

ORIGINAL ARTICLE

A PROFILE OF ORGANOPHOSPHORUS POISONING IN CENTRAL TERAI REGION OF NEPAL:
A HOSPITAL BASED CROSS SECTIONAL STUDYSanjay Kumar Sah¹, Bishal Sah², Bishwanath Ranpal³¹Department of Forensic Medicine & Toxicology, National Medical College, Birgunj, Nepal²Department of Anatomy, National Medical College, Birgunj, Nepal³Department of MDGP & Emergency, National Medical College, Birgunj, Nepal**Date of Submission** : October 02, 2024**Date of Acceptance** : October 07, 2024**Date of Publication** : January 3, 2025***Correspondence to:**

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**ABSTRACT****Introduction:** Poisoning is the second most common method of suicide in Nepal. About 24% of poisoning death occurs as a result of ingestion of organophosphorus compounds. The present study shows sociodemographic as well as clinical profile of organophosphorus poisoning presenting to the emergency department of a tertiary center in mid-southern region of Nepal.**Materials and methods:** Descriptive cross-sectional study was carried out among 108 (44 male and 64 females) patients attending the emergency department of National Medical College Teaching Hospital. Consent has been taken from the patient or their guardians before their recruitment in the study. The data were collected by using proforma. Statistical analysis was performed using SPSS 23.0.**Results:** The present study shows organophosphorus poisoning are more common among females. Most common age group is 21-30. Majority of patients (32.4%) were from lower middle class. Students are commonly involved in organophosphorus poisoning which was about 38.9% followed by farmers. Majority of the victims (43.5%) consumed poisoning due to family issues. Most common intent of poisoning was suicidal. Majority of victims (65.7%) predominantly showed the muscarinic signs. Most of the victims (38.9%) arrived between 4-10 PM. Route of administration of poisoning was oral in majority of cases (92.6%). Most common compound used by victims was Methyl parathion (34.3%).**Conclusion:** Organophosphate poisoning is common in female, farmer and students. Most common issue for suicide is family issue so proper psychological management and counselling should be provided to the venerable age group.**Keywords:** Organophosphorus, Pesticide, Poisoning, Suicide**INTRODUCTION**

Among the pesticides, organophosphorus compounds are commonly used by farmers. The frequent and traditional use of this compound has led to steady rise in suicidal and accidental poisoning.¹ In global scenario, over 300 million cases of organophosphorus poisoning are reported per year with 300000 fatalities.²

Among all cases of worldwide mortalities, 90% alone is bearded by developing countries.³ Farming being the most common occupation of Nepalese population, pesticides are easily accessible to them causing major problem of poisoning.^{4,5} Poisoning is the second most common method of suicide in Nepal. About 24% of poisoning death occurs as a result of ingestion of pesticides,

mostly organophosphorus compounds.^{6,7,8} Among the organophosphorus compounds Methyl Parathion and Dichlorvos are commonly ingested to commit suicide.⁹

Because of limited study being conducted in mid-southern region of Nepal, little information about pattern of organophosphorus poisoning is available so this study aims to find out the sociodemographic as well as clinical profile of organophosphorus poisoning presenting to the emergency department of a tertiary center in mid-southern region of Nepal.

MATERIALS AND METHODS

The present descriptive cross-sectional study was carried

out in the Emergency Department of National Medical College Teaching Hospital after taking ethical approval from Institutional Review Committee (IRC) of the same institute with reference number (F-NMC/556/078-079). The study period was one year from June 2022 to May 2023. Consent has been taken from the patient or their guardians before their recruitment in the study. The persons who were unable to communicate consent, it was taken from family members. Sample size was calculated by using the formulae below:

$$n = Z^2 p (1-p) / e^2$$

$$= (1.96)^2 \times 0.046 \times (1-0.046) / (0.04)^2$$

$$= 105.36 \leq 108$$

Where,

n= required sample size

z= confidence interval (CI) at 95% (standard value of 1.96)

P= prevalence for acute organophosphorus poisoning, 4.6%.⁶

q = 1-p

e = degree of accuracy desired, 4%

The entire patients with the confirmed case of acute organophosphorus poisoning were included in this study. The patients and their relatives who were unwilling to give consent and brought dead cases were excluded from the study. Data was collected using preformed proforma regarding their socio-demographic profile and clinical profile. Data were analyzed using Statistical Package for Social Science (SPSS version 23.0) software.

RESULTS

The present cross-sectional study was conducted on 108 (44 males and 64 females) in the emergency department of National Medical College Teaching Hospital. Most common age group of acute organophosphorus poisoning was 21-30 years(37%) followed by age group 31-40(33.3%), age group 10-20(18.5%) and age group >60(3.7%). The organophosphorus poisoning was common among females 64(59.26%) as compared with that of male 44(40.74%). Majority of the cases 70 (64.8%) were married while compared with unmarried

cases which were 38(35.2%). Most 61(56.5%) of victims were from lower socioeconomic status followed by lower middle 35(32.4%) and higher class 12(11.1%). Victim of Hindus origin was 74(68.5%) followed by Muslim 24(22.2%), Buddha 6(5.6%) and others 4(3.7%). In response to educational status, it was reported that most of the victims were studied secondary school 48(44.4%) followed by primary school 34(31.5%), illiterate 18(16.7%) and higher school 8(7.4%). Majority 42(38.9%) of victims were students followed by 33(30.6%) farmers.

Table 1. Socio-demographic profile of acute organophosphorus poisoning.

