

# Study of pattern and outcome of acute poisoning cases at tertiary care hospital in North India

Naman Aggarwal, Kamal K. Sawlani, Shyam C. Chaudhary,  
Kauser Usman, Himanshu Dandu, Virendra Atam, Shivani Rani,  
Rajat Chaudhary

Department of Medicine, King George's Medical University, Lucknow, Uttar Pradesh, India

## ABSTRACT

**Introduction:** The WHO 2021 data estimate that 2 million lives and 53 million disability-adjusted life-years were lost in 2019 due to exposures to selected chemicals. It is important to know the pattern and outcome of acute poisoning cases for proper planning, prevention and management. Knowing the pattern will also help in designing training modules for primary care physicians to make them aware about newer poisons and their management. Awareness regarding newer poisons consumed is necessary for early identification, initial management and timely referral to higher centres by primary care physicians. This study was performed to see the pattern and outcome of acute poisoning cases in North Indian population and various factors related to outcome. **Materials and Methods:** This study was conducted in department of medicine of a teaching institute in North India after approval by the Institutional Review Board. Patients admitted in the department during the study and fulfilling the inclusion criteria were enrolled in the study after obtaining consent. **Results:** A total of 417 patients with poisoning were recruited in the study. Out of 417 patients, majority were males (59.5%). Maximum number of patients were in the age group of 21–30 years (33.8%), and rural population (79.9%) was found to be more affected. Most of the patients were students and private employees. Most common types of poisoning were snakebite ( $n = 109$ , 26.1%), organophosphate ( $n = 49$ , 11.8%) and aluminium phosphide ( $n = 39$ , 9.3%). Out of 417 patients, 349 (83.69%) improved, while 68 (16.3%) expired. Requirement of ventilatory support was most commonly associated with aluminium phosphide poisoning (30.12%) followed by organophosphate poisoning (24.1%). **Conclusion:** Poisoning was more common in young males and more prevalent in rural population. Pesticides and snakebite were major causes of poisoning. Among suicidal cases, family conflict (problem/altercation with family members/marital discord) was main reason for the consumption of poison. There is need for creation of poison information centre along with separate toxicological units in tertiary care hospitals.

**Keywords:** Acute poisoning, aluminium phosphide, amitraz, organophosphate, snakebite, suicide

## Introduction

Poisoning is a significant global public health problem with 90% of the burden of fatal poisoning coming from developing countries. The WHO 2021 data addendum estimates that 2

million lives and 53 million disability-adjusted life-years were lost in 2019 due to exposures to selected chemicals.<sup>[1]</sup> In many countries, poisoning is one of the main causes of emergency attendance at hospitals. Poisoning is a time-dependent emergency and, like infectious diseases, may require a specialist for appropriate diagnosis and treatment.<sup>[2]</sup> Research analysis performed during COVID-19 pandemic reported an increase by 2 to 7 times in number of suicides in northern states of India: Punjab, Uttar Pradesh, Haryana, Himachal Pradesh, and Rajasthan.<sup>[3]</sup>

**Address for correspondence:** Dr. Naman Aggarwal,  
Department of Medicine, King George's Medical  
University, Lucknow - 226 003, Uttar Pradesh, India.  
E-mail: aggarwalnaman372@gmail.com

Received: 03-04-2023

Revised: 21-06-2023

Accepted: 26-06-2023

Published: 30-09-2023

### Access this article online

#### Quick Response Code:



**Website:**  
<http://journals.lww.com/JFMPC>

**DOI:**  
10.4103/jfmpe.jfmpe\_592\_23

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow\_reprints@wolterskluwer.com

**How to cite this article:** Aggarwal N, Sawlani KK, Chaudhary SC, Usman K, Dandu H, Atam V, *et al.* Study of pattern and outcome of acute poisoning cases at tertiary care hospital in North India. J Family Med Prim Care 2023;12:2047-52.

It is important to know the pattern and outcome of acute poisoning cases for proper planning, prevention and management of these cases. Knowing the pattern will also help in designing training modules for primary care physicians to make them aware about newer poisons and their management. This study was performed to see pattern and outcome of acute poisoning cases in North Indian population.

## Materials and Methods

This study was conducted in department of medicine of a teaching institute in North India after approval by the institutional ethics committee from August 2021 to July 2022. Patients admitted in the department during the study and fulfilling the inclusion criteria were enrolled after obtaining consent. This study included all patients above the age of 12 years with alleged history of consumption of poisonous substance and snakebite.

