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Original Research Article

Sociodemographic profile of patients and prescribing trend of drugs in organophosphate poisoning at tertiary care teaching hospital in Central India: a descriptive study

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ABSTRACT

Background: India is an agrarian country, where pesticides are most widely used in farming. Monsoon dependent agricultural practices are common in India. In present study socioeconomic class and prescribing pattern of commonly used drugs in organophosphate poisoning in indoor setting at tertiary care hospital is evaluated. The aim of the study was to evaluate prescribing trend of drugs and socioeconomic class of patients in organophosphate poisoning in monsoon season.
Methods: Prospective observational study was conducted at Medical Intensive Care Unit (MICU) and Medicine Wards for 4 months at 540 bedded tertiary care teaching hospital.
Results: Total 64 diagnosed cases were enrolled and analyzed in present study (n=64). Maximum number of cases (57.81%) were male followed by female (42.18%). Most of the cases (37.50%) were from the age group of 21-30 years. 49 (76.56%) patients were of primary intentional poisoning followed by 15 (23.43%) patients of accidental poisoning. Most common drugs prescribed were atropine, pralidoxime, cefotaxime and ranitidine. The average amount of atropine and pralidoxime used per patient/day were 37.89±63.63 mg and 10.07±26.87 gm respectively.
Conclusions: Present study revealed that young male adults with low socioeconomic class from rural background were prone for intentional organophosphate poisoning in central India.

Keywords: Atropine, Organophosphate, OPP, Pesticides, Pralidoxime, WHO prescribing indicators

INTRODUCTION

Poisoning with organophosphorus compound is a global public health problem. According to World Health Organization (WHO), 3 Million cases of pesticides (mainly O P compounds) poisoning occur every year, resulting in excess of 2.50 thousand deaths.[1] India is a predominantly agrarian country where pesticides are widely used for farming. As per estimates of National Crime Bureau of India, suicides by consumption of pesticides account for 19.4% and 19.7% of all cases of suicidal poisoning in the year 2006 and 2007 respectively.[2] Rapid industrialization and massive use of pesticides in agriculture has increased the incidence of poisoning. In India, as agriculture is the backbone of the country, insecticides are used to a greater extent and the poisoning with such agents are more common.[3]

Organophosphorus compounds are diverse group of chemicals esters, amides or thiol derivatives of phosphoric acid. According to the toxicity caused by organophosphates (OP) they are classified as mild,

moderate and highly toxic.[4] Majority of patients of the O P Poisoning belong to the younger generation less than 30 years and is self-intentional.[5] Organophosphates (OP) compound are principally used as agricultural insecticides due to their easy accessibility and they are responsible for loss of lives in rural areas and to considerable extent in urban areas also.[6] Pesticides are classified as organophosphorus and non-organophosphorus compounds. Monocrotophos phorate and methomyl are class I toxic pesticides as per WHO.[7] Atropine is highly effective in counteracting muscarinic symptoms but does not reverse peripheral muscular paralysis; it is given in the dose of 2 mg intravenous (IV) repeated every 10 minutes until dryness of mouth or other signs of atropinization appear.[8] Pralidoxime is cholinesterase re-activator useful in OP poisoning and anti-cholinesterase poisoning. It causes faster reactivation of the enzyme if started early within hours before the ageing of enzymes occurs. It is injected IV slowly in the dose of 28 to 30 mg/kg IV loading dose followed by 8-10 mg/kg/hr.[9] This study was undertaken due to scarce data available on drug utilization in organophosphate poisoning patients and their socioeconomic status in this geographical region of central India.

METHODS

The prospective observational drug utilization study was conducted at 540 bedded tertiary care teaching hospital in central India. Total 64 patients were enrolled (n=64) after confirming diagnosis of OPP and approval by institutional ethics committee. The study duration was 4 months from May to August 2018.

Data source

Indoor case papers of the patients admitted in the medicine ward (male and female) and MICU (Medical Intensive Care Unit) of tertiary care teaching hospital were screened.

Inclusion criteria

Case papers of adult patients ≥18 years of age diagnosed by clinician as organophosphate poisoning willing to give written consent to share socioeconomic information were enrolled for the study.

Exclusion criteria

- Patients <18 years of age,
- Critically ill,
- And cases discharged against medical advice.

