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A Study on the Clinical Profile of Cholinergic Insecticide Poisoning in a Tertiary Care Centre in Kerala

Author
Dr Suresh Raghavan[1]
[1]Professor & HOD, Dept. of General Medicine, Govt. T.D. Medical College, Alappuzha
Corresponding Author
Dr Suresh Raghavan

Introduction

In India, insecticides pose a significant risk of poisoning, particularly in rural households where they are readily accessible and frequently employed for deliberate self-harm. Acute organophosphate (OP) poisoning represents a critical medical emergency and stands as a significant contributor to both mortality and morbidity rates. Among the various insecticides, OP poisoning stands out as the most commonly encountered. Patients afflicted with OP poisoning may experience respiratory failure due to several factors, including the aspiration of gastric contents, excessive secretions, pneumonia, and septicemia, which can further escalate into acute respiratory distress syndrome[1].

Objectives

To determine the clinical profile of cholinergic insecticide poisoning at the Government Medical College, Alappuzha, in both medical wards and the ICU.

Materials and Methods

Study Design: This study adopts a cross-sectional design.

Study Population: The study includes cases of cholinergic insecticide poisoning admitted to the medical wards and ICU at Government Medical College, Alappuzha.

Procedure: Prior to participation, all subjects provided informed written consent. Socio-demographic details were documented, including the mode and nature of poisoning, time elapsed between consumption and presentation, and route of poisoning. The time interval in hours before Ryle's tube wash was administered was recorded[2]. The severity of poisoning, clinical manifestations, vital signs, single breath count, and Glasgow Coma Scale scoring were documented upon admission. Patients were subsequently monitored for the development of any complications. The outcome, whether survival or death, was recorded. Additionally, the length of hospital and ICU stays was documented, along with whether mechanical ventilation was required. For ventilated patients, the duration of ventilation was also noted.

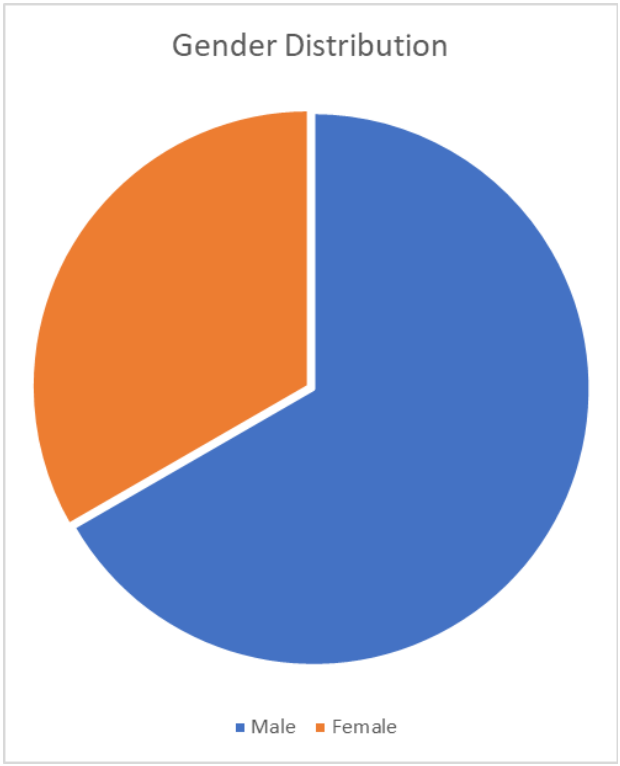
Results

A hospital-based study was conducted on patients presenting to the General Medicine department at Government Medical College, Alappuzha. Patients diagnosed with cholinergic poisoning were included in the study after meeting the specified inclusion and exclusion criteria. A total of 120 patients were enrolled for analysis. The study findings are categorized into the following sections: Baseline Characteristics, Poison Characteristics, Timing of Initial Clinical Presentation and Stomach Wash, Clinical Symptoms, Vital Signs Examination, Clinical Presentation of Poisoning, Complications of Cholinergic Poisoning, Day of Initiation of Mechanical Ventilation, Duration of Hospital and ICU Stay and Ventilation, Indications for Ventilation, Outcome, Association of Final Outcome with Other Variables, and Predictors of the Need for Mechanical Ventilation.

