Section: Anaesthesiology

Original Research Article

SEVERITY MODE AND MANAGEMENT OF ACUTE ORGANOPHOSPHATE POISONING: A PROSPECTIVE INTENSIVE CARE UNIT BASED STUDY IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Organophosphorus (OP) compound poisoning is one of the most common poisonings in India. Organophosphate compounds avidly bind to cholinesterase molecules and share a similar chemical structure. Hence this study is done to find out the pattern of poisoning and effect of treatment in acute organophosphate poisoning cases needing mechanical ventilation.

Materials and Methods: The study was conducted in the department of Anaesthesiology, Bapuji Hospital and Chigateri general Hospital attached to JJM Medical College, Davangere, Karnataka. A total of 50 patients were selected based on inclusion and exclusion criteria. All the patients demographic, clinical hematological data were collected and analyzed. Statistical Package for Social Sciences (SPSS 20.0) version used for analysis.

Results: In this study maximum number of patients had age between 31-40 years. Males are more than females. House wife and farmer are more in number compared to other occupations. The most common mode of poisoning is suicide and maximum number had mild severity. 3 had Diabetes mellitus and 1 had COPD. 12 patients had GCS 6. Maximum number of patients had pulse rate >60. 16 patients had SPO2 89 % ,others had less. 14 patients had 6 days hospital stay. Maximum number of patients were given pralidoxime within 6 hours.

Conclusion: This study results concluded that age, mode of exposure, severity of symptoms and initiation of treatment can reduce the morbidity and mortality.

Keywords: Atropine, Organophosphate, Poisoning, GCS, SPO2, Pulse rate, Blood pressure, Pralidoxime.

INTRODUCTION

Organophosphorous (OP) insecticides are currently Organophosphorus (OP) pesticide poisoning kills around 200 000 people each year, principally due to self-poisoning in the Asia-Pacific region. [1] Organophosphorus (OP) compound poisoning is one of the most common poisonings in India. Organophosphorus (OP) compounds constitute a heterogeneous category of chemicals specifically designed for the control of pests, weeds or plant diseases. [2-4] Their application is still the most effective and accepted means for the protection of plants from pests, and has contributed significantly to enhanced agricultural productivity and crop yields. [5] The importance of pesticides in India can be understood from the fact that agriculture is a major component of the Indian economy. Having cheap and easily available highly hazardous pesticides at hand increases the incidence of intentional pesticide poisonings. [6,7] Organophosphate compounds avidly bind to cholinesterase molecules and share a similar chemical structure. In human beings, the two principal cholinesterases are RBC, or true cholinesterase (acetylcholinesterase), and serum cholinesterase (pseudocholinesterase). [8] Normally the cholinesterases rapidly hydrolyze the

neurotransmitter acetylcholine into inactive fragments of choline and acetic acid after the completion of neurochemical transmission. The major toxicity of organophosphate compounds is the covalent binding of phosphate radicals to the active sites of the cholinesterases, transforming them into enzymatically inert molecules. Organophosphates thus act as irreversible cholinesterase inhibitors because the organophosphate-cholinesterase bond is not spontaneously reversible without pharmacological intervention. [9] The inhibition of cholinesterase activity leads to the accumulation of acetylcholine at synapses, causing overstimulation and subsequent disruption of transmission in both the central and peripheral nervous systems. [10-12] Hence, this study is conducted to know the survival pattern in patients with acute organophosphate poisoning on mechanical ventilator which is most commonly seen in India. This study is done to find out the pattern of poisoning and effect of treatment in acute organophosphate poisoning cases needing mechanical ventilator.

MATERIALS AND METHODS

Study Design: Prospective observational study
Study Settings: This study was done in the department of Anesthesiology, Intensive Care Unit, Bapuji Hospital, Chigateri General Hospital attached with JJM Medical College, Davangere, Karnataka.
Study Period: The study was conducted during the period of 2014 to 2016.

Inclusion Criteria

- Age above 18 years
- Both gender
- Consumed organophosphate and admitted in ICU
- Need mechanical ventilation

Exclusion Criteria

- Unknown drug poisoning
- Multiple drug poisoning
- Pregnant women

Procedure

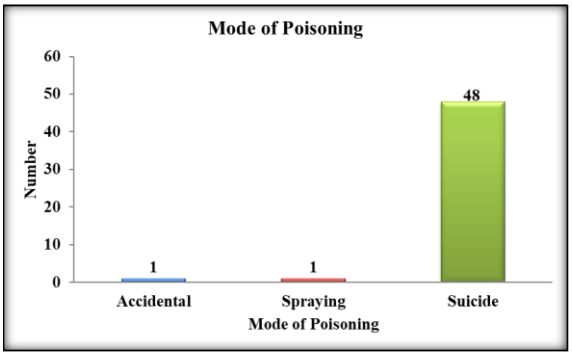
The study included 50 OP poisoning patients on mechanical ventilation based on inclusion and exclusion criteria. Study procedure was explained to patient's relatives and informed consent was obtained. All the patients demographic, clinical data and treatment procedure was recorded and analyzed.

Statistical Analysis

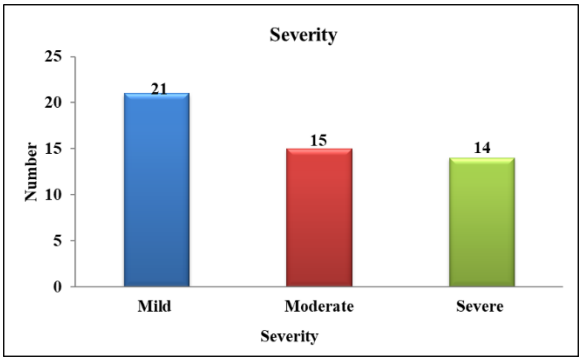
The data was expressed in number, percentage, mean and standard deviation. Statistical Package for Social Sciences (SPSS 20.0) version used for analysis. Chi square test applied to find the statistical significant. P value less than 0.05 considered statistically significant at 95% confidence interval.