Data collection

The study parameters in predesigned format like demographic data, duration of hospital stay, diagnosis, treatment delivered, and drug schedule were recorded during their stay in the hospital. For analyzing socioeconomic class modified Kuppuswamy scale was applied in which occupation of the head of family, education of the head of family and total monthly income of the family were noted for each patient and on summation of all score, class of particular patient was obtained.[10] Drugs prescribed by brand names and generic names were obtained from the 2017 edition of the WHO Model List of Essential Medicine.[11]

Statistical analysis

Data was analyzed using SPSS Version 16 software and results were expressed using descriptive statistics. According to modified Kuppuswamy scale 2018 scoring was given and corresponding socioeconomic Class I to V decided for victims.

RESULTS

In the present study, out of 64 cases, 37 (57.81%) were men while 27 (42.18%) were women (Figure 1). Maximum number of patients 24 (37.50 %) were from age group 21-30 years followed by 16 patients (25%) from 31-40 years while 10 cases (15.62%) were under 20 years age group. However, there were only 3 (4.68%) patients who belonged to older age (61-70 years) and the mean age was 33.87±3.5 years (SD) with an age range of 18-70 years (Table 1).

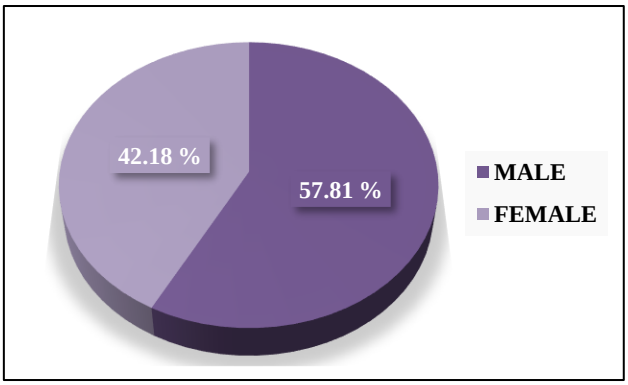

Figure 1: Gender distribution of cases.

Table 1: Age wise distribution of cases.

Age group (in years)	No. of cases	Percentage
< 20	10	15.62%
21-30	24	37.50%
31-40	16	25.00%
41-50	05	7.81%
51-60	06	9.37%
61-70	03	4.68%
Total	64	100%
Mean±SD*		33.87±3.5

Note:* SD - Standard Deviation

Among the 64 victims, there were 49 (76.56%) cases of Intentional (suicidal) poisoning followed by 15 (23.44%) cases of accidental poisoning (Figure 2).

Maximum number of cases were under the socioeconomic upper lower class IV 48 (75%) followed by lower middle class III 10 (15.62%) and lower class V 6 (9.38%). However not a single case was reported from upper I and upper middle class II (Table 2).

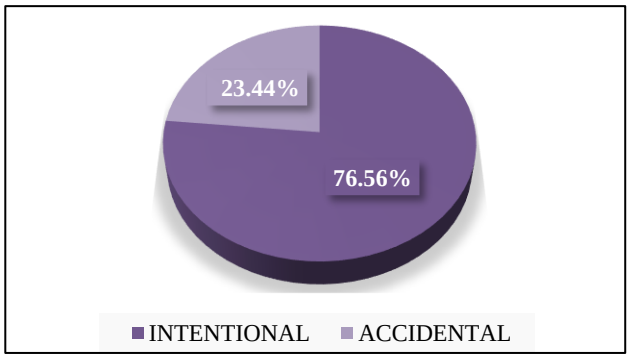

Figure 2: Mode of exposure in OP poisoning.

Table 2: Distribution of socioeconomic class*.

Kuppuswamy class	No. of cases	Percentage
I-Upper	0	0%
II-Upper middle	0	0%
III-Lower middle	10	15.62%
IV-Upper lower	48	75%
V-Lower	6	9.38%
Total	64	100%

Note: * - Modified 2018 Kuppuswamy scale

Most of the cases of O P poisoning were from rural areas 53 (82.82%) followed by 11 (17.18%) from urban background (Table 3).

Table 3: Rural-urban distribution of O P poisoning cases.

Residence	No. of cases	Percentage (%)
Rural	53	82.82
Urban	11	17.18
Total	64	100

Table 4: Atropine and pralidoxime profile.

Total dose required in (mgs / gms) / day and duration	Mean±SD
Atropine	37.89±63.63
Pralidoxime	10.07±26.87
Total duration (number of days)	Mean±SD
Atropine	3.42±3.5
Pralidoxime	2.79±4.24
Atropine required from admission till recovery (mg)	Mean±SD
Atropine requirement in 1st 24 hours	18.93±5.65
Atropine requirement from 24 hours onwards till final outcome	19.21±57.98

Total daily mean dose required for Atropine and Pralidoxime were 37.89±63.63 mg and 10.07±26.87 gm respectively. Mean duration of Atropine and Pralidoxime given to patients were 3.42±3.5 and 2.79±4.24 days respectively. Mean atropine requirement in 1st 24 hours in (mg) was 18.93±5.65 and from 24 hours onwards till recovery of patient in (mg) was 19.21±57.98 (Table 4).

Table 5: Core prescribing indicators.

Prescribing indicators	Average/ percentage	WHO reference values
Average number of drug per encounter	4.4	(1.6-1.8)
Percentage of encounter with antibiotics	100%	20.0% - 26.8%
Percentage of encounter with injection	100%	13.4% - 24.1%
Percentage of drug prescribed by generic	46.31%	100%
Percentage of drug from essential drug list (WHO)	70%	100%

In this study, the average number of drugs per prescription which is an important index of the standard of prescribing, was 4.4; the percentage of encounter with antibiotics and injections was 100%; the percentage of drugs prescribed by generic name was 46.31%. Whereas percentage of drugs from essential drug list was found to be 70% (Table 5).

Table 6: Distribution of drugs prescribed.

Name of DRUGS	Total no. of drug prescribe	Percentage (%)
Inj Atropine	61	23.10
Inj Pralidoxime	61	23.10
Inj Cefotaxime	59	22.35
Inj Ranitidine	59	22.35
Inj Paracetamol	01	0.38
Inj Ondensetaron	01	0.38
Inj Mucomix	03	1.14
Inj Haloperidol	01	0.38
Inj Calcium gluconate	02	0.75
Inj Hydrocortisone	01	0.38
Inj Lasix	01	0.38
Inj Vitamin K	01	0.38
Inj Thiamine	02	0.75
Inj Optineuron	06	2.28
Inj Magnesium sulphate	01	0.38
Tab Nephrozone	01	0.38
Tab Sodamint	01	0.38
Tab Udiliv	01	0.38
Syp Kesol 200 ml	01	0.38
Total	264	100

In total 64 patients, 264 drugs were prescribed , among them most frequently prescribed drug were Inj atropine and

Inj pralidoxime 61 (23.10%) each; followed by Inj Cefotaxime and Inj ranitidine 59 (22.35%) each; whereas 11 drugs were prescribed only 1 (0.38%) time for the treatment of the Organophosphate poisoning (Table 6).

Maximum percentage of cases were mild 41 (64.06%) followed by moderate 18 (28.13%) and severe 05 (7.81%) (Figure 3).

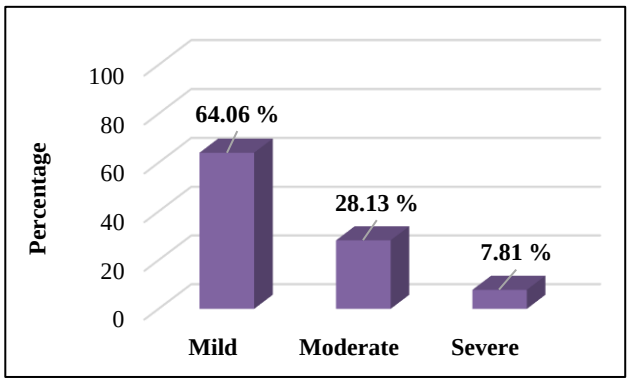

Figure 3: Severity of cases in O P poisoning.

Maximum number of cases 26 (40.63%) were seen in month of July followed by June and August, while minimum number of cases were seen in month of May (Figure 4).

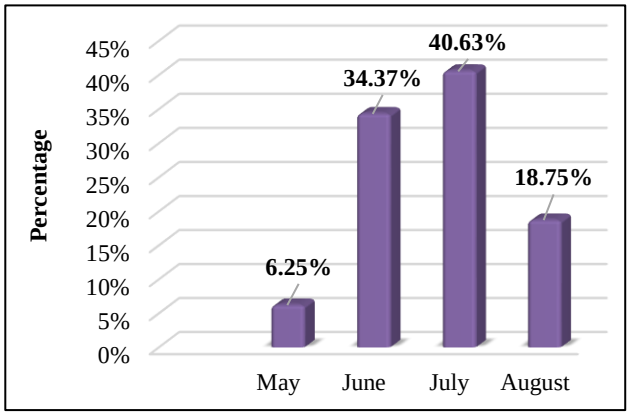

Figure 4: Months wise distribution of cases.