Socio-demographic variables	Frequency	Percentage
Age (years)		
10-20	20	18.5
21-30	40	37.0
31-40	36	33.3
51-60	8	7.4
>60	4	3.7
Gender		
Male	44	40.74
Female	64	59.26
Marital status		
Married	70	64.8
Unmarried	38	35.2
Socio-economic status		
Lower	61	56.5
Lower middle	35	32.4
Higher	12	11.1
Educational status		
Primary school	34	31.5
Secondary school	48	44.4
Higher school	8	7.4
Illiterate	18	16.7
Occupation		
Farmer	33	30.6
Student	42	38.9
Businessman	17	15.7
Job holder	5	4.6
Others	11	10.2
Religion		
Hindu	74	68.5
Muslim	24	22.2
Buddha	6	5.6
Others	4	3.7

Table 2, depicts the medicolegal profile related to the

victims of acute organophosphorus poisoning.

Majority of the victims 47(43.5%) consumed poisoning due to family issues followed by 20(18.5%) as a result of unemployment, 17(15.7%) due to stress, 14(13%) due to unknown reasons and 10(9.3%) due to psychiatric illness. Most common intent of poisoning was suicidal 98(90.7%) followed by accidental 10(9.3%).

Table 2, Medicolegal profile of acute organophosphorus poisoning

Variables	Frequency	Percentage
Reason of poisoning		
Family issue	47	43.5
Stress	17	15.7
Unemployment	20	18.5
Psychiatric illness	10	9.3
Unknown	14	13.0
Intent of poisoning		
Suicidal	98	90.7
Accidental	10	9.3

Table 3, shows clinical profile of the victims

Majority of victims 71(65.7%) predominantly showed the muscarinic signs and symptoms followed by nicotinic 28(25.9%) and neurological 9(8.3%). Most of the victims 42(38.9%) arrived between 4-10 PM followed by between 4-10 AM 34(31.5%). Route of administration of poisoning was oral in majority of cases 100(92.6%) followed by inhalation 6(5.6%) and by skin contact 2(1.9%). Most common compound used by victims was methyl parathion 37(34.3%) followed by Dichlorvos 23(21.3%) and Chlorpyrifos 18(16.7%).

Table 3, Clinical profile of victims

Variables	Frequency	Percentage
Predominant symptoms		
Muscarinic	71	65.7
Nicotinic	28	25.9
Neurological	9	8.3
Time of poisoning		
4-10 AM	34	31.5
10-4 PM	24	22.2
4-10 PM	42	38.9
10-4 AM	8	7.4
Route of administration		

Oral	100	92.6
Inhalation	6	5.6
Skin contact	2	1.9
Type of compound		
Methyl parathion	37	34.3
Chlorpyrifos	18	16.7
Dichlorvos	23	21.3
Phosmet	9	8.3
Malathion	4	3.7
Others	17	15.7

DISCUSSION

In this study, the most common age group was 21-30 years. Person of this age group can't control over his impulsive behavior. They face stress in daily life activities like failure in education and adjustment with family and love relationship. At this age group, they are emotionally weak and vulnerable to minor conflicts. Other studies have also shown the similar results.^{3,10,11} Married persons were more 70(64.8%) among the cases of poisoning while compared with unmarried, which was 38(35.2%). Married persons may have more responsibilities which may result in stressful life. The result is similar with other studies.^{3,5,12,13} In this study majority of victims were female 64(59.26%) with male female ratio 1:1.45. Similar trend has been reported in study conducted by Pradhan M et al.⁵ Majority of cases 61(56.5%) were from lower socioeconomic status. Similar result was found in study conducted by Dash et al.¹⁴ Most of the victims had studied secondary school (44.4%) followed by primary school (31.5%) and illiterate (16.7%). The study was similar to the study conducted by Aggarwal et al.³ In this study, it was observed that most of the victims were from Hindu religious background followed by Muslims and Buddha. This is as per population distribution of different religion in this area. The study conducted by Pradhan M et al also showed OP poisoning were highest among Hindu population.⁵ This study revealed OP poisoning was higher among students (38.9%) followed by farmer (30.6%). Other studies had also noted higher rate OP poisoning among students.^{15,16}

In our study, the most common intent of poisoning was suicidal (90.7%) followed by accidental (9.3%). A study conducted by Pandey et al showed 56.65% of poisoning was suicidal in nature.¹⁵ Other studies had also confirmed

this finding.^{17,18} In this study, the most common reason of OP poisoning was family issue (43.5%) followed by unemployment (18.5%). Pradhan et al in their study also reported family issue was the most common reason of poisoning.⁵

In this study muscarinic symptoms were predominantly present in the majority (65.7%) of cases followed by nicotinic (25.9%) and neurological (8.3%). The various studies reported similar results.^{19,20} The most common route of ingestion of OP poison was oral (92.6%) followed by inhalation (5.6%) and skin contact (1.9%). Shah et al in their study also reported the most common route of exposure was oral.²¹ In this studies most victims consumed poison between 4-10 PM (38.9%). Pradhan et al in their study reported poisoning occurred between 6-12 midnight.⁵ In this study most of the victims used Methyl parathion (34.3%) followed by Dichlorvos (21.3%) and Chlorpyrifos (16.7%). Other studies had reported Methyl parathion followed by Chlorpyrifos being the common compounds used.²²

CONCLUSIONS

In this study majority of victims were females. Occupation wise students and farmers were more prone to using organophosphorus compounds as a poison. Organophosphorus compounds are easily available because of farming being the most common occupation in Nepal. So strict regulation should be taken in selling of the substances so that everybody can't have easy access to these substances. The most common reason of suicide was family issues, so any family members who are vulnerable to suicide should be identified earlier and proper psychological management and counselling should be provided.

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