

Pattern of Organophosphate Poisoning in Bapuji Hospital, Davangere (2011-2013)

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Abstract

Introduction: Poisoning is an important health hazard and one of the leading causes of morbidity and mortality worldwide. Organophosphorus compounds are commonly used for suicide worldwide. **Method:** This observational study was conducted on patients of organophosphate poisoning admitted to Bapuji Hospital, Davangere during the period spanning October 2011 to March 2013. Total number of cases studied were 150. Data was collected from hospital admission records, hospital MLC registers, patient case history. **Results:** The maximum number of cases was seen in the 21 to 30 years age group with male predominance. All the study participants were found to be employed in agricultural labor. The commonest poison consumed in the study was Malathion. Majority of the patients consumed twice the lethal dose of poison. All the fatalities had suicidal manner of consumption, and all the accidental consumption cases survived. **Discussion:** Our study showed a notably higher fatality rate possibly due to higher amounts of poison consumed with other findings comparable with previous studies. **Conclusion:** This study concludes that most cases of organophosphorus poisoning were reported in adult male farmers with malathion being the most common source for poisoning. Even though malathion is not suitable to be an ideal suicidal poison and has unpalatable taste, majority of the patients consumed poison in quantities more than the lethal dose which translates to higher mortality rates.

Keywords: Organophosphate, suicidal poisoning, malathion

Introduction

Poisoning is an important health hazard and one of the leading causes of morbidity and mortality worldwide¹. The type of poison generally seen to be ingested accidentally, or used for suicidal or homicidal purpose, may depend upon ease of access, availability and mode of action. However, there is a progressive shift towards suicidal poisoning and accidental poisoning in the household and in agriculture². Accidental poisoning which is common among children is ascribed to the

increased use of numerous chemical articles in the household. Industrial poisoning is gradually receding statistically, owing to advances in industrial hygiene and medical service and to the increasing automation of industrial processes. In adults the manner of poisoning, irrespective of sex of the victim can be: 1. Suicidal 2. Accidental 3. Homicidal 4. Self-treatment 5. Injudicious medication. Organophosphorus compounds and Endrin are commonly used for this purpose^{2,3}. These poisons are easily obtained in the market in the form of insecticides, pesticides, rodenticides and weed killers. Following general awareness of the highly lethal nature of these substances they have become popular as suicidal and homicidal poisons^{4,5}. Information from Medical Record Division of Bapuji Hospital shows high incidence and mortality due to organophosphate poisoning, which prompted the undertaking of this study

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Objectives

- To study case load of acute Organophosphate poisoning.
- To study the demographic characteristics of the patients with acute Organophosphate poisoning.

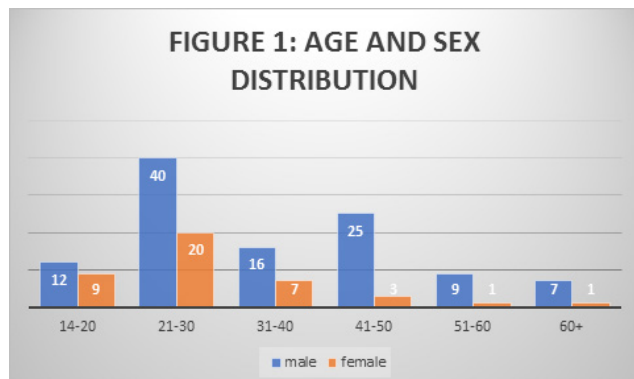
Methodology

This observational study was conducted on patients of organophosphate poisoning admitted to Bapuji Hospital, Davangere during the period spanning October 2011 to March 2013, after obtaining approval from the institutional ethics committee. Total number of cases studied were 150. Data was collected from hospital admission records, hospital MLC registers, patient case history and history from eye witness, relatives, friends of deceased, investigating officers. All patients with Organophosphate poisoning aged more than 14 years belonging to either sex were included in the study after obtaining informed consent from the participants (from guardians in case of minors). Detailed history was obtained regarding the type of poison, quantity of poison and manner of poisoning from the patient and his/her relatives and also from the police. Examination of the poison container was also done whenever available.

Results

Patient Characteristics: Age and Sex

The age and sex distribution of the study group is shown in figure 1. The maximum number of cases was seen in the 21 to 30 years age group. Youngest patients were 2 females of age 14 years each and oldest patient was a male of age 76 years. Sex distribution of the cases studied had a male predominance in each age group with 109 (73%) male patients to 41 (27%) female patients.

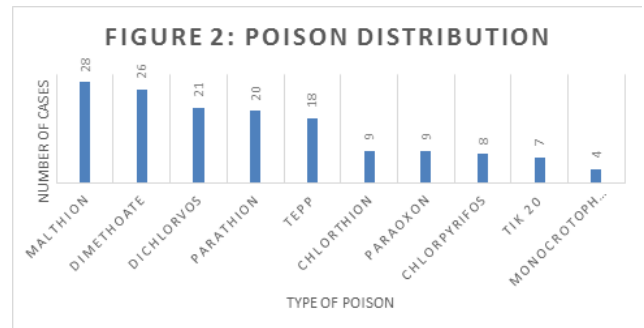


Education and Occupation:

The maximum educational level of the individuals studied was 6years of schooling with only one 14-year-old boy who had studied upto 7th standard and dropped out. Of the remaining a large proportion were illiterate (63 out of 150, 42%) and all the study participants were found to be employed in agricultural labor including those below 18years of age.