RESULTS

The study included 50 patients based on the study protocol. 26 patients had age between 31-40 years, 11 had age between 21-30 years. 2 patients had age above 60 years. Male (29) are more compared to females (21). In this study maximum patients are house wife (13) followed by farmer (12). 3 are shopkeepers and 8 students (Table-1). In this study maximum patients consumed OP for suicidal purpose (48), 1 while spraying and 1 accidental (Graph-1). 21 had mild, 15 had moderate and 14 had OP poisoning severity (Graph-2). 46 patients do not have any co-morbidities and 3 had diabetes mellitus and 1 COPD. According to GCS 12 had 6, 10 had 8, 9 had 7. 3 patients had GCS 11 and 1 had 12. Maximum patients had pulse rate >60. 38 patients had blood pressure <90/60 and 12 had >90/60. SPO2 was high in 4 patients (92) and maximum patients had spo2 of 89% (Table-2). 14 patients had 6 days and 13 had 5 days hospital stay. 1 patient had one day hospital stay. Maximum days (12) of hospital stay was seen in one patient. 5.76 is a mean duration of hospital stay in study population (Table-3). Pralidoxime was given 13 patients after 6 hr, 12 patients after 7 hours. 3 patients received drug after 11 hours. Only 3 patients received drug after 3 hours (Table-4).



Graph-1: Distribution of patients based on mode of OP poisoning



Graph-2: Distribution of patients based on the severity of OP poisoning

Table 1: Distribution of patients based on demographic data

Demographic data		Number	Percentage (%)
	≤ 20	6	12.0
	21-30	11	22.0

Age (years)	**31-40**	26	52.0
	41-50	2	4.0
	51-60	3	6.0
	>60	2	4.0
Gender	**Male**	29	58.0
	Female	21	42.0
Occupation	**Business**	6	12.0
	Farmer	12	24.0
	House wife	13	26.0
	Labourer	8	16.0
	Shopkeeper	3	6.0
	Student	8	16.0

Table 2: Distribution of patients based on clinical data

Clinical data		Number	Percentage (%)
Co-morbidities	**None**	46	**92.0**
	DM	3	**6.0**
	COPD	1	**2.0**
GCS	**3**	1	2.0
	4	1	2.0
	5	4	8.0
	6	12	24.0
	7	9	18.0
	8	10	20.0
	9	7	14.0
	10	2	4.0
	11	3	6.0
	12	1	2.0
Pulse rate	**<60**	12	24.0
	>60	38	76.0
Blood pressure	**<90/60**	38	76.0
	>90/60	12	24.0
SPO2	**86**	1	2.0
	87	5	10.0
	88	5	10.0
	89	16	32.0
	90	15	30.0
	91	4	8.0
	92	4	8.0

Table 3: Distribution of patients based on the Hospital study

Duration of Hospital Stay (in Days)	Number	Percentage (%)
1	1	2.0
2	3	6.0
3	1	2.0
4	3	6.0
5	13	26.0
6	14	28.0
7	9	18.0
8	3	6.0
9	2	4.0
12	1	2.0
Mean ± SD	5.76 ± 1.91	
Range	1-12	

Table 4: Distribution of patients according to the Initiation time of Pralidoxime (N = 50)

Initiation time of Pralidoxime (in hours)	Number	Percentage (%)
3	2	4.0
4	4	8.0
5	1	2.0
6	13	26.0
7	12	24.0
8	4	8.0
9	5	10.0
10	6	12.0
11	3	6.0

DISCUSSION

This study was conducted in 50 patients with organophosphate poisoning on mechanical ventilation admitted to ICU of Bapuji Hospital and Chigateri hospital associated with it. The study was conducted for a three year period from 2014 December till 2016 August. All the inclusion criteria and exclusion criteria were met. Out of the 50 patients studied, 26 patients (52%) were of age group 31-40 years, and recovery was more in younger patients. Mean age was 33.9+-12.0; range of age group was from 7-70 years. In the same study conducted by Dr Syed M Ahmed gender was not having a significant association with the outcome.[13] From our study it was evident that occupation didn't have any significant association with outcome in these patients. Out of 50 patients, mode of poisoning was suicidal in 48 patients, in one patient it was accidental ingestion and another one it was occupational spray exposure. [14] Out of 48 patients with suicidal mode of poisoning, 10(20.8%) expired and all the patients with other modes of poisoning survived. In a study conducted by Dr. Dheeraj et al shown that 97.5 % of the patients in study ingested the poison for suicidal attempt and only 2.5 % patients had accidental inhalation. In a study done by murat and muhammed (10) 68% patients were suicide attempts and 32% were accidental exposure. 93.6% of the patients were poisoned through the gastrointestinal route, 2.1% patient had inhalational poisoning and 4.2% patients had intravenous injection for suicidal purposes. [15] Out of 50 patients, 21 had mild poisoning while 15 had moderate poisoning and 14 had severe poisoning. Recovery was more in patients who received Pralidoxime therapy within 8 hours of poisoning.

CONCLUSION

The study was concluded that age of the patient, severity of the poisoning, associated co-morbid conditions, duration of stay and initiation time of Pralidoxime treatment had strong association with the outcome of the patient, while mode of poisoning of the patient didn't have any significant association with outcome of the patient.

Limitations of study

The major limitation of study is less sample size.

Conflict of interest: Nil
Funding: Self

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