DISCUSSION

The occurrence of 64 cases of OPP in this tertiary care hospital over a period of four months highlights the seriousness of problem. In the present study, O P poisoning was more common in males 37 (57.81%) than females 27 (42.18%); the observation was similar with Revankar SP et al, and Prasad DR et al, study; however, Liu H X et al, Sidhart. T et al, found more number of female cases.[4,12-14] Other investigator also shown comparable finding in Nepalese population.[15,16] These observations may be attributed to the fact that pesticides are equally accessible to male and female farmworkers. In our study, the main age group involved (37.50%) ranged between 21-30 years which is comparable with Revankar SP et al, Srivastava et al, Vaidya and Hulke et al, and Biswas S et al, the younger age group vulnerability may be due to poverty, lack of education, unemployment and stressful life.[4,17-19] Among the 64 cases of poisoning, 49 (75.56%) were Intentional (Suicidal) poisoning while 15 (23.44%) Accidental poisoning and the finding comparable with Revankar S P.[4] This high incidence of suicidal poisoning was probably because it is cheap, easily available and used as pesticide in agricultural farming throughout India. Authors have observed maximum cases 48 (75%) from upper lower (IV) socio economic class followed by lower middle class (III) (Modified Kuppuswamy 2018 classification) the data comparable with Sidhart T, Rajesh. KS, Suvarna.M.Kstudy.[14] Most of the cases in our study were from rural areas (82.82%); The finding were comparable with Amarnath M et al, study while Sidhart T et al, reported more cases in urban area (61.53%).[14,20] The average number of drugs per prescription is 1.6-1.8 according to WHO which is an important index of the standard of prescribing, In our study it was 4.4 while it was 2.6 in Demeke B et al, study.[21] Percentage of encounter with antibiotics in this study was 100 % while 32% in Demeke B et al, study which is higher than the WHO reference value of 20.0-26.8%.[21] The available literature on use of antibiotic prophylaxis in O P poisoning suggest that they did not offer any advantage over nonuse, on the contrary they carries the risk of development of super infection by more resistant organism.[22,23] However use of prophylactic antibiotics in ventilator induced pneumonia in O P poisoning is beneficial.[24] Prescribing by generic name is known to reduce the cost of drug treatment. It was 46.31% in present study, while Asari PDet al, study had similar observation.[25] Generic prescribing should be further encouraged as it is the best way to ensure accessibility of drugs to the patients especially in developing countries.[26] Overuse of injections lead to increased cost and health hazards as non-sterile injections contribute to the transmission of hepatitis, HIV / AIDS and other blood borne diseases. In this study the percentage of encounters with injection was very high (100%) than recommended WHO range (13.4% - 24.1%) while it is (98.5%) in Asari PD et al, study.[25] The percentage of drugs from essential drug list was found to be 70% which is less than the WHO standard value of 100% while it is (66%) in Asari PD et al, study.[25] The average daily requirement of Atropine per patient in present study was 37.89±63.63 mg. while Vijaykumar HN et al, study reported 74.82±22.39 mg in randomized controlled trial.[27] In the same study the investigator found less mean daily atropine requirement (53.11 mg) in a group where Magnesium sulphate was given.[27] Most of the victims in present study were mild (64.06%) to moderate (28.13%) in severity which justifies less average daily requirement of atropine. One patient received Inj. Magnesium sulphate parenterally in present study. Intravenous magnesium sulphate given on the 1st day of admission in O P poisoning cases have shown to decrease hospitalization period and improve outcome.[28,29] Maximum number of patients 61 (23.10%) received Inj atropine and inj. pralidoxime followed by inj. cefotaxime

and Inj. ranitidine 59 (22.35%). In Dixon EW et al, study benzodiazepines were widely used in O P poisoning but in this study, they were not prescribed.[30] However, their efficacy as primary treatment is not established. Highest number of O P poisoning cases 26 (40.63%) were seen in month of July followed by June and August in rainy season in present study, Sidhart T et al, study had similar findings.[14] However, Maharani B et al, reported more poisoning cases during summer.[31] The regulatory authority should consider for banning the sale of very toxic type of organophosphates compounds used commonly as pesticides in farming.

The limitations of the study were: due to medico legal concern patients below 18 years of age and seriously ill patients were excluded. This was short duration, small sample size and single center study with regional focus.

CONCLUSION

In present study, the younger age males with lower socioeconomic class with rural background were more vulnerable for organophosphate poisoning. The high incidence of intentional (suicidal) poisoning in young adult farmworkers can be reduced by psychological counselling and rural employment generation. Regular training of resident doctors in good clinical practice is need of hour so that WHO core prescribing indicators are followed. All clinicians to strictly follow the antibiotic policy of the institute and avoid prophylactic use of antibiotics in O P Poisoning. Further research is needed in this region of central India with longer duration and larger sample size to comment on seasonal variation of victims and to establish the guidelines for treatment of organophosphate poisoning.

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