INTERNATIONAL JOURNAL OF ADVANCES IN PHARMACY MEDICINE AND BIOALLIED SCIENCES
An International, Multi-Disciplinary, Peer-Reviewed, Indexed, Open Access Journal
www.biomedjournal.com
ISSN 2348-2109

A prospective study on different types of poisoning cases and their outcome at tertiary care hospital

Mohammad Rafiuddin[1], Syed Shabbir Hussain[1], Syed Arifuddin Hashmi[1], Shaikh Aythesaam Ahmed Qureshi[1], Mohammad Avez Ali[1*], U. Ramchander Rao[2], Javed Akhtar Ansari[1].

[1]*Department of Pharmacy Practice (PharmD), MESCO College of Pharmacy, Mustaidpura, Hyderabad, INDIA.*
[2]*Department of General Medicine, Osmania General Hospital (OGH), Afzal Gunj, Hyderabad, INDIA.*

ORIGINAL RESEARCH ARTICLE

ABSTRACT

Background: The aim is to study the demographics and characterize types of poisoning at tertiary care hospital and evaluate the survival and mortality.
Subjects and methods: An observational, prospective study was conducted at tertiary teaching hospital at Hyderabad, T.S. Analysis were performed to test the association of demographic characteristics with type of poison ingested and their outcome. A multivariable logistic regression model was used to assess the association between mortality and survival.
Results: Demographic information was obtained on 175 patients relating to acute poisoning. Maximum numbers of patients were in the age group of 20–29 years followed by age group below 20 years. 106 were male (60.57%) and 69 were female (39.5%). The high incidence in case of males may be because males are more exposed to stress and strain due to financial difficulties, loss of job, discord at home and work place, etc. Organophosphates were the most common type of poison consumed. Overall mortality in the present study was 16.5 per cent. This finding is similar to the reported mortality rates in other previous studies.
Conclusion: It has been clear that there is no doubt in increase in the incidence of the poisoning cases, of which suicidal poisoning has been recorded as the highest cause of acute poisoning in the rural areas. The need of the hour is to generate awareness among the public & counsel them on how to manage an encounter of poisoning incident. This study has highlighted the lacunae in the management of poisoning incidents and the need to establish a poison information center for the better management & prevention of poisoning cases.
Keywords: Organophosphates, gender, poisoning, mortality, age group.

*Author for correspondence
E-mail: owais4peace@gmail.com

Article ID 126

INTRODUCTION

Use of toxic material can be considered as old as mankind. To the earliest man, poison was known for the use of hunting, waging war, and official execution consisted of plant extracts, animal venoms and minerals including arsenic, lead, opium and cyanogenic glycosides.

There is an ever increasing use of chemicals with industrial and agricultural field revolution along with the upgradation and advances in medical sciences through the century, which has led a vast number of toxic materials available. Exposure to these, results in severe toxicity that has long been a concern in humans. The adverse effects caused due to exposures of chemicals, drugs or other xenobiotics, are responsible for morbidity and mortality which vary from country to country (Poklis, 2000). All substances are poisons; there is none that is not a poison. The right dose differentiates a poison and a remedy.

Poisoning is a common medico-social problem nowadays all over the world. It consumes not only the valuable

health service resources but also causes considerable morbidity and mortality. Everyday around the world, almost 700 people die from poisonings and for every person that dies, several thousands more are affected by poisoning. The severity and outcome in such cases are determined by a number of factors such as chemical and physical properties of the poison, amount consumed, mode of poisoning and individual characteristics like the functional reserve of the individual or target organ, which is further influenced by age and pre-existing disease (Sharma et al., 2002; Eddleston, 2000). Worldwide intentional poisoning is increasing day by day due to change in the life style and social behavior with leading mortality and morbidity. Acute pesticide poisoning is one of the most common causes of intentional deaths worldwide. The various bites and stings are responsible for accidental poisoning (Singh and Unnikrishnan, 2006; Jesslin et al., 2010).