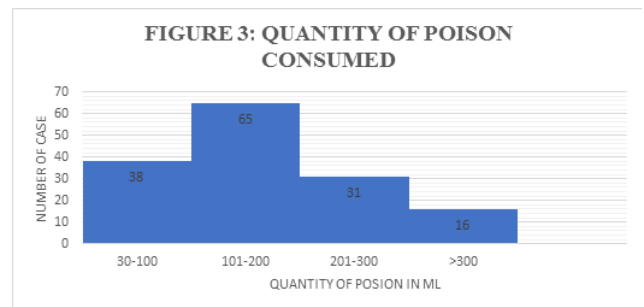
Type of Poison Consumed:

The distribution of patients according to type of poison consumed is shown in figure. 2. The commonest poison consumed in the study was Malathion (28 patients,18.67%). Second commonest was Dimethoate (26 patients,17.33%), followed by dichlorvos and parathion. All poisons belonged to organophosphorus class.



Approximate Quantity of Insecticide Ingested

65 patients (43.33%) had consumed 101ml to 200ml of organophosphorus compound. 38 patients (25.33%) had consumed 30ml to 100ml of organophosphorus compound. 31 patients (20.67%) had consumed 201ml to 300ml of organophosphorus compound. Very high doses of consumption i.e. > 300ml were seen in 16 patients (10.67%). Data depicted in figure 3.



5. MANNER OF CONSUMPTION AND FINAL OUTCOME

Suicidal consumption of organophosphorus compounds was seen in 128 patients (85.33%) and accidental consumption of the same was seen in remaining 22 patients (14.67%). No homicidal administration of organophosphorus compounds was seen during this study.

In the 3-day follow-up 60 patients (40%) had fatal outcome and 90 patients (60%) survived with treatment. Of the 60 fatalities, 26 cases (17.33%) died within 24 hours.

All the fatalities were associated with severe poisoning. Among those who survived 18 patients (12%) had severe poisoning. Another striking fact noted was that all the fatalities had suicidal manner of consumption, and all the accidental cases survived. Thus, we arrive at a fatality rate of 46.87% (60 out of 128) in suicidal poisoning cases.

Discussion

In the present study, the sex incidence shows males are more affected (73%) than the females (27%). Similar observations were made by Singh et al.³⁰, consisting of 67.95% males and majority of the cases were adults belonging to the age group of 21 to 30 years. Our study shows that all of the patients admitted were agricultural laborers. This could be due to easy availability and accessibility of poisons, particularly insecticides which are responsible for high incidence of poisoning among the agricultural workers. Similar incidence was reported by Sozmen et al.⁷ and although the total exposure time was similar in both areas, BuChE and PON1 activities of farmers who work in tobacco production were lower. Overall, BuChE and PON1 activities showed a depletion in the farmer group compared to age-matched controls. When the farmers were categorized according to the number of their symptoms, the BuChE activities of farmers who had two or more symptoms were found to be depleted (n = 43, 2948 +/- 756 and Naravaneni & Jamil²¹ farmers exposed to pesticides and 160 non-exposed individuals were enrolled for determining the genotoxicity and AChE levels. The AChE levels were determined in plasma and RBC lysate from blood samples collected from farmers and control subjects. AChE (true and pseudo where in all the patients chosen for the study with exposure to organophosphate insecticide were

farmers. In all cases the poisons were consumed via the oral route. Malathion is one of the most commonly used organophosphate insecticide and is commonly available for agricultural use. Even though it has a disagreeable taste, it is most often taken orally because of its easy availability to farmers and also lethality of its action. Other studies also reflect similar findings⁹⁻¹².

Majority of the patients in our study had consumed 101ml to 200ml of organophosphorus compound (43.33%). This dose is in excess of the lethal dose for the two most common poisons found to be used in our study i.e Malathion and Dimethoate.

The patients were followed up for 3 days during which 40% had fatal outcome and 60% survived with treatment. Of the total number of fatalities 17.33% died within 24 hours of admission to the hospital. A study by Nilamadhav Kar et al¹³ found a mortality of 26% in patients with suicidal organophosphorus poisoning, but our study showed a notably higher fatality rate. This difference may possibly be explained by higher amounts of poison consumption in our study group, lower prices/better affordability and also increased awareness since 2006, when their findings were published. A study by Singh et al⁶ reports a 24 hour mortality of 17.30% which is in agreement with our 24 hour mortality rate.

Conclusion

This study concludes that most cases of organophosphorus poisoning were reported in adult male farmers with malathion being the most common source for poisoning. Even though malathion is not suitable to be an ideal suicidal poison and has unpalatable taste, majority of the patients consumed poison in quantities more than the lethal dose which translates to higher mortality rates. Estimation of plasma pseudocholinesterase levels in Organophosphorus poisoning can be a significant factor in improving the outcome of such patients as it can be a good prognostic tool. Since majority of the cases in this study are farmers who have easy access to such poison, the use of such poisons by them need to be monitored and regulated also counselling to those in need would reduce the incidence of suicide. Organophosphates usually are consumed in conjunction with other drugs like alcohol, barbiturates, benzodiazepines, etc. or mixed with food and beverages to make it more palatable which requires further exploration.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Obtained from Institutional Ethics Committee, Jjm Medical College (Attached to Bapuji Hospital), Davangere.

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