A total number of 417 cases fulfilling the inclusion criteria were enrolled. All these cases were evaluated by detailed history, clinical examination and routine blood investigations as per working proforma. Data regarding age, sex, marital status, education status, occupation, residence (rural/urban), time elapsed since intake, circumstances of poisoning, name of poison, treatment given, requirement of ventilatory support, ICU stay, hospital stay and outcome were collected in prestructured proforma. The statistical analysis was performed using SPSS (Statistical Package for Social Sciences) Version 23.0 statistical analysis software. Chi-square test and analysis of variance (ANOVA) test were applied. Level of significance ( $P < 0.05$ ) was considered as statistically significant.

## Results

A total of 417 patients were recruited in the study. Gender-wise distribution of study population in different age groups is given in Table 1. A maximum number of patients were in the age group 21–30 years ( $n = 141$ , 33.8%). In the present study, 248 (59.5%) were males and rest 169 (40.5%) were females. A majority of males were in age group 21-30 years, whereas majority of females were in age group is 12-20 years. About 23.5% of the patients ( $n = 98$ ) were illiterate. Educational status of 101 (24.2%) patients was up to high school, 117 (28.1%) were educated up to intermediate, and rest 101 (24.2%) were graduates. In the present study, poison consumption was found to be more prevalent in rural population (79.9%,  $n = 333$ ) as compared to urban population (20.1%,  $n = 84$ ).

Out of 417 patients recruited in the study, majority [248 (59.47%)] were married and rest 169 (40.53%) were unmarried. Distribution of cases according to occupation is shown in Table 2. Most common group was of students (34.0%) followed by private job (26.9%) and housewife (21.1%). Other included agriculture (8.6%), labourers (2.4%) and govt. job (1.85%). Patients who were unemployed accounted for 3.9% of cases. Mode of poisoning in majority of patients was suicidal (65.2%),

**Table 1: Gender-wise distribution of study population in different age groups (n=417)**

Age intervals	Sex			
	Male		Female	
	n	%	n	%
12-20 years	68	27.4%	65	38.5%
21-30 years	81	32.7%	60	35.5%
31-40 years	49	19.8%	23	13.6%
41-50 years	27	10.9%	17	10.1%
51-60 years	12	4.8%	3	1.8%
>61 years	11	4.4%	1	0.6%
Total	248	100%	169	100%
Range (median)	12-80 (25)		13-65 (23)	
Mean±SD	30.41±14.17		26.58±10.51	

**Table 2: Occupation of study population**

Occupation	Frequency	Percent
Agriculture	36	8.6
Government job	5	1.2
Housewife	88	21.1
Labourer	10	2.4
Others	8	1.9
Private job	112	26.9
Student	142	34.0
Unemployed	16	3.9
Total	417	100.0

followed by snakebite (26.1%). Accidental poisoning was seen in 6.7% of patients, whereas homicide accounts for only 1.8% of cases.

Reason for consumption of poison is shown in Table 3. Family conflict (family problem/altercation with family members/marital discord) was the most common (40.44%) reason of consumption of poison. Consumption of poison for this reason in male and female population was almost similar (males 42.00% and females 40.44). Consumption of poison by patients who were having psychiatric illness accounts for 8.09% of cases (males 8% and females 8.20%). Poison consumption for unknown reasons was seen in 50.00% of cases (Males 48% and females 52.46%).

Identification of poisonous substance was performed on the basis of history and constellation of signs and symptoms. In this study, forensic analysis of body fluid/secretion was not performed for the identification of poison. Those cases in which poisonous substance could not be identified clearly on the basis of history and clinical examination were labelled as poisoning by 'unknown' substance. Distribution of patient on the basis of poison consumed is shown in Table 4(a) and (b). Most common type of poisoning cases reported overall was snake bite ( $n = 109$ , 26.1%) followed by organophosphate ( $n = 49$ , 11.8%) followed by aluminium phosphide ( $n = 39$ , 9.3%). Unknown poisoning accounted for 22.5% of cases. Among males, most common type of poisoning cases reported was snake bite ( $n = 73$ , 29.4%) followed by organophosphate ( $n = 23$ , 9.3%). Among females

