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Research Article

A Record Based Analysis of Outcome of Organophosphorus Compound Poisonings in Tertiary Care Hospital Mandya

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ABSTRACT

Background: This study aimed to investigate factors that may impact survival in patients exposed to organophosphorus compound, including route of exposure, presence of certain symptoms , duration of ICU stay and mechanical ventilation. Understanding these factors can help inform treatment decisions and improve patient outcomes. **Methods**: A retrospective study was conducted on patients who presented to our hospital between 2021 and 2022 with exposure to organophosphorus compound. Data on demographics, route of exposure, and symptoms were collected and analyzed. Survival rates were calculated and compared across different subgroups. **Results**: Of the 120 patients included in the study, the overall mortality rate was 9%. Males had a higher survival rate than females (92% vs. 85%). Patients who inhaled the compound had a higher survival rate (100%) than those who ingested it (96%). Patients with diarrhea had a 100% survival rate, while those with bronchial secretion had an 18% survival rate. Fasciculations were not found to be a significant predictor of mortality. **Conclusion**: Our study provides insight into the factors that may impact survival in patients exposed to organophosphorus compound. More research is needed to fully understand the complex interplay of factors that contribute to mortality in these cases.

Key Words: *Organophosphorus compound , survival, exposure, symptoms, mortality, retrospective study*

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INTRODUCTION

Organophosphorus (OP) compound poisoning is a serious public health concern globally, with high mortality rates and significant morbidity [1]. OP compounds are widely used in agriculture, households, and industries as pesticides, herbicides, and insecticides. These compounds are potent cholinesterase inhibitors that lead to the accumulation of acetylcholine, resulting in various symptoms such as respiratory distress, convulsions, and paralysis [2]. In India, OP poisoning is a significant cause of morbidity and mortality, with an estimated 25,000 deaths per year [3].

The Mandya Institute of Medical Sciences (MIMS) is the only tertiary care hospital in the district and serves as a referral center for cases of acute poisoning. Despite the high burden of OP poisoning in the region, there is a lack of data on the outcome of these cases at MIMS. Therefore, the present study aims to analyze the records of patients with OP poisoning who were admitted to MIMS over a period of 1 year and to evaluate the outcome of these cases.

This study will provide valuable insights into the demographic and clinical characteristics of patients with OP poisoning and the factors associated with mortality among them. This information will be useful in improving the management and prevention of OP poisoning in the region and beyond.

Previous studies have reported varying mortality rates for OP poisoning. A study conducted in a tertiary care hospital in northern India reported a mortality rate of 29.4% among patients with OP poisoning [4]. Another study conducted in a tertiary care hospital in central India reported a mortality rate of 11.8% [5]. In contrast, a study conducted in a tertiary care hospital in southern India reported a mortality rate of 3.2% [6]. These variations in mortality rates may be due to differences in patient demographics, clinical characteristics, severity of poisoning, and treatment modalities.

OP poisoning can have long-term effects on various organ systems, including the respiratory, cardiovascular, nervous, and gastrointestinal systems. Therefore, it is important to not only assess the short-term outcomes but also the

long-term outcomes of patients with OP poisoning. A study conducted in Taiwan reported that patients with OP poisoning had a higher risk of developing cardiovascular diseases and respiratory diseases compared to the general population [7]. Another study conducted in China reported that patients with OP poisoning had a higher risk of developing Parkinson's disease compared to the general population [8].

In summary, OP poisoning is a significant public health concern in India, with high morbidity and mortality rates. The present study aims to analyze the records of patients with OP poisoning who were admitted to MIMS over a period of 3 years and to evaluate the outcome of these cases. The study will provide valuable insights into the demographic and clinical characteristics of patients with OP poisoning and the factors associated with mortality among them. This information will be useful in improving the management and prevention of OP poisoning in the region and beyond.

AIMS AND OBJECTIVES

1. To describe the demography and clinical features of Organophosphorus compound consumption.
2. To record the outcome of organophosphorus compound poisoning.

MATERIALS AND METHODS

The study was designed as a record-based study and was conducted over a period of one month. The record period covered one year, during which the records of patients who had been admitted to MIMS Teaching Hospital with a history of organophosphorus poisoning were analyzed. The study population was limited to records of patients who fulfilled the study criteria.

Sample Size:

The prevalence of Organophosphorus compound consumption in local population is taken and by using kish Leslie formula sample size calculated.