The growing incidence of poisoning due to accidental, occupational or intentional exposure to chemical agents has drawn worldwide attention (Singh and Unnikrishnan, 2006). It is estimated that up to half a million people die each year as a result of poisoning, especially due to exposure to pesticides (UNEP, 1997).

According to WHO more than three million poisoning cases with 251,881 deaths occur worldwide annually, of which, 99% of fatal poisonings occur in developing countries, particularly among agricultural workers (WHO, 1999).

Approximately 258,000 fatal cases of pesticide self-poisoning are reported globally each year, (Gunnell et al., 2007) most from Asia and the figure is greatly exceeded by the number of poisoned patients who seek treatment at health facilities. Data about the other kinds of poisonings are limited and are quite variable depending on the geographical area, socioeconomic factors and cultural diversity.

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 (Das 2007; Thomas et al., 2000; Batra, 2003). Easy availability and low cost of hazardous chemicals play a major role in suicidal, homicidal and accidental poisoning in developing countries (Unnikrishnan et al., 2006; Jesslin et al., 2010). In developed countries, the rate of mortality from poisoning varies only from 1 to 2 per cent but in developing countries like India, it varies between 15 to 30 per cent and is the fourth most common cause of mortality especially in rural India (Taruni et al., 2001; Pillay, 2001).

Several studies have revealed that Pesticides are the commonly used poisoning agents for intentional poisoning in India. Pesticides are comprised of a wide range of compounds including insecticides, herbicides, fungicides, rodenticides and disinfectants (WHO, 2009). Thus, far more than 1,000 active substances have been incorporated in approximately 35,000 preparations of pesticides used in agriculture. OPCs are the most commonly used among them and their use is gradually increasing with high morbidity and mortality rates, especially in developing countries (Unnikrishnan et al., 2006).

Pesticide poisoning is a significant problem in India. Because, predominantly it is an agrarian country about 60 to 80% of rural population depend on agriculture. Pesticides are routinely used for advanced farming and are readily available over the counter for agriculture purposes. Therefore, a pesticide is an easy accessing source for suicidal purpose (Rao et al., 2005; Anju et al., 2011).

The data from poison information center of All India Institute of Medical Sciences (AIIMS) reveals that highest incidence of poisoning cases was found in the age group of 14-40 years with male preponderance (Nalini, 2010).

In a previous retrospective study from South India, organophosphorus compounds (OPC) were reported as the most common cause of poisoning (36.0%) followed by snake bite (16.2%), drugs (11.0%), rat poison (7.3%) and others (Ramesha, 2009). Another study from North India also reported OPC and ALP as the most common poisonings although a majority (76.60%) were unknown poisonings.

Snake bite is also a major problem worldwide. According to estimates, more than 5 million venomous snake bites occur every year, and nearly, 125,000 of those who suffer snake bite die, with the majority of the deaths occurring in the rural population because of inadequate primary treatment and lack of tertiary care facilities (Garg, 2013).

SUBJECTS AND METHODS

This study was conducted for a period of seven months beginning in 2014. Data was collected from all the poisoning cases and snake bite cases admitted during this period to the Emergency ward and Medical wards in Osmania General Hospital, Hyderabad, Telangana. In the present study all poisoning cases above 18 years and snake bite were included. However, the paediatric patients, pregnant women, patient who are not willing to participate in the study, food poisoning, and allergic reactions to drugs were excluded from the study.

Study design

A standard, well-designed, structured proforma/data collection form was used to collect demographic data pertaining to the progress study. It included name, age, gender, date of admission, date of discharge, history of poisoning and categorization of poison ingested. A hospital based, prospective study was carried out on 175 patients. At study sites, patients present to the emergency department unit. Data pertaining to diagnosis, any co-morbid illness, any previous history of poisoning, mode of poisoning whether accidental/suicidal/homicidal and any recent precipitating event were also recorded.

The patients who were brought dead or died immediately upon arrival before receiving any indoor treatment were excluded. Pregnant women, pediatrics, patients who were not willing to participate in the study, food poisoning as well as patients with allergic reactions to drug were excluded from the study.

