Scholars Journal of Applied Medical Sciences (SJAMS)
Abbreviated Key Title: Sch. J. App. Med. Sci.
ISSN 2320-6691 (Online)
ISSN 2347-954X (Print)
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A Unit of Scholars Academic and Scientific Society, India
www.saspublishers.com

General Medicine

A Cross-Sectional Study to Determine the Relation between Glycemic Status at Admission and the Outcome Following Organophosphorus Poisoning Cases in Rural Teaching Hospital

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Original Research Article

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Article History
Received: 13.06.2018
Accepted: 26.06.2018
Published: 30.06.2018

DOI:
10.36347/sjams.2018.v06i06.048

Abstract: Random blood sugar (RBS) level is one of the factors which influence the severity of the organophosphorous compound poisoning. To study the clinical profile in patients who had consumed organophosphorous poison. To determine the relation between glycemic status at admission and outcome in organophosphorus poisoning. 100 cases of OP poisoning admitted to Adichunchanagiri Hospital and Research Centre, B.G.Nagar, Mandya between June 2015-May 2017 were studied. Detailed history and clinical examination was done according to the proforma with special reference to the need for ventilator support, admission RBS and pseudocholinesterase levels.100 cases of OP poisoning admitted to SAH&RC were considered. The most common age group was 18-25 years. Males were common (65%). Main group were farmers (55%). Majority of patients admitted within 4 hours of exposure. The most common compound was dimethoate. Vomiting (94%), hypersalivation (90%) were the most common symptoms. Respiratory failure was the most common complication (40%). Hyperglycemia was observed in 36% of patients with 80.6% developing complications and 72% needed ventilator. Admission RBS >200mg/dl is reliable parameters to predict mortality and ventilator requirement in organophosphorus compound poisoning. A increase in blood sugar levels were associated for ventilator requirements, mortality and complications, and was found to be statistically significant according to chi square test.
Keywords: Organophosphorous; Hyperglycemia; Pseudocholinesterase.

INTRODUCTION

Acute Organophosphorus poisoning (OP) is widespread in the developing world and itsrequency is increasing [1]. Organophosphorus (OP) pesticide self-poisoning is estimated to kill lakhs of people each year, largely in the Asia-Pacific region. This predominantly occurs in rural communities and is often an impulsive act comparable to self-poisoning with medication in the west; the critical difference being the 10–20% case fatality rate (compared to 0.3% in Britain for example)[1].

The pharmacological action of all OPs is the inhibition of acetyl cholinesterase; cardiorespiratory failure is commonest cause for death. However, depending on the particular OP involved there is much variation in the timing of onset and clinical features. OP poisoning has high inpatient mortality and many patients have cardiorespiratory arrests after admission (40% of patients requiring intubation in this study)[2].

Previous studies associating the severity or prognosis of organophosphorus poisoning with the estimation of plasma cholinesterase have been contradictory. Goswamy R *et al*. [3], in their study concluded that apart from clinical indicators, low plasma cholinesterase levels were of greatest predictive value in organophosphorus poisoning.

However Aygun D *et al*. [4] found that plasma cholinesterase level estimations are useful in diagnosis of organophosphorus poisoning in acute phase but show no relation to severity of poisoning and also regarding morbidity and mortality of case [4].

Organophosphorous compounds inhibit cholinesterase allowing accumulation of acetylcholine at cholinergic sites resulting in continuous stimulation of cholinergic sites leading to marked increase in cateholamines which can lead to hyperglycemia [1].

Nicotinic receptors function in brain pathways that increase the release of several pituitary hormones in crediting-vasopressin, ACTH and prolactin. In animal experiments changes in diurnal pattern of ACTH has been reported following organophosphorous poisoning. Persistent cholinergic stimulation could be causing changes in hormones and causes hyperglycemia [5-7].

In view of this, a study was required to know the role of estimation of plasma cholinesterase levels in predicting the prognosis of patients with organophosphorous poisoning.

MATERIALS AND METHODS

Study Design

Cross sectional analytical study

Study setting

Adichunchanagiri Hospital and Research Centre, B.G. Nagara during the period of November - 2015 to May 2017.

Study period

November -2015 to May 2017

Sample size

Minimum number of 100 cases will be studied over the period of 18 months.

Sampling method

Purposive sampling

Instrument for data collection

A pretested structured pilot tested questionare. Written informed consent.

Inclusion criteria

- Patients with history of exposure to organophosphorus compound within previous 24 hours with characteristic clinical manifestations of organophosphorus compound poisoning.
- Patients with age more than 18 years.

Exclusion criteria

- Patients who had consumed alcohol, other poisons, drugs, mixed poisons.
- Known cases of diabetes mellitus.
- Patients of age less than 18 years.

Investigations

Routine investigations

Blood: Hb%, TC, DC, ESR; Urine: albumin, sugar, microscopy, blood sugar, blood urea, serum creatinine, ECG.

Specific investigations

Serum pseudocholinesterase levels, Hba1c levels, ABG (arterial blood gas) analysis.

RESULTS

100 cases of OP poisoning admitted to Adichunchanagiri Hospital and Research Centre were considered. Commonest age group involved was between 18-25 years. Males were the most common victims (65%).Suicide was the most common motive of poisoning (90%) and ingestion was the most common mode of poisoning (90%). Farmers were the main group involved in poisoning (55%). Majority of patients admitted within 4 hours of exposure. Dimethoate was the most common compound in poisoning.

