

PSEUDOCHOLINE ESTERASE AND LIVER ENZYMES IN PATIENT WITH ORGANOPHOSPHATE POISONING IN A TERTIARY CARE HOSPITAL, MYSORE

*Arathi M. R. and Ramesh S. S.

Department of General Medicine Mysore Medical College and Research Institute, Mysore 570001.

Received on: 20/03/2023

Revised on: 10/04/2023

Accepted on: 30/04/2023

*Corresponding Author

Arathi M. R.

Department of General
Medicine Mysore Medical
College and Research
Institute, Mysore 570001.

ABSTRACT

Introduction: Organophosphates compounds are commonly used in the agriculture as an insecticide. Organ phosphorus compounds are one of the most common causes of insecticide poisoning worldwide leading to high degree of morbidity and mortality. The primary mechanism of action by OP and carbamate insecticides is the inhibition of acetylcholinesterase (AChE), an enzyme that catalyzes the hydrolysis of the neurotransmitter acetylcholine. The liver is the main organ that metabolizes various compounds including toxins, chemicals and drugs and eventually excretes from the body. The toxicity of organophosphorus compounds is mediated by generation of free radicals which may alter the liver metabolism and is evidenced by changes in level of its enzyme. This study aimed to determine liver transaminases (AST and ALT) and bilirubin levels to assess the severity of poisoning in patients with acute OP and carbamate poisoning. **Materials and Methods:** This was a retrospective study, and data was collected with the help of medical records department. This study included patients with organophosphate poisoning admitted between AUGUST 2020 and DECEMBER 2021 at a dedicated tertiary hospital in MYSURU, KARNATAKA **Results:** Mean age was 44: Males 58.66%, Females 41.3% Mild cases were 21, moderate cases were 37, severe cases were 17. Total 2 patients died. Mean ALT levels mild cases were 32.82 (8.52), moderate cases were 45.03 (12.41), severe cases were 48.90 (19.07) with p value 0.002. AST level in mild cases were 37.65 (6.49), moderate cases were 45.03 (12.41) and severe cases 53.80 (18.59) with p value <0.001. Pseudo choline esterase levels in mild cases was 7349.59, moderate cases were 2608.76 and severe cases was 1020.30 with p value <0.001. AST and ALT levels on admission showed significant correlations with the severity of poisoning. **Conclusion:** AST and ALT levels on admission showed significant correlations with the severity of poisoning.

INTRODUCTION

Organophosphates compounds are commonly used in the agriculture as an insecticide.^[1]

Organ phosphorus compounds are one of the most common causes of insecticide poisoning worldwide leading to high degree of morbidity and mortality. Evidence suggests that OP poisoning has become a major toxicological threat to humans and animals through various toxic effects such as neurotoxicity, endocrine toxicity, reproductive toxicity, immunotoxicity, and disruption of glucose homeostasis. The primary mechanism of action by OP and carbamate insecticides is the inhibition of acetylcholinesterase (AChE), an enzyme that catalyzes the hydrolysis of the neurotransmitter acetylcholine.^[2] The liver is the main organ that metabolizes various compounds including toxins, chemicals and drugs and eventually excretes from the body.^[3] The toxicity of organophosphorus compounds is mediated by generation of free radicals which may alter the liver metabolism and is evidenced

by changes in level of its enzyme. This study aimed to determine liver transaminases (AST and ALT) and bilirubin levels to assess the severity of poisoning in patients with acute OP and carbamate poisoning.

MATERIALS AND METHODS

This was a retrospective observational study conducted in K R Hospital, MYSURU. This study included patients with organophosphate poisoning admitted between AUGUST 2020 and DECEMBER 2021 at a dedicated tertiary hospital in MYSURU, KARNTAKA. The demographic and clinical information, laboratory results, and treatment details patients were collected from medical records department Patients are categorised into mild moderate and severe according to Peradeniya organophosphate poisoning scale.

Sample size calculated using the formula $n = 4pq/d^2$ with 95% confidence interval and 5% level of significance of (Standard Deviation) =35.95 and absolute allowable error of 7%. The sample size is 75.

All patients in the age group of more than 18 years with OP compound poisoning.

Ethical Approval

Ethical approval was obtained from Mysore medical college and research institute Ethics Committee and the ethical protocols of the declaration of Helsinki (1967) including the ethical principles of informed consent, voluntary participation and withdrawal, privacy and confidentiality, were followed.

Data Analysis and Statistics

Data obtained from the study has been entered in excel sheets and analyzed using SPSS (Statistical package for social sciences) software version 20. and has been

presented as descriptive statistics in the form of frequency, tables, figures and graphs.