The patients were identified based on symptoms upon admission, medical records, history of poisoning and were followed up on a daily basis until discharge. The type of poison was identified by the physician based on information collected from the patient's attendant or caretaker. The study was conducted after getting approval from Institutional Ethics Committee (MCP/IEC/PD/PR/02) and confidentiality of data was ensured. Data was documented and statistically analyzed.

Statistical analysis

The SPSS statistical package (version 20.0, IBM-SPSS Inc.) is used for statistical analysis of chi-square test for significance, logistic regression to determine the correlation. Microsoft Excel is used for preparing spread sheet. Graphical representation of patient demographics.

RESULTS

According to the plan of work, population description in relation to age and gender was described.

The distribution of poisoning cases according to the gender: A total of 175 patients [105 males (60%) and 70 females (40%)] were enrolled in the study. Maximum number of cases (n = 55) were recorded in the age group of 20-29 years followed by the age group of 30-39 years (n = 40). The male cases (n = 105) outnumbered the female cases (n = 70).

Table 1. Distribution of patients based on gender and age.

Age(years)	Male	Female	Total
<20	5	6	11
20-29	33	22	55
30-39	25	15	40
40-49	24	11	35
>50	18	16	34
Total	105	70	175

Table 1 shows the distribution of poisoning cases according to the gender. A total of 175 patients [105 males (60%) and 70 females (40%)] were enrolled in the study. Maximum number of cases (n = 55) were recorded in the age group of 20-29 years followed by the age group of 30-39 years (n = 40). The male cases (n = 105) outnumbered the female cases (n = 70).

Table 2. Distibution of patients by their gender and type of poisoning.

Type of poisoning	Gender		Total
	Male	Female	
Organophosphate	31	20	51
Aluminium Phosphide	20	12	32
Snake bite	20	6	26
Rat poison	16	8	24
Unknown drugs	4	9	13
Sedatives	8	4	12
Disinfectants	2	3	5
Acids	0	4	4
Deleriants	4	0	4
Others	1	3	4
Total	106	69	175

Table 2 shows the distribution of the poisoning cases according to the gender and the types of poisoning. Maximum number of cases were recorded in organophosphates (n = 51) followed by ALP (n = 32), snake bite (n = 26), rat poison (n = 24), unknown drug (n = 13), sedatives (n = 12), disinfectant (n = 5), acids (n = 4), Deliriants (n = 4) and others (n = 4).

There were 116 suicidal cases that included 65 males and 51 females, 52 accidental cases which included 36 males and 16 females and 7 homicidal of which 4 males and 3 females. Irrespective of gender, suicide was the most common mode of poisoning.

Moreover, gender had no statistically significant effect on the mode of poisoning. Organophosphates was the most common poison in suicidal cases while accidental

poisoning occurred due to snake bite, rat poison, acid ingestion.

Table 3. Types of poisoning and its associated mortality.

Type of Poisoning	Number of patients (100%)	Mortality
OPP	5 (29.14%)	16 (9.14%)
ALP	32 (18.28%)	11 (6.28%)
Snake bite	26 (14.80%)	1 (0.57%)
Rat poison	24 (13.71%)	1 (0.57%)
Unknown drugs	13 (7.42%)	-
Sedatives	12 (6.85%)	-
Disinfectants	5 (2.85%)	-
Acids	4 (2.28%)	-
Deliriants	4 (2.28%)	-
Others	4 (2.28%)	-
Total	175 (100%)	29 (16.5%)

In table 3 the total mortality was found to be 16.5% (29 cases). Mortality rate was 9.14% % among patients with OPC poisoning followed by a mortality of6.28% in ALP. Mortality in snake bite poisoning was because of respiratory paralysis and severe hemorrhage. There was no mortality in Unknown drugs, sedatives, Disinfectants, acids, Deliriants, others.

