SPSS 20.0 software. After getting consent from the by standers patient will be assessed based on the profoma containing all the variables. Profoma was filled in written format after assessing the clinical status of patient and eliciting a detailed history from the bystanders. 4 ml of venous blood sample will be collected from the patient to assess the serum

pseudocholinesterase level. Both blood sample and profoma filling was done at the time of admission. POP score was also calculated at the time of admission. Suitable statistical methods applied to assess correlation and variables.

#### **RESULTS:**

In present study, the majority of patients were in the age group of 21-30 years (54.3%) with a mean age of 30yrs with standard deviation of 10.9 yrs. Our present study showed the following clinical manifestations, bradycardia (71.5%) miosis (34.3%), tachypnea with cyanosis (8.6%), altered sensorium (57.2%), fasciculations-both generalized and continuous (10%) and seizure (11.4%). Pseudocholinesterase was measured at the time of admission and on analysis it was found that lower pseudocholinesterase was found in patients with severe clinical manifestation. The POP scale was calculated for all patients at initial presentation. There was the significant correlation between the severity of poisoning categorized by the POP scale and the serum cholinesterase at the time of initial presentation of the patients ( $P < 0.001$ ).

#### **CONCLUSION:**

Present study concluded that there is a significant correlation between the severity of poisoning and degree of derangement of serum cholinesterase level at the initial presentation. The higher the POP scale, the higher was the degree of derangement in the serum cholinesterase level. Both serum cholinesterase and POP scale are an important tool for the diagnosis of the severity of OP poisoning. The facility of estimation of serum cholinesterase is not available in all centres of India. In that case, POP scale can be used to describe the severity of OP poisoning. Timely administration of an antidote sufficient dose and duration are much more important in the patients with evidence of a moderate and severe degree of OP

poisoning. Such patients need to be monitored and observed closely with good supportive care. Larger population- based studies are needed as the study group is just adequate.

consumed. Bystanders who are giving consent to study is included.

**STUDY POPULATION:**

**Inclusion criteria:**

A history of exposure to organophosphorus compound within previous 24 hours as indicated by patient or relatives or the referring doctor, with characteristic clinical manifestations of organophosphorus compound poison and physical evidence of the poison

**Exclusion criteria:**

- Patients with chronic medical conditions or diseases that are likely to alter the respiratory effort due to organophosphorous compound poisoning.
- Patients who consumed other poisons along with organophosphorus compound.
- Patients with chronic lung disease.
- Patients who have consumed poison along with alcohol.
- Patients with chronic liver disease

**Table 1: Peradeniya organophosphorus poisoning (POP) scale**

Parameter	Criteria	Score
Pupil size	≥2 mm	0
	<2 mm	1
	pinpoint	2
Respiratory rate	<20/min	0
	≥20/min	1
	≥20/min with central cyanosis	2
Heart rate	>60/min	0
	41-60/min	1
	<40/min	2
Fasciculation	None	0
	Present, generalized/ continuous	1
	Both generalized and continuous	2
Level of consciousness	Conscious and rationale	0
	Impaired response to verbal command	1
	No response to verbal command	2
Seizures	Absent	0
	present	1
0-3: mild poisoning, 4-7: moderate poisoning, 8-11: severe poisoning		

**OBSERVATION AND RESULTS:**

Age in years	Frequency	Percent
≤20	9	12.9
21 - 30	38	54.3
31 - 40	14	20
41 - 50	5	7.1
51 - 60	1	1.4
>60	3	4.3
<b>Total</b>	70	100

Sex	Frequency	Percent
Male	43	61.4
Female	27	38.6
<b>Total</b>	70	100

SES	Frequency	Percent
Upper	3	4.3
Upper middle	9	12.9
Lower middle	10	14.3
Upper lower	20	28.6
Lower	28	40
Total	70	100

Pupil size	Frequency	Percent
>2mm	14	20
<2mm	32	45.7
Pin Point	24	34.3
Total	70	100

Respiratory rate	Frequency	Percent
<20/min	15	21.4
>20/min	49	70
>20/min with cyanosis	6	8.6
Total	70	100

Heart rate	Frequency	Percent
>60/min	20	28.6
41-60/min	27	38.6
<40/min	23	32.9
Total	70	100

Level of consciousness	Frequency	Percent
Conscious and rationale	30	42.9
Impaired response to verbal commands	27	38.6
No response to verbal commands	13	18.6
Total	70	100

Fasciculations	Frequency	Percent
None	41	58.6
Present-generalized or continuous	22	31.4
Both generalized and continuous	7	10
Total	70	100

Seizure	Frequency	Percent
Absent	62	88.6
Present	8	11.4
Total	70	100

Serum pseudocholinesterase(U/L)	Frequency	Percent
Normal(>5000)	34	48.6
Mild(4500-5000)	20	28.6
Moderate(2500-4499)	10	14.3
Severe(<2500)	6	8.6
Total	70	100

POP scale	Frequency	Percent
Mild(0-3)	36	51.4
Moderate(4-7)	24	34.3
Severe(8-11)	10	14.3
Total	70	100

PUPIL	SERUM PSEUDOCHOLINESTERASE				Totaln(%)
	Normal n(%)	Mild n(%)	Moderate n(%)	Severe n(%)	
>2mm	13(38.2)	1(5)	0(0)	0(0)	14(20)
<2mm	19(55.9)	10(50)	3(30)	0(0)	32(45.7)
Pin Point	2(5.9)	9(45)	7(70)	6(100)	24(34.3)
<b>Total</b>	34(100)	20(100)	10(100)	6(100)	70(100)
		$\chi^2$	Df	P	
Chi-Square test		35.18	6	0.000	

Respiratory Rate	SERUM PSEUDOCHOLINESTERASE				Totaln(%)
	Normal n(%)	Mild n(%)	Moderate n(%)	Severe n(%)	
<20/min	14(41.2)	1(5)	0(0)	0(0)	15(21.4)
>20/min	16(47.1)	19(95)	10(100)	4(66.7)	49(70)
>20/min with cyanosis	4(11.8)	0(0)	0(0)	2(33.3)	6(8.6)
<b>Total</b>	34(100)	20(100)	10(100)	6(100)	70(100)
		$\chi^2$	Df	P	
Chi-Square test		25.04	6	0.000	

Heart Rate	SERUM PSEUDOCHOLINESTERASE				Totaln(%)
	Normal n(%)	Mild n(%)	Moderate n(%)	Severe n(%)	
>60/min	18(52.9)	2(10)	0(0)	0(0)	20(28.6)
41-60/min	12(35.3)	13(65)	2(20)	0(0)	27(38.6)
<40/min	4(11.8)	5(25)	8(80)	6(100)	23(32.9)
<b>Total</b>	34(100)	20(100)	10(100)	6(100)	70(100)
		$\chi^2$	Df	P	
Chi-Square test		40.95	6	0.000	

Level of consciousness	SERUM PSEUDOCHOLINESTERASE				Totaln(%)
	Normal n(%)	Mild n(%)	Moderate n(%)	Severe n(%)	
Conscious and rationale	26(76.5)	4(20)	0(0)	0(0)	30(42.9)
Impaired response to verbal commands	6(17.6)	15(75)	5(50)	1(16.7)	27(38.6)
No response to verbal commands	2(5.9)	1(5)	5(50)	5(83.3)	13(18.6)
<b>Total</b>	34(100)	20(100)	10(100)	6(100)	70(100)
		$\chi^2$	Df	P	
Chi-Square test		53.88	6	0.000	

Fasciculations	SERUM PSEUDOCHOLINESTERASE				Totaln(%)
	Normal n(%)	Mild n(%)	Moderate n(%)	Severe n(%)	
None	18(52.9)	2(10)	0(0)	0(0)	20(28.6)
Present-generalized or	12(35.3)	13(65)	2(20)	0(0)	27(38.6)

continuous					
generalized and continuous	4(11.8)	5(25)	8(80)	6(100)	23(32.9)
<b>Total</b>	34(100)	20(100)	10(100)	6(100)	70(100)
		$\chi^2$	Df	P	
	Chi-Square test	40.95	6	0.000	

Seizure	SERUM PSEUDOCHOLINESTERASE				Totaln(%)
	Normal n(%)	Mild n(%)	Moderate n(%)	Severe n(%)	
Absent	33(97.1)	18(90)	8(80)	3(50)	62(88.6)
Present	1(2.9)	2(10)	2(20)	3(50)	8(11.4)
<b>Total</b>	34(100)	20(100)	10(100)	6(100)	70(100)
		$\chi^2$	Df	P	
	Chi-Square test	12	3	0.007	

POP scale	SERUM PSEUDOCHOLINESTERASE(U/L)				Totaln(%)
	Normal(>5000)n(%)	Mild(4500-5000)n(%)	Moderate(2500-4499)n(%)	Severe(<2500)n(%)	
Mild(0-3)	34(100)	2(10)	0(0)	0(0)	36(51.4)
Moderate(4-7)	0(0)	18(90)	6(60)	0(0)	24(34.3)
Severe(8-11)	0(0)	0(0)	4(40)	6(100)	10(14.3)
<b>Total</b>	34(100)	20(100)	10(100)	6(100)	70(100)
		$\chi^2$	df	P	
	Chi-Square test	107.5	6	0.000	

## DISCUSSION:

Organophosphorus compound poisoning is the global health burden with particularly higher prevalence rate in developing countries. In clinical practice, it is very difficult to evaluate the severity and predict outcomes without early biomarker. The highly variable history of patients and difficulty determining the actual dose and types of the poisoned compound make further challenging to predict the clinical outcome because people admitted in fairly good condition can rapidly deteriorate and may need mechanical ventilation. In this study, we measured serum SChE and established clinical severity scale to determine the several clinical correlations and outcomes after treatment. The present study was conducted at the Department of General Medicine, Government Medical College, Thiruvananthapuram. A total of 70 cases were studied. The clinical and diagnostic findings of this study are compared with studies in the literature. In present study, the majority of patients were in the age group of 21-30 years (54.3%) with a mean age of 30yrs with standard deviation of 10.9 yrs in comparison to studies done by Bhattari et al(1), twayana et al(36), Ravi chethan et al(37).

This study revealed a male preponderance (61.4%), females accounting for 38.6% of cases. The male to female ratio in this study is 1.5:1. This comparable to the results shown by Ravi chethan et al(37). Whereas bhattari et al(1) and twayana et al(36) showed female preponderance in their studies.

Rehiman S et al(34) and Ravi chethan et al(37), showed that bradycardia(68%), miosis (28%), tachypnea (21%), altered sensorium(28%), fasciculations(15%) and seizure(10%) are commonly present in OP poisoning patients. Our present study showed the following clinical manifestations, bradycardia (71.5%) miosis(34.3%), tachypnea with cyanosis(8.6%), altered sensorium (57.2%), fasciculations-both generalized and continuous (10%) and seizure (11.4%) These clinical features are due to increased muscarinic, nicotinic and central effects of acute cholinergic manifestations of OP poisoning. Clinical manifestation depends upon type of OP compound.

In our study pseudocholinesterase was measured at the time of admission. Already in studies done by hiremath et al(35), twayana et al(36), Rehiman S et al(34) and Ravi chethan et al(37) and bhattari et al(1) had showed significant correlation between the prognosis of patients and with the degree of fall in pseudocholinesterase level. Similarly in our present study there was significant correlation between patients with severe symptoms( bradycardia , miosis, tachypnea with cyanosis, altered sensorium, fasciculations-both generalized and continuous and seizure ) at presentation and the degree of fall in pseudocholinesterase level. So from the analysis our study confirmed that

pseudocholinesterase level can be used to predict the prognosis of the patients at the time of presentation.

The POP scale was calculated for all patients at initial presentation. POP scale is a clinical symptoms based score. It includes the following parameters-pupil size, respiratory rate, heart rate, fasciculations, level of consciousness, seizures. It is graded as mild (0-3), moderate (4-7), severe (8-11). Studies like Hiremath et al (35), Twayana et al (36), Rehiman S et al (34) and Ravichethan et al (37) had already showed that patients with higher POP score at the time of presentation was associated with severe symptoms and poor prognosis. In our study, 51.4% of patients had a mild grade of poisoning and 34.3% had a moderate grade of poisoning. 14.3% patients had severe poisoning with scores more than 8 according to POP scoring system. Serum cholinesterase levels was classified according to Proudfoot classification (subclinical >5000 U/L, mild-4500 to 5000 U/L, moderate-2500 to 4499 U/L and severe <2500 U/L poisoning). In present study 48.6% of patients had normal level, 20% had mild level, 10% had moderate level and 8.6% had severe level of pseudocholinesterase. There was the significant correlation between the severity of poisoning categorized by the POP scale and the serum cholinesterase at the time of initial presentation of the patients ( $P < 0.001$ ). This comparable to the results shown by Hiremath et al (35), Twayana et al (36), Rehiman S et al (34) and Ravi chethan et al (37).

In the present study, it was found that only 8.6% are diabetic, 11.4% are hypertensive, 12.9% have dyslipidemia and 1.4% had CAD. This is because in our study population most of the people belong to the age group of 21-30 yrs. In the present study there is no significant correlation found between pseudocholinesterase level and comorbid conditions (Diabetes, systemic hypertension, CAD and dyslipidemia). In our study population only 14.3% are psychiatric patients. So it was found that most of the patients most the patients had no previous psychiatric disorder and they had no previous history of suicidal attempts.

The current study observed the significant correlation between the degree of derangement in serum cholinesterase level and severity of poisoning at the initial presentation. Higher the score on the POP scale, the greater was the degree of derangement in the serum cholinesterase level.

### **CONCLUSION:**

Present study concluded that there is a significant correlation between the severity of poisoning and degree of derangement of serum cholinesterase level at the initial presentation. The higher the POP scale, the higher was the degree of derangement in the serum cholinesterase level. Both serum cholinesterase and POP scale are an important tool for the diagnosis of the severity of OP poisoning. The facility of estimation

of serum cholinesterase is not available in all centres of India. In that case, POP scale can be used to describe the severity of OP poisoning. Timely administration of an antidote sufficient dose and duration are much more important in the patients with evidence of a moderate and severe degree of OP poisoning. Such patients need to be monitored and observed closely with good supportive care. Larger population-based studies are needed as the study group is just adequate.

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