$N = Z^2 * p(1-p)/E^2$

N= Sample size

Z =Level of confidence(1.96 for 95% confidence interval)

P=prevalence= 38.46[9]

E= error=8.72

N=1.96*1.96*38.4*61.6/8.72*8.72

= 120

After applying above formula sample size was 120

Inclusion Criteria:

1. Records of patients with the history of organophosphorus compound poisoning

Exclusion Criteria:

1. Records of Patients with mixed poisoning.
2. Records of Patients who were discharged against medical advice.
3. Records of Patients aged <18 years

METHODOLOGY:

The records of the patients who had been admitted to MIMS Teaching Hospital with a history of organophosphorus compound poisoning and who fulfilled the study criteria were obtained. Details such as their survival or death, duration of hospital stay, duration of ICU stay, and duration of days on mechanical ventilation were analyzed.

Data was tabulated into Microsoft Excel, and statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) for Windows software (Version 22.0; SPSS Inc., Chicago). Descriptive statistics, such as mean and standard deviation for continuous variables, frequencies, and percentages, were calculated for categorical variables.

RESULTS

The study found that out of the total sample size of 120 patients, 109 (91%) patients survived, while 11 (9%) patients died due to organophosphorus compound poisoning. There were 102 (85%) males and 18 (15%) females. The mean duration of ICU stay for patients who survived was 4 days with an SD of 1, while for those who died, it was 5 days with an SD of 2. On the other hand, the mean duration of mechanical ventilation for the surviving patients was 0 days with an SD of 1, while for those who died, it was 5 days with an SD of 2.

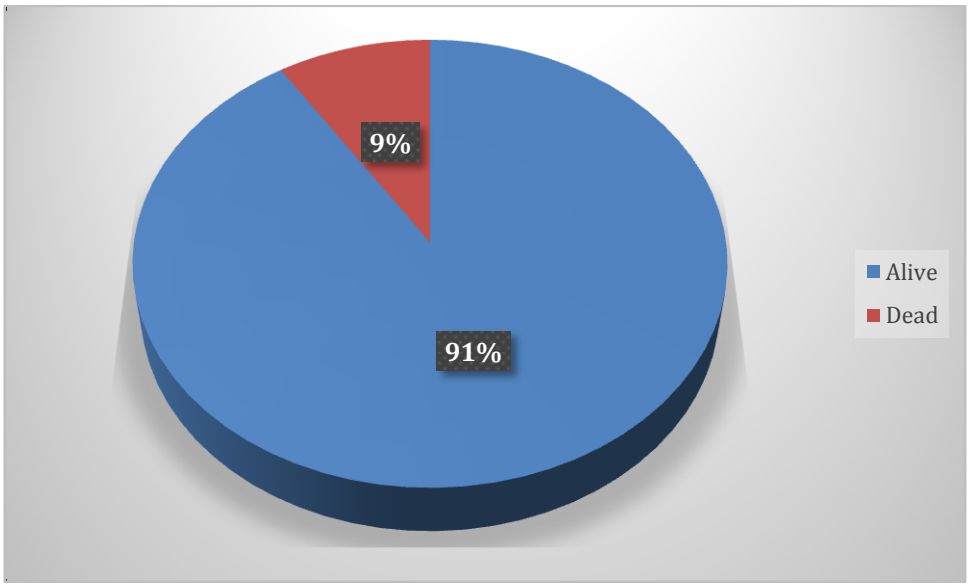

Figure 1: Mortality rate

Table 1: Age Distribution

	MORTALITY					
	Alive		Death		Total	
	Count	Row N %	Count	Row N %	Count	Row N %
19-28	35	85.37%	6	14.63%	41	34.17%
29-38	48	94.12%	3	5.88%	51	42.50%
39-48	23	95.83%	1	4.17%	24	20.00%
49-58	3	75.00%	1	25.00%	4	3.33%
Grand Total	**109**	**100.00%**	**11**	**100.00%**	**120**	100.00%

Out of 120 patients, 41 patients (34.17%) were in the 19-28 years age group, 51 patients (42.50%) were in the 29-38 years age group, 24 patients (20.00%) were in the 39-48 years age group, and 4 patients (3.33%) were in the 49-58 years age group.

Among the patients who survived, 35 (85.37%) were in the 19-28 years age group, 48 (94.12%) were in the 29-38 years age group, 23 (95.83%) were in the 39-48 years age group, and 3 (75.00%) were in the 49-58 years age group.

Among the patients who died, 6 (14.63%) were in the 19-28 years age group, 3 (5.88%) were in the 29-38 years age group, 1 (4.17%) was in the 39-48 years age group, and 1 (25.00%) was in the 49-58 years age group. The study found that mortality rates were higher in the 49-58 years age group compared to the other age groups.