Baseline Characteristics

Gender Distribution

The majority of our study population consisted of males, totaling 80 individuals, while females accounted for only 40.



Age and Gender Distribution

The distribution of age and gender revealed a predominance of males in the age groups 55-60 years, with a similar trend observed for females, who were primarily represented in the same age bracket of 55 – 60 years.

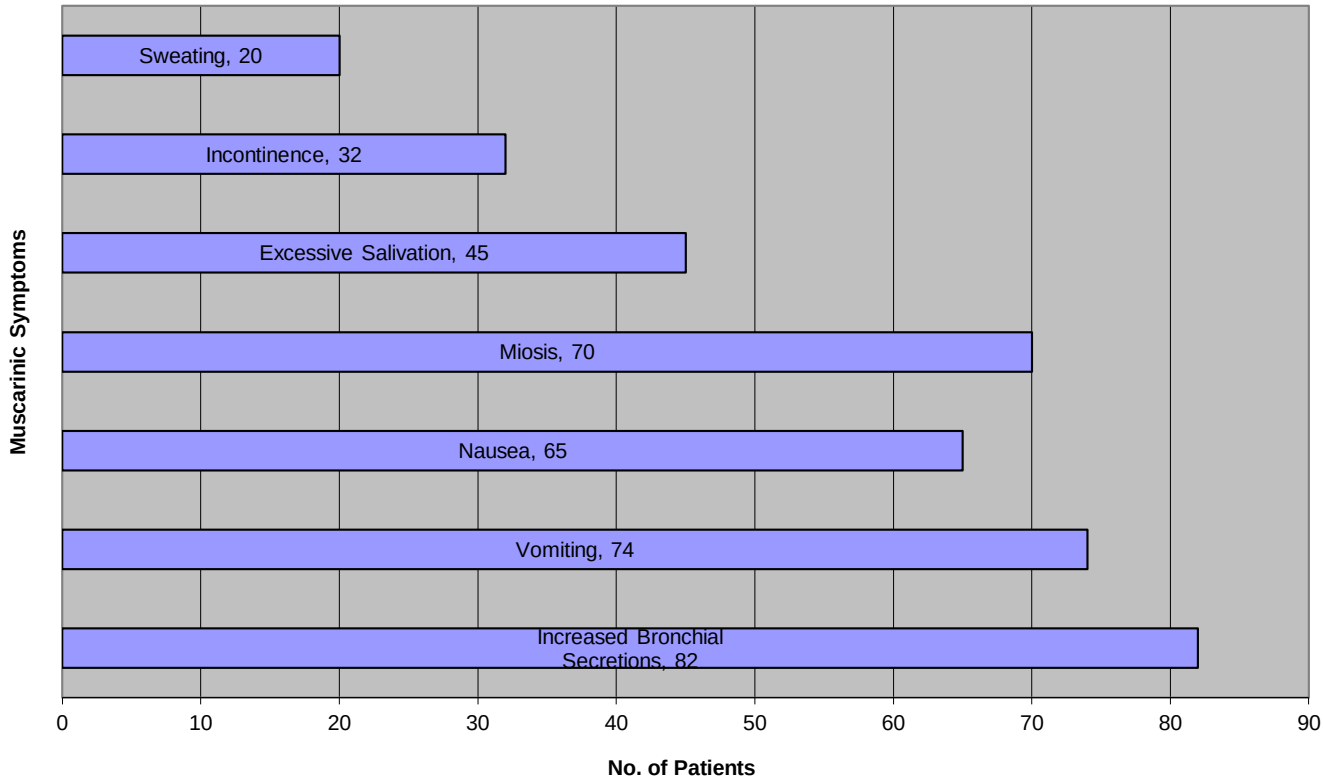
Characteristics of Poison

A quarter of the patient cohort were referred from external medical facilities following cholinergic poison ingestion, while the remainder sought direct hospitalization due to poisoning. Suicide was the established mode of poisoning in all cases, with ingestion being the predominant route. The specific poison type and its characteristics remained unidentified in 45 patients. Among those with identified poison, the most commonly ingested was Ekalux/Quinalphos, trailed by Chlorpyrifos and Furidan, while Cypermethin + Ethion was the least reported.