**Table 3: Reason for consuming poison in suicidal cases (n=272)**

Reason for poisoning	Male		Female		Total	
	n	%	n	%	n	%
Family conflict	63	42.00	47	38.52	110	40.44
Known psychiatric illness	12	8.00	10	8.20	22	8.09
Stress related to studies	1	0.67	1	0.82	2	0.74
Unemployed	2	1.33	0	0.00	2	0.74
Unknown	72	48.00	64	52.46	136	50.00
Total	150	100	122	100	272	100

**Table 4(a): Type of poison consumed (n=417)**

Name of poison	Frequency	Percent
Aluminium phosphide/celphos	39	9.3
Corrosive/acid/phenol	23	5.5
Drug overdose	23	5.5
Insecticide	25	6.0
Methanol	8	1.9
Miscellaneous*	23	5.5
Organophosphate	49	11.8
Rat kill poison	24	5.8
Snake bite	109	26.1
Unknown	94	22.5
Total	417	100.0

\*Distribution of miscellaneous poisoning is shown in Table 4(b)

**Table 4(b): Miscellaneous poisoning**

Miscellaneous	n	%
Amitraz	7	30.43
Ayurvedic oil	1	4.35
Dhatura	2	8.70
Diesel	2	8.70
Glass powder	1	4.35
Kerosene	1	4.35
Methyl ethyl ketone peroxide	1	4.35
Liquid mosquito repellent	3	13.04
Naphthalene	1	4.35
Paraquat	3	13.04
Turpentine oil	1	4.35
Total	23	100.0

also, most common type of poisoning cases reported was snake bite (n = 36, 21.3%) followed by organophosphate (n = 26, 15.4%).

Proportion of females was higher as compared to males for drug overdose (7.1% vs. 4.4%), organophosphate (15.4% vs. 9.3%), rat killer (7.1% vs. 4.8%), miscellaneous (5.9% vs. 5.2%) and unknown (27.8% vs. 19.0%), whereas proportion of males was higher as compared to females for consumption of aluminium phosphide (12.1% vs. 5.3%), corrosive/acid/phenol (6.0% vs. 4.7%), snake bite (29.4% vs. 21.3%), methanol (3.2% vs. 0.0%) and insecticides (4.85% vs. 3.95%).

Out of 417 patients included in the study, 349 (83.69%) improved, whereas rest of the 68 (16.3%) expired [Table 5].

Table 6 shows that 259 patients (62.11%) reached the hospital  $\leq 2$  hours after consumption of poison, and 63 patients (15.10%) reached between 2 and 4 hours. 95 patients (22.78%) arrived after time lapse of  $>4$  hours. Among patient who reach hospital within 2 hours, 84.17% patients improved and 15.83% expired. Among patients who reached hospital between 2 to 4 hours, 80.95% improved and 19.05% expired. Among those who took  $>4$  hours to reach the hospital, 84.21% improved and 15.79% expired. A statistically significant association between outcome and time lapsed in reaching hospital was found. Out of 68 cases who expired after reaching the hospital, 41 patients (60.29%) reached the hospital within 2 hours after consumption of poison, 12 (17.65%) patients reached the hospital between 2 and 4 hours, and 15 (22.06%) patients reached after 4 hours.

Proportion of suicidal poisonings was higher as compared to that of accidental for consumption of aluminium phosphide (12.9% vs. 3.4%), drug overdose (8.5% vs. 0.0%), organophosphate (15.8% vs. 13.8%), rat kill (8.1% vs. 6.9%) and unknown (33.1% vs. 10.3%), whereas proportion of accidental was higher as compared to that of suicidal for consumption of corrosive/acid/phenyl (10.3% vs. 7.4%), insecticides (10.3% vs. 7.4%), methanol (27.6% vs. 0.0%) and miscellaneous (13.8% vs. 7.0%).

Duration of hospital stay in the present study ranged from 1 to 45 days, and mean duration of stay was  $5.07 \pm 4.43$  days. Minimum hospital stay was found for corrosive ( $3.89 \pm 2.50$  days), insecticide ( $3.94 \pm 2.73$  days), followed by aluminium phosphide/celphos ( $3.96 \pm 3.99$  days), whereas maximum stay was found for organophosphate ( $7.20 \pm 3.38$  days) followed by drug overdose ( $6.33 \pm 5.58$  days).

As shown in Table 7, proportion of mortality was higher in aluminium phosphide (30.88%), unknown (30.88%), snake bite (16.18%) and organophosphate (10.29%) as compared to other poisonous substances. These four causes collectively account for 88.28% of mortality.