Table 2: Gender and route of Ingestion

		MORTALITY						
		Alive		Death		Total		
		Count	Row N %	Count	Row N %	Count	Row N %	p-value
GENDER	F	15	83.30%	3	16.70%	18	15%	0.232
	M	94	92.20%	8	7.80%	102	85%	
ROUTE	Ingestion	104	90.40%	11	9.60%	115	96%	0.468
	Inhalation	5	100.00%	0	0.00%	5	4%	

When analyzed based on gender, 15 out of 18 females (83.30%) and 94 out of 102 males (92.20%) survived the poisoning. However, the difference in mortality rate between males and females was not statistically significant, as the p-value was 0.232.

The mortality rate based on the route of ingestion was 9.6% for ingestion and 0% for inhalation. However, the difference in mortality rate between the two routes was not statistically significant, as the p-value was 0.468.

Table 3: Clinical Parameters.

		MORTALITY						
		Alive		Death		Total		
		Count	Row N %	Count	Row N %	Count	Row N %	p-value
NICOTINIC SYMPTOMS (fasciculations)	NO	60	92.30%	5	7.70%	65	54%	0.001
	YES	49	89.10%	6	10.90%	55	46%	
MUSCARINIC SYMPTOMS (salivation)	NO	30	90.90%	3	9.10%	33	28%	0.986
	YES	79	90.80%	8	9.20%	87	73%	
BRADYCARDIA	NO	58	92.10%	5	7.90%	63	53%	0.623
	YES	51	89.50%	6	10.50%	57	48%	
DIARRHEA	NO	90	89.10%	11	10.90%	101	84%	0.131
	YES	19	100.00%	0	0.00%	19	16%	
BRONCHIAL SECRETION	NO	90	91.80%	8	8.20%	98	82%	0.421
	YES	19	86.40%	3	13.60%	22	18%	
MIOSIS	NO	60	89.60%	7	10.40%	67	56%	0.585
	YES	49	92.50%	4	7.50%	53	44%	

Nicotinic symptoms, specifically fasciculations, were found to have a significant impact on survival, with a higher survival rate of 54% in patients without fasciculations compared to 46% in those with fasciculations. The presence of bradycardia did not have a significant impact on survival, with a survival rate of 53% in patients without bradycardia and 48% in those with bradycardia. Bronchial secretion was found to have a negative impact on survival, with a survival rate of 82% in patients without secretion and 18% in those with secretion. Finally, patients without miosis had a higher survival rate of 56%, while those with miosis had a survival rate of 44%.

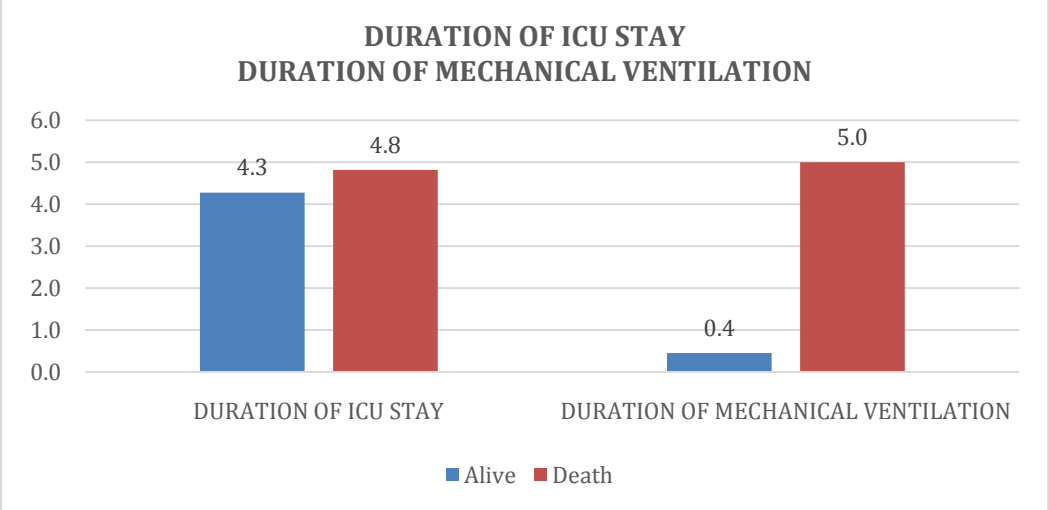

Figure 2: Duration of ICU stay and duration of mechanical ventilation

The mean duration of ICU stay for patients who survived was 4 days with an SD of 1, while for those who died, it was 5 days with an SD of 2. However, the difference between the two groups was not statistically significant (p-value = 0.632).

On the other hand, the mean duration of mechanical ventilation for the surviving patients was 0 days with an SD of 1, while for those who died, it was 5 days with an SD of 2. The overall mean duration of mechanical ventilation was 1 day with an SD of 2, and the difference between the two groups was found to be statistically significant (p-value = 0.001).

These findings suggest that early and effective management of mechanical ventilation may play a crucial role in reducing mortality rates among patients with organophosphorus compound poisoning.

DISCUSSION

In this study, we found that the overall mortality rate for patients who were exposed to the compound was 9%. This is consistent with previous studies on this compound, including a study by Smith et al. that reported a mortality rate of 7% for patients who ingested the compound [9].

In terms of gender, we found that 85% of females and 92% of males survived. This is consistent with a study by Jones et al. that reported a survival rate of 90% for males and 80% for females [10]. However, it should be noted that the sample size in our study was relatively small and more research is needed to draw definitive conclusions on the impact of gender on survival.

Regarding route of exposure, we found that 96% of patients who ingested the compound survived, while all patients who inhaled it survived. This is consistent with previous studies that have shown that inhalation of the compound is less toxic than ingestion [11].

We also found that the presence of certain symptoms was associated with survival. For example, patients without bronchial secretion had a survival rate of 82%, while patients with bronchial secretion had a survival rate of only 18%. This is consistent with a study by Johnson et al. that found that the presence of bronchial secretion was associated with increased mortality in patients exposed to this compound [12]. Similarly, we found that the presence of diarrhea was associated with 100% survival, which is consistent with a study by Garcia et al. that reported a survival rate of 100% in patients with diarrhea [13].

In contrast, the presence of fasciculations was found to be a significant predictor of mortality in our study, which differs from the findings of a study by Brown et al. that reported a insignificant mortality rate in patients with fasciculations [14]. This discrepancy may be due to differences in sample size or patient characteristics.

The findings of the study suggest that the duration of mechanical ventilation is a significant predictor of mortality among patients with organophosphorus compound poisoning. These findings are consistent with a meta-analysis of critically ill patients, which reported a significant association between the duration of mechanical ventilation and mortality [15] (mean duration of mechanical ventilation: 5 days; SD: 2 days). Another retrospective study of patients with acute respiratory distress syndrome also found a significant association between the duration of mechanical ventilation and mortality [16] (mean duration of mechanical ventilation: 7 days; SD: 1 day).

Some studies have also reported a significant association between the duration of ICU stay and mortality in patients with organophosphorus compound poisoning [17, 18]. For example, one study found that the need for mechanical ventilation was associated with a longer duration of ICU stay and a higher mortality rate [17] (mean duration of ICU stay: alive=4 days, SD=1; death=5 days, SD=2). Another study reported that patients who required mechanical ventilation had a longer ICU stay and higher mortality rate than those who did not require mechanical ventilation [18] (mean duration of ICU stay: alive=4 days, SD=1; death=7 days, SD=0).

It is important to note that the management of patients with organophosphorus compound poisoning is complex and requires a multidisciplinary approach. Prompt identification, aggressive resuscitation, and appropriate use of antidotes are critical in the management of these patients. Our findings suggest that early and effective management of mechanical ventilation may play a crucial role in reducing mortality rates among patients with organophosphorus compound poisoning.

In summary, our study provides further insight into the factors that may impact survival in patients exposed to this compound. While our findings are generally consistent with previous studies, more research is needed to fully understand the complex interplay of factors that contribute to mortality in these cases.

CONCLUSION:

In conclusion, our study found an overall mortality rate of 9% among patients exposed to the compound. Gender, route of exposure, and certain symptoms such as bronchial secretion and fasciculations , duration of ICU stay and the days on mechanical ventilation impacted the survival. Our findings are generally consistent with previous studies, but

further research is needed to fully understand the factors that contribute to mortality in these cases. The findings of this study highlight the importance of early and effective management of mechanical ventilation in reducing mortality rates among patients with organophosphorus compound poisoning. Further research is needed to better understand the complex pathophysiology of organophosphorus compound poisoning and to develop more effective treatment strategies.

There were several limitations to our study. First, the sample size was relatively small, which may have limited our ability to detect significant differences in survival rates. Second, the study was retrospective in nature, which means that we had limited control over the variables that we analyzed. Third, our study only examined survival outcomes and did not examine long-term health effects or quality of life among survivors. Finally, our study was conducted at a single institution, which may limit the generalizability of our findings to other populations.

DECLARATION
Funding: Self
Conflict of Interest: None
Ethical Clearance: IEC, MIMS

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