Clinical Symptoms

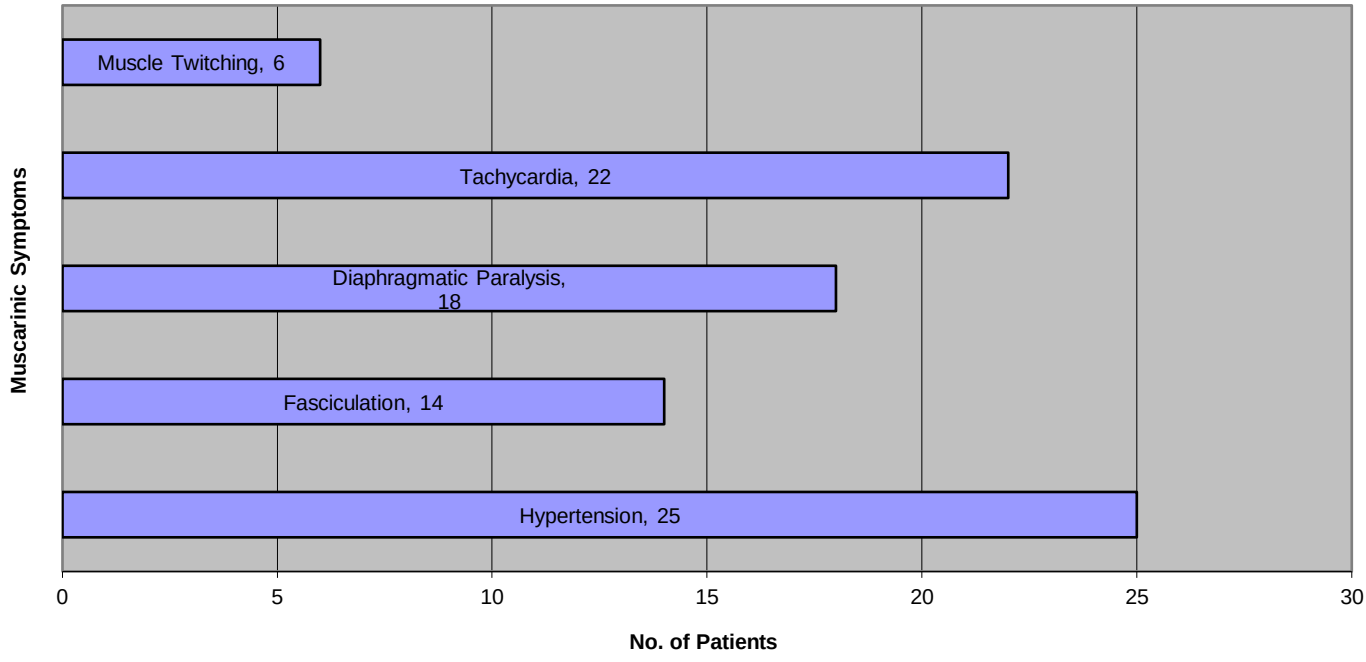
In our study, the most prevalent muscarinic symptom observed was increased bronchial secretions, documented in 82 patients, followed by vomiting in 74 patients, nausea in 65 patients, and miosis in 70 patients. Excessive salivation was noted in 45 patients, while incontinence was observed in 32 patients, and sweating was reported in 20 patients.

Muscarinic Symptoms	No. of Patients
Increased Bronchial Secretions	82
Vomiting	74
Nausea	65
Miosis	70
Excessive Salivation	45
Incontinence	32
Sweating	20



Nicotinic Symptoms

In our study, hypertension was the most prevalent nicotinic symptom observed in 25 patients, followed by fasciculation in 14 patients, diaphragmatic paralysis in 18 patients, tachycardia in 22 patients, and muscle twitching in 6 patients. Additionally, 31 patients did not exhibit any nicotinic symptoms.



Examination

More than half of the patients exhibited severe poisoning effects. Assessment of single breath count was unfeasible for the majority, while it ranged from 16 to 20 in some cases, from 26 to 30 in others, and exceeded 30 in a few instances. Eight patients displayed neck muscle weakness.

A score of 13 to 15 was recorded in certain cases. Deep tendon reflexes were evaluated, showing their absence in a significant portion of patients and present in the remainder.

Complications during admission were assessed, with respiratory failure being the most prevalent, predominantly occurring within the first day. Apnoeic spells were observed in some patients, and cardiac arrest occurred in a minority, primarily on the first day. Incidences of aspiration were noted, mainly on the 2nd and 3rd days. Seizures were exclusively associated with IMS, primarily occurring by the 4th day. Some patients were in a comatose state, while ARDS was absent in all patients.

Association of final outcome

Age demonstrated a correlation with the final outcome, wherein as age advanced, the probability of survival decreased, and this association was found to be statistically significant. Similarly, the nature of the poison exhibited a comparable impact; when the nature of the poison was unknown, there was a higher likelihood of mortality[3]. Additionally, more deaths were observed in the OP group compared to the Carbamate group. It was also observed that early presentation of the patient and prompt administration of stomach wash positively influenced survival probabilities, and these associations were statistically significant.

Discussion

A hospital-based investigation was conducted on patients presenting to the General Medicine department at Government Medical College, Alappuzha. Patients diagnosed with cholinergic poison ingestion were incorporated into the study, totaling 177 individuals who met the predefined inclusion and exclusion criteria[4].

Distribution by Age and Gender

The gender distribution revealed a predominance of males, while females accounted for a minority of the total patients. In terms of age and gender distribution, males were more prevalent in the 51 to 60 years age group, similar to females who were also notably higher in the same age bracket. These findings differ from previous studies, where males dominated, potentially due to differences in demographic samples.

Characteristics of Poison

A quarter of patients were referred from other hospitals due to cholinergic poison ingestion, while the remainder presented directly to the hospital. All patients attempted suicide with poison ingestion being the chosen route. The specific poison name was unknown in a notable portion of patients, with Ekalux/Quinalphos being the most frequently ingested[5] Similarly, the nature of the poison remained unidentified in a significant number of cases, with OP being the most commonly used compound[6].

Time of Clinical Presentation

The majority of patients presented with poisoning symptoms within a few hours, emphasizing the importance of early presentation to the hospital. The first stomach wash was predominantly performed within the first few hours of presentation[i]. Early presentation and prompt stomach wash administration were associated with increased survival probabilities.

Clinical Symptoms

The most common muscarinic symptom observed was increased bronchial secretions, followed by vomiting, nausea, and miosis. Excessive salivation, incontinence, and sweating were also noted. The most prevalent nicotinic symptom was hypertension, followed by fasciculation, diaphragmatic paralysis, tachycardia, and muscle twitching. CNS symptoms included coma and drowsiness/altered sensorium.

Clinical Examination

Pulse rate, blood pressure, respiratory rate, and SpO_2 levels varied across the patient population. Abdominothoracic respiratory pattern and

accessory muscle utilization were observed in a significant portion of cases. These clinical findings align with previous studies, highlighting the common signs of cholinergic poisoning.

This study contributes valuable insights into the clinical presentation and characteristics of cholinergic poison ingestion, emphasizing the importance of early intervention and appropriate medical management.

Conclusion

Organophosphate (OP) poisoning constitutes a medical emergency necessitating prompt diagnosis and intervention. Its widespread availability and affordability have unfortunately rendered it a common choice for self-poisoning incidents. Particularly alarming is its impact on the most economically active age group within society. Mortality rates are notably high, especially in rural India where delays in accessing medical care exacerbate the severity of poisoning[7].

The likelihood of mortality is directly correlated with several factors, including the severity and type of poisoning, delays in initiating treatment, and the duration of mechanical ventilation. While each predictor (such as age, gender, time lapse for presentation and stomach wash, severity of poisoning, low Glasgow Coma Scale score, and duration of ventilation) is individually associated with mortality, fatalities in OP poisoning cases typically result from a combination of these factors. No single factor independently determines mortality in these patients.

Respiratory failure emerges as the primary cause of mortality, underscoring the importance of vigilant monitoring, appropriate management, and early detection of this complication[8]. Recognition of the specific OP compound involved is crucial, as highly lipid-soluble poisons like fenthion can lead to delayed effects. Alarmingly, half of all patients succumbing to this type of poisoning exhibit only mild symptoms upon presentation. Improving intensive care unit (ICU) management and providing timely, tailored supportive care are paramount. Swift transfer of patients to well-equipped ICUs, early administration of antidotes, and meticulous resuscitation efforts play pivotal roles in mitigating mortality rates.

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