Requirement of ventilator most commonly associated with aluminium phosphide poisoning (30.12%) followed by organophosphate poisoning (24.1%) and unknown cases (21.69%), whereas in other types, it ranges from 0 to 9.6%.

## Discussion

Poisoning forms a major problem in developing countries, though the type of poison and the associated morbidity and mortality varies from one place to another and it may change over a period of time. Therefore, it is important to become aware of current trends. It is equally important for both primary care physicians and those working at higher centre to know the prevailing trend in consumption of poisoning for better diagnosis and management. Profile of poisoning in an area depends upon a variety of factors, ranging from access to and availability of poison, marital status, occupational, cultural and religious influences, etc.

In spite of the fact that acute poisoning cases are second only to road traffic accidents in numbers, this is often a neglected health problem compounded with the problem of difficult diagnosis in poisoning cases.<sup>[4]</sup> In the present study, men (59.5%) outnumbered women (40.5%). Male: female ratio was 1:0.68. High proportion of poisoning in these productive years may be attributed to high degree of stress in academic, financial, and emotional fronts, inability to achieve targets and also due to easy accessibility to poisons. Most of previous studies also showed that poisoning is more common in males.<sup>[5-13]</sup> In few studies, females were more than males.<sup>[14-19]</sup>

In our study, majority of cases (33.8%) were from age group of 21–30 years. This can be explained by the fact that the persons of this age suffer from stress of the modern lifestyles, failure in education, family problems, impulsive behaviour, etc., Other studies have also reported that most of poisoning cases belong to 21–30 years.<sup>[11,12,18-24]</sup>

In our study, we found that about 23.5% of the patients (*n* = 98) were illiterate. Educational status of 101 (24.2%) patients was up to high school, 117 (28.1%) were educated up to intermediate, and rest 101 (24.2%) were graduates. This might be due to fact

that majority of patient in our study are from rural area where literacy rate is lower than urban population. However, there is slight improvement in education status of patient as compared to previous studies. This might be due to overall improvement in literacy rate in Northern India.

In the present study, poison consumption was found to be more prevalent in rural population (79.9%) as compared to urban population (20.1%). This might be because of more prevalent agriculture profession and widespread use of pesticide in agriculture sector in rural area. Poverty, failure of crops, family problems, and easy availability of the poison in their household made people of rural area more prone for poisoning and whenever there is a precipitating factor one might try to end one's own life. Rural population forms the major proportion of poisoning cases in other studies as well.<sup>[5,10,12,24,25]</sup> Few studies have shown that urban population forms majority of cases.<sup>[8,17,22]</sup>

Out of 417 patients recruited in the study, majority [230 (55.2%)] were married and rest 187 (44.8%) were unmarried. Difference in marital status of male and female cases was not found to be statistically significant (*P* = 0.398). Poisoning is more common in married persons because they have more responsibility in comparison with unmarried persons. Other studies have also shown that poisoning was more common in married individuals.<sup>[8,10,19,20,22,26]</sup>

Snake bite is common in our study because of predominance of people from rural area. Organophosphate and aluminium phosphide are used as common agents for poisoning because of their low cost and easy availability. Since majority of patients in our study were from rural background and were farmers, they used these pesticides instead of other poisons.

Drugs, organophosphate compounds and rat killer are easily available in home so women select these poisons instead of others. Proportion of men was higher as compared to women for aluminium phosphide, snake bite, methanol intoxication can be explained by fact that men usually go to fields for work

**Table 5: Outcome in study population**

Outcome	Frequency	Percent
Discharge	349	83.69
Expired	68	16.3
Total	417	100.0

**Table 6: Association of timelapse with outcome**

Time lapsed in reaching hospital	Outcome					
	Discharge		Expired		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
≤2 hours	218	84.17%	41	15.83%	259	100.0%
>2 to 4 hours	51	80.95%	12	19.05%	63	100.0%
>4 hours	80	84.21%	15	15.79%	95	100.0%
Total	349	89.72%	68	10.28%	417	100.0%