Descriptive statistics of the explanatory and outcome variables were calculated by mean, Standard deviation for quantitative variables, frequency and proportions for qualitative variables.

Inferential statistics like

- 1) Chi-square test was applied for qualitative variables.
- 2) Independent sample t test will be applied to compare the quantitative variables between the groups. The level of significance is set at 5%. A 'p' value of <0.05 is considered statistically significant.

RESULTS

A) Characteristics of Study Population- The mean age of our study population was 44. The sex preponderance was as follows males 58.6 and females 41.3.

sex	frequency	Present
male	44	58.6
female	31	41.3
total	75	100

B) SEVERITY OF CASES

severity	frequency	percent
mild	21	28
moderate	37	49.3
severe	17	22.6
total	75	100

Mild cases were 21, moderate cases were 37, severe cases were 17.
Total 2 patients died.

C) Association between severity of the disease and enzymes

	Mild	Moderate	Severe	P value
Age	47.12 (9.14)	42.73 (9.27)	44.40 (8.19)	0.276
ALT	32.82 (8.52)	45.03 (12.41)	48.90 (19.07)	0.002
AST	37.65 (6.49)	54.97 (14.60)	53.80 (18.59)	<0.001
Pseudocholine	7349.59 (1801.95)	2608.76 (1741.69)	1020.30 (839.98)	<0.001
T Bilirubin	0.57 (0.41)	0.49 (0.42)	0.42 (0.20)	0.632

Mean ALT levels mild cases was 32.82 (8.52), moderate cases were 45.03 (12.41), severe cases were 48.90 (19.07) with p value 0.002.

AST level in mild cases were 37.65 (6.49), moderate cases were 45.03 (12.41) and severe cases 53.80 (18.59) with p value <0.001

Pseudo choline esterase levels in mild cases was 7349.59, moderate cases was 2608.76 and severe cases was 1020.30 with p value <0.001

DISCUSSION

OP compounds are commonly used in agriculture and one of the common poisoning presenting to hospital in India.^[4] OP compounds cause irreversible inhibition of Acetyl cholinesterase and shows symptoms collectively referred to as cholinergic crisis. This is due to the accumulation of Acetylcholine at the synapse which over stimulates the central and the peripheral nervous system. The resulting muscarinic and nicotinic symptoms usually continue for days and months until the Acetylcholine Esterase (AChE) enzyme forms again.

In a study done by Dr. Prabodh Risal et al^[5] "Cholinesterase and Liver Enzymes in Patients with Organophosphate Poisoning" 54 patients with OP compound is studied with majority females. They studied ALT, AST, ALP, Total bilirubin, bilirubin and choline esterase. Among all the liver enzymes AST had negative significance with choline esterase.

In another study done by R. Senarathne et al^[6] "Selected Liver Markers in Predicting the Severity of Organophosphate and Carbamate Poisoning 166 patients were taken for study. They concluded that AST and ALT levels on admission and AST level at discharge showed significant correlations with the severity of poisoning. Comparing with this study Our study showed significant correlation of AST and ALT level with severity of poisoning. OP compounds cause irreversible inhibition of Acetyl cholinesterase and shows symptoms collectively referred to as cholinergic crisis. This is due to the accumulation of Acetylcholine at the synapse which over stimulates the central and the peripheral nervous

system.^[11] The resulting muscar-inic and nicotinic symptoms usually continue for days and months until the Acetylcholine Esterase (AChE) enzyme forms again [OP compounds cause irreversible inhibition of Acetyl cholinesterase and shows symptoms collectively referred to as cholinergic crisis. This is due to the accumulation of Acetylcholine at the synapse which over stimulates the central and the peripheral nervous system.^[11] The resulting muscar-inic and nicotinic symptoms usually continue for days and months until the Acetylcholine Esterase (AChE) enzyme forms again [OP compounds cause irreversible inhibition of Acetyl cholinesterase and shows symptoms collectively referred to as cholinergic crisis. This is due to the accumulation of Acetylcholine at the synapse which over stimulates the central and the peripheral nervous system.^[11] The resulting muscar-inic and nicotinic symptoms usually continue for days and months until the Acetylcholine Esterase (AChE) enzyme forms again for among the fifty four patients with OP poisoning, female were found to be mostly affected comprising 64.8% of total cases.

CONCLUSION

AST and ALT levels on admission showed significant correlations with the severity of poisoning.

LIMITATIONS

Our study comprised a relatively small sample size.

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