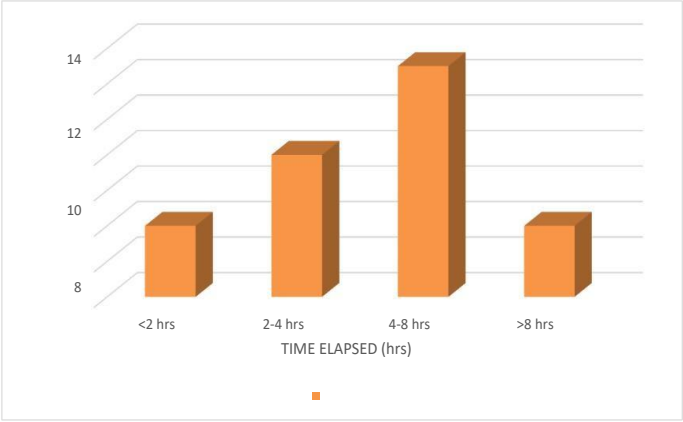

Figure 1. Time elapsed since exposure to hospital arrival and mortality.

Fig.1 shows the relation between the lag time and the mortality. Maximum patients 13 expired when there was a delay in admission to hospital by more than 4 hours after ingestion, followed by a time period of 2-4 hours. Patients admitted within 2 hours of ingestion had the least mortality.

Table 4. Distribution of patients according to their Educational Status.

Education	Total No. of patients	% Population
Primary	26	14.8
Secondary	63	36
Higher	27	15.4
Illiterate	59	33.71

Table 4 displays the distribution of patients based on their educational qualification. The literacy status of the victims showed 62.2% (n=116) was literate, out of which the secondary school 36% (n=63) population reported highest rate of suicidal poisonings followed by population with higher education 15.4% (n=27) then followed by population with primary education 14.8% (n=26). In illiterate population poisoning cases were reported to be 33.71% (n=59). The data indicates that there is high incidence of poisoning among the illiterate population and could be due to lack of knowledge and other problems, whereas the population of secondary education has the highest number of poisonings and could be due to reasons like failure in exam's, career, job and love affairs.

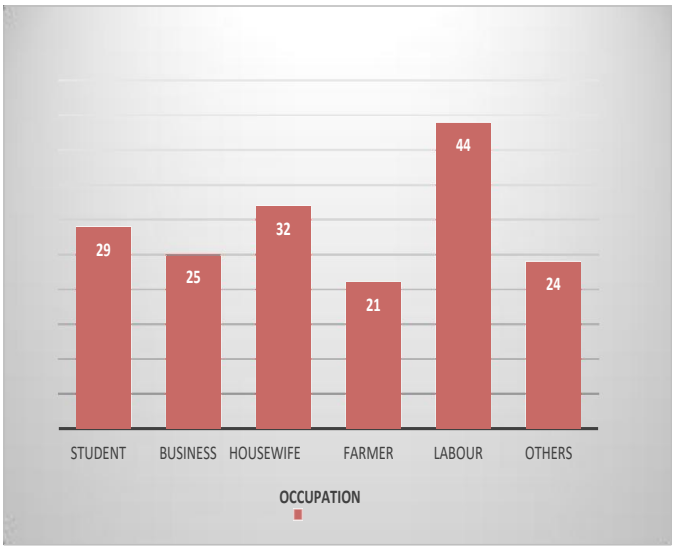

Figure 2. Distribution of patients based on their occupational status.

Figure 2 exhibit the distribution of the poisoning cases based upon the occupation and work of the patients. The Labour occupants reported highest incidences of poisoning cases 25.14% (n=44) due to poor economic status, lack of knowledge or illiteracy, marital dispute, family problems and depression. The next class that reported the maximum number of poisoning incidences is housewives 18.28% (n=32) followed by the majority of students with a reporting of 16.5% (n=29) of the poisoning cases. The other occupation's like farming and business reported an incidence of 12% (n=21) and 14.28% (n=25) respectively.