**Table 7: Distribution of patients by type of poison, gender and outcome**

Name of poison	Male				Female				Total				Case fatality rate
	Discharge		Expired		Discharge		Expired		Discharge		Expired		
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Aluminium Phosphide/Celphos	13	6.47%	17	36.17%	5	3.38%	4	19.05%	18	5.16%	21	30.88%	53.85%
Corrosive/Acid/Phenol	14	6.97%	1	2.13%	8	5.41%	0	0.00%	22	6.30%	1	1.47%	4.35%
Drug overdose	11	5.47%	0	0.00%	12	8.11%	0	0.00%	23	6.59%	0	0.00%	0.00%
Insecticide	15	7.46%	1	2.13%	9	6.08%	0	0.00%	24	6.88%	1	1.47%	4.00%
Methanol	7	3.48%	1	2.13%	0	0.00%	0	0.00%	7	2.01%	1	1.47%	12.50%
Miscellaneous	11	5.47%	2	4.26%	9	6.08%	1	4.76%	20	5.73%	3	4.41%	13.04%
Organophosphate	19	9.45%	4	8.51%	23	15.54%	3	14.29%	42	12.03%	7	10.29%	14.29%
Rat kill	11	5.47%	1	2.13%	11	7.43%	1	4.76%	22	6.30%	2	2.94%	8.33%
Snake bite	66	32.84%	7	14.89%	32	21.62%	4	19.05%	98	28.08%	11	16.18%	10.09%
Unknown	34	16.92%	13	27.66%	39	26.35%	8	38.10%	73	20.92%	21	30.88%	22.34%
Total	201	100.00%	47	100.00%	148	100.00%	21	100.00%	349	100.00%	68	100.00%	16.31%

where snake bite commonly occur; men are addicted to alcohol, so methanol poisoning is seen in them.

Among miscellaneous poisoning, we have noted poisoning with amitraz, liquid mosquito repellent, paraquat, Dhatura, diesel, ayurvedic oil, glass powder, kerosene, naphthalene and turpentine oil.

Healthcare workers are aware about conventional poisonings like organophosphate, aluminium phosphide, corrosives and snake bites. Primary care physicians must also know about new poisons being consumed for proper identification, initial management and timely referral to higher centre for proper management.

Among patient who reached hospital within 2 hours, 84.17% patients improved and 15.83% expired. Among patients who reached hospital between 2 and 4 hours, 80.95% improved and 19.05% expired. This shows that getting early medical treatment is necessary to reduce mortality. Requirement of ventilator was most commonly associated with aluminium phosphide and organophosphate poisoning.

Increasing incidence of poisoning and mortality associated with it makes it necessary to take some steps so that these can be reduced. The government should regulate the import, manufacture, sale, transport, distribution and use of these poisons with a view to prevent risk to human beings. Poison information centres and separate toxicological units in tertiary care hospitals should be established.

## Conclusion

Poisoning was more common in young males and more prevalent in rural population. Pesticides and snake bite were major causes of poisoning. Among suicidal cases, family conflict (problem/altercation with family members/marital discord) was main reason for consumption of poison. There is need for creation of poison information centre along with separate toxicological units in tertiary care hospitals.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## References

- World Health Organisation [www.who.int]. Geneva: The public health impact of chemicals: knowns and unknowns-data addendum for 2016. Available from: <https://www.who.int/publications/i/item/WHO-CED-PHE-EPE-18.09>. [Last accessed on 2023 March 31].
- World Health Organisation [www.who.int]. Geneva: WHO Guidelines for establishing a poison centre. Available from: URL: <https://www.who.int/news/item/18-01-2021-who-guidelines-for-establishing-a-poison-centre>. [Last accessed on 2023 March 31].
- Pathare S, Vijayakumar L, Fernandes TN, Shastri M, Kapoor A, Pandit D, *et al.* Analysis of news media reports of suicides and attempted suicides during the COVID-19 lockdown in India. *Int J Ment Health Syst* 2020;14:88.
- Singh NP, Kaur G. Poisoning: Basic considerations and epidemiology. In: Munjal YP, Sharma SK, Agarwal AK, Gupta P, Kamath SA, Nadkar MY, *et al.*, editors. *API text book of medicine*. 10<sup>th</sup> ed. Mumbai: Association of Physicians of India; 2015. vol 2 p. 2628.
- Kaur S, Gupta S, Sadiq S, Khajuria V. Spectrum of acute poisoning: A retrospective observational study in a tertiary care hospital in North India. *Natl J Physiol Pharm Pharmacol* 2016;6:247-50.
- Ahuja H, Mathai AS, Pannu A, Arora R. Acute poisonings admitted to a tertiary level intensive care unit in Northern India: Patient profile and outcomes. *J Clin Diagn Res* 2015;9:UC01-4.
- Mittal N, Shafiq N, Bhalla A, Pandhi P, Malhotra S. A prospective observational study on different poisoning cases and their outcomes in a tertiary care hospital. *SAGE Open Med* 2013;1:2050312113504213.
- Aravind A, Rai M. Pattern of acute poisoning admissions in the medical intensive care unit of a tertiary care hospital. *Int J Pharm Sci Drug Res* 2014;6:239-42.
- Batra AK, Keoliya AN, Jadhav GU. Poisoning: An unnatural cause of morbidity and mortality in rural India. *J Assoc Physicians India* 2003;51:955-9.
- Maharani B, Vijayakumari N. Profile of poisoning cases in a tertiary care hospital, Tamil Nadu, India. *J Appl Pharm Sci* 2013;3:91-4.
- Anjum A, Husain M, Hanif SA, Ali SM, Beg M, Sardha M. Epidemiological profile of snake bite at tertiary care hospital, North India. *J Forensic Res* 2012;3:1-5.
- Ali I, Sawlani KK, Dandu HR, Chaudhary SC, Usman K, Atam V, *et al.* Study of pattern and outcome of acute poisoning cases at tertiary care hospital in north India. *J Evid Based Med Healthc* 2017;4:326-31.
- Parashar A, Ramesh M. Assessment of the sociodemographic profile, pattern, and outcomes of intentional poisoning cases in an emergency department of a Tertiary Care Teaching Hospital. *Crisis* 2020;41:490-4.
- Rageh OE, Sabra HK, Alammam AA, Alanazi ON, Nagy A, Kabbash IA. Profile and outcomes of acute poisoning in the toxicology treatment and control center at Tanta University Hospital, Egypt. *BMC Pharmacol Toxicol* 2023;24:6.
- Laheer AE, Motara F, Gihwala R, Moolla M. The profile of patients presenting with intentional self-poisoning to the Charlotte Maxeke Johannesburg Academic Hospital emergency department, South Africa. *S Afr Med J* 2022;112:347-51.
- Thapa S, Dawadi BR, Upreti AR. Acute poisoning among patients presenting to the emergency department of a Tertiary Care Center: A descriptive cross-sectional study. *JNMA J Nepal Med Assoc* 2020;58:470-3.
- Getie A, Belayneh YM. A retrospective study of acute poisoning cases and their management at emergency department of Dessie Referral Hospital, Northeast Ethiopia. *Drug Healthc Patient Saf* 2020;12:41-8.
- Raghu K, Shreevani P, Kumar SS, Gopal S, Shaik MV, Ahammed B. Incidence and outcome of poisoning patients in a tertiary care teaching hospital. *Asian J Pharmacol Toxicol* 2015;03:23-6.

19. Acharya S, Lakshminarayana K, Sharanappa M. Assessment of poisoning cases in a tertiary care hospital. *Int J Biomed Res* 2014;05:578-81.
20. Mugadhlmadh A, Bagali MA, Hibare SR, Ingale DI, Gupta N, Bhuyyar C. Study of socio-demographic profile of poisoning cases at Shri B M Patil Medical College Hospital and Research Centre, Bijapur. *Int J Cur Res Rev* 2012;04:80-4.
21. Indu TH, Raja D, Ponnusankar S. Toxicoepidemiology of acute poisoning cases in a secondary care hospital in rural South India: A five-year analysis. *J Postgrad Med* 2015;61:159-62.
22. Mahabalshetty AD, Aithal KR, Patil BS, Kudari SS, Dhananjaya M. Profile of acute poisoning cases at a tertiary care hospital. *Med Inn* 2013;2:81-6.
23. Mathew R, Jamshed N, Aggarwal P, Patel S, Pandey RM. Profile of acute poisoning cases and their outcome in a teaching hospital of north India. *J Family Med Prim Care* 2019;8:3935-9.
24. Chatterjee S, Verma VK, Hazra A, Pal J. An observational study on acute poisoning in a tertiary care hospital in West Bengal, India. *Perspect Clin Res* 2020;11:75-80.
25. Sarkar AP, Mondal TK, Shivam S, Thakur R, Ghosh S, Misra RN. Socio-demographic characteristics of poisoning cases in a tertiary care level hospital of West Bengal. *Indian J Basic Appl Med Res* 2015;4:476-82.
26. Patil A, Peddawad R, Verma VCS. Profile of acute poisoning cases treated in a tertiary care hospital: A study in Navi Mumbai. *Asia Pac J Med Toxicol* 2014;3:36-40.