Table-1: Age distribution of study subjects

Age	No. of patients(n=100)
18 – 25	40
26 – 35	25
36 – 45	14
46 – 55	7
56–65	14

Table-2: Occurrence of Hyperglycemia of study subjects

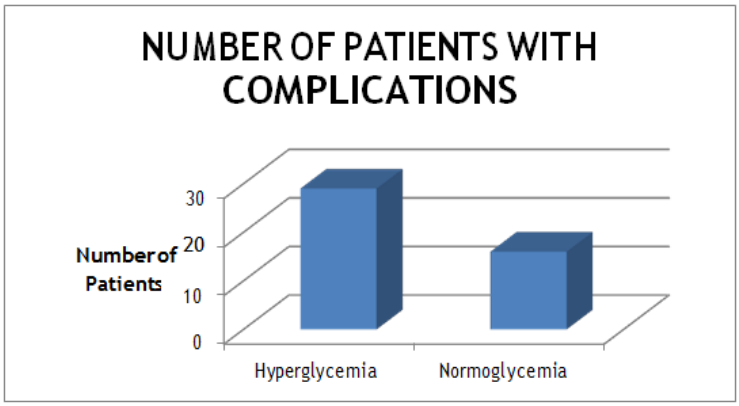
Blood Sugar	Number of patients
Hyperglycemic	36
Normoglycemic	64

In our study, 36 patients had RBS > 200 mg/dl which was taken as hyperglycemia.

Table-3: Association between admission RBS and complications of study subjects (%)

Blood Sugar	Complications present (%)	Complications absent (%)	p value
Hyperglycemic	29	7	
Normoglycae0mic	13	51	<0.0001

X^2 =34.33, P<0.0001



Graph-1: Admission rbs and complications of study subjects

Of all the patients with hyperglycemia, 29 (80.6%) developed at least one complication, no complications in rest 7(19.4%) hyperglycemic patients,16(25%) normoglycemic patients developed complications while complications where absent in 48 (75%) of normoglycemic patients.

DISCUSSION

In the developing world acute Organophosphorus poisoning (OP) is widespread and its frequency is increasing [1]. WHO has estimated that lakhs of people worldwide die from pesticide poisoning? The commonest poisoning in India is OP poisoning. Owing to limited availability of facilities and finances in the developing countries as a result all OP patients cannot be managed in the intensive care unit. It is therefore important that clinical features and other factors which indicate severity of poisoning also predict the need for ventilatory support. It should be identified at the initial examination at admission in the emergency ward. In this study, maximum incidence of poisoning was among 18-25 years of age group (40%) which is consistent with the studies done by Logaraj M *et al.* [8] and Shankar PS *et al.* [9] this age group in all probability is more vulnerable to the various emotional conflicts which occur during this phase of life.

Males were the common victims in the present study which is in concurrence with the findings of Vikram P *et al.* [10] Shobha TR *et al.* [11] Goel *et al.* [12]. This could be attributed to the fact that they are exposed to more stresses of life and perhaps they are less efficient in managing the same when compared to women.

Organophosphorus compound

Dimethoate (28%) was the most common compound implicated in the poisoning. It was followed by Chlorpyriphos (22%) and qunolphos (14%). This was different from the study done by P Karki *et al.* [15] Who found the most common compound as Methyl parathion (23%) followed by Propoxur (5%), which can be explained by the difference in availability of compound in a particular geographic location. In 6 patients (12%) the compound was not brought and the patient was diagnosed and treated on the basis of clinical features.

Table-4: Studies comparing clinical features of study subjects

Clinical features	Adlakha *et al.* (%)	Singh S *et al.* (%)	Goel *et al.* (%)	Present study (%)
Vomiting	56	90	97.08	94
Hyper salivation	36	80	28.15	90
Seizures	11	20	-	20

Vomiting was the commonest symptom in 94% followed by Hypersalivation 90% and above findings are comparable with following studies done by Adlakha *et al.* [16] Singh S *et al.* [17] Goel *et al.*[12].

Table-5: Studies comparing complications of study subjects

Complications	Goel *et al.*	Sungur	Present study
Respiratory Failure	34.95	29.7	40
ARDS	-	-	9
Pneumonia	-	-	5

Respiratory failure was the most common complication seen in 40% of patients which is comparable to studies by Goel *et al.* [12] Sungur *et al.* [14].Table-6: Studies comparing hyperglycemia of study SUBJECTS

Study	Hyperglycemia (%)
Present study	36
Sungur *et al.*	31.9
Shobha *et al.*	26
Rao *et al.*	12

Hyperglycemia was detected in 36% in this study which was similar to observations reported by Shobha *et al*. [11], Sungur *et al*. [14], Rao *et al*. [18].

In present study it was observed that admission hyperglycemia (RBS>200 mg/dl) was associated with complications in 81% as compared to 67% in Rao *et al*. [18]. This showed a correlation that was highly significant (p<0.001). In addition hyperglycemia also showed a significant association with need for ventilator support (p<0.001).72% of patients with hyperglycemia were found to need ventilator support as compared to 22% with normoglycemia.

Table-7: Studies comparing complications in hyperglycemic patients

Study	Complications in hyperglycemic cases
Rao *et al* [18]	67%
Present study	81%

CONCLUSION AND RECOMMENDATIONS

Admission hyperglycemia (RBS>200 mg/dl) was observed in 36% of patients associated with complications in 81% (p<0.001) as compared to 25% in normoglycemics. Overall mortality was 20%. Mortality was 33% in patients with hyperglycemia (p<0.009). Recommendations - Study with follow up of study subjects is needed.

Limitations of the study

Bigger population with probability sampling technique ideally in community based study needed.

ACKNOWLEDGEMENT

I am pleased to thank all those people who helped me in bringing out this paper. Dr. Radha Ramaiah (Professor, Department of Community Medicine, AIMS). All staff of Department of General Medicine, AIMS. Dr. Shrunga (Senior resident, Department of OBG,AIMS).

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