Figure 3 display the distribution of the patients based upon the mode of transportation by which they arrived at the hospital. It was found that with a very high majority of patients 78.28% (n=137) opted for ambulance as the means of transportation to reach the hospital early, followed by 14.85% (n=26) of patients used car to reach hospital. Remaining patients 6.28% (n=11) and 0.57% (n=1) used other transportation (auto, bus etc.) and bike respectively.

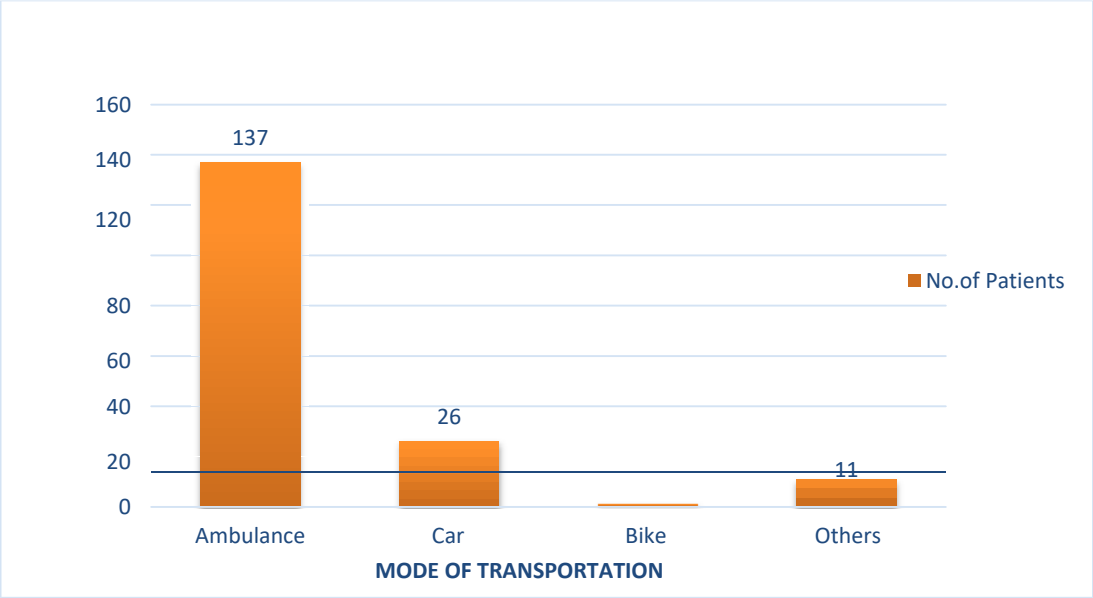

Figure 3. Mode of transportation.

Table 5. Statistical results.

Variable	Mortality		
	Alive [N=146] (%)	Death [N=29] (%)	*P*- Value
Socio demographics characteristics			
Age, years +/- Std. Deviation	35(12.1)	45(14.7)	< 0.001
Male	86(82%)	19(18%)	0.507
Female	60(86)	10(14)	
Mode of Poisoning			
Suicidal	94(81)	22(19)	0.232
Accidental	48(92)	4(8)	0.040
Homicidal	4(57)	3(43)	0.056
Type of Poisoning			
Organophosphates	35(69)	16(31)	0.001
Aluminium Phosphide	21(66)	11(34)	0.003
Snake Bite	25(96)	1(4)	0.059
Rat Poison	23(96)	1(4)	0.078
Unknown Drugs	13(100)	0	0.095
Sedatives	12(100)	0	0.110
Disinfectants	5(100)	0	0.312
Acids	4(100)	0	0.367
Deliriants	4(100)	0	0.367
Other	4(100)	0	0.367

Cause of Poisoning			
Marital Discord	26(93)	2(7)	0.143
Failure in Exam	9(90)	1(10)	0.565
Family Problems	20(67)	10(33)	0.007
Financial Difficulties	14(82)	3(18)	0.900
Discord with parents	1(25)	3(75)	0.001
Separation / Death of Lovers	8(89)	1(11)	0.651
Loss of Job	2(100)	0	0.526
Others	66(88)	9(12)	0.159
Marital Status			
Married	107(80)	27(20)	0.021
Unmarried	39(95)	2(5)	
Religion			
Hindu	128(82)	28(18)	0.369
Muslim	17(94)	1(6)	
Others	1(100)	0	
Treatment			
First aid received	139(85)	25(15)	0.068
Time-Lag for First aid	146 (35" ± 27")	29 (58" ± 39")	< 0.001
Time-Lag for treatment	146 (3'51"±4'16")	29 (8'15" ± 17'6")	0.007
Region			
Rural	77(77)	23(23)	
Urban	69(92)	6(8)	0.008
Educational status			
Illiterate	43(73)	16(27)	0.007
Primary Education	24(92)	2(8)	0.187
Secondary Education	52(82)	11(18)	0.813
Higher Education	27(100)	0	0.012
Occupation			
Farmer	16(73)	5(27)	0.342
Labour	32(73)	12(27)	0.027
House-wife	29(91)	3(9)	0.226
Students	26(90)	3(10)	0.323
Businessman	21(84)	4(16)	0.934
Others	22(92)	2(8)	0.243

DISCUSSION

Most of the patients in this study were in the young age group and maximum number of patients was in the age group of 20–29 years followed by 20 yrs. age group. A study conducted by Howlader et al. (2008) found the occurrence of poisoning were more prominent in the age between 26-35.

Since most of the cases were suicidal in nature, the distribution pattern shows the mental vulnerability and impulsiveness of youth population. The present study

indicates that there were more number of male poisoning cases (60.5%) compared to females (29.5%) our findings are similar with the other studies carried out by Mittal et al. (2013) in which 70% patients were males and Kumar et al. (2010) there were more male patients than females, with 52.15% (n = 1161) and 47.84% (n = 1,065) male and female, respectively.

The high incidence in case of males may be because they are more exposed to stress and strain due to financial difficulties, loss of job, discord at home and work place, etc. Organophosphates were the most common poison consumed 51(29.1%) followed by Aluminum phosphide 32(18.1%) and Snake bite 26(14.8%). Our study shows similar result with the study conducted by Abubakar et al. (2014) were organophosphorous poisoning (33.3%) were more when compared to other type of poisoning.

Studies have reported Aluminum phosphide and other pesticides as common causes of poisoning (Mittal, 2013). Recently, there has been an increasing trend in the incidence of aluminum phosphide poisoning in India, may be due to its easy availability, absence of specific antidote and high fatality rate. In an earlier study, this difference in the type of poisoning seen within the country may be due to the difference in the pattern of use and availability of pesticides. Males dominated the present study with male to female ratio of 1.5:1. However, other studies have shown that males are marginally higher compared to females. In our study we found that the literacy status of the victims showed 62.2% (n=116) was literate, out of which the secondary school 36% (n=63) population reported highest rate of suicidal poisonings followed by population with higher education 15.4% (n=27) then followed by population with primary education 14.8% (n=26). In illiterate population poisoning cases were reported to be 33.71% (n=59). Our findings were similar to the previous study conducted by Ramanath and Naveen Kumar (2012). The data indicates that there is high incidence of poisoning among the illiterate population and could be due to lack of knowledge and other problems, whereas the population of secondary education has the highest number of poisonings and could be due to reasons like failure in exam's, career, job and love affairs.

CONCLUSIONS

Among above poisoning cases the age group of 20-29 yrs. constituted the majority followed by 30-39 yrs. Organophosphates were the most common poison consumed 51(29.1%) followed by Aluminum phosphide 32(18.1%) and Snake bite 26(14.8%).

According to the findings of the study carried out, it has been clear that there is no doubt in increase in the incidence of the poisoning cases, of which suicidal poisoning has been recorded as the highest cause of acute poisoning in the rural areas. The outcomes of the study indicate that significant opportunities for reducing mortality exist by better medical management as first aid & by further restrictions on the most toxic pesticides. The need of the hour is to generate awareness among the public & counseling them about how to manage an encounter of poisoning incident. This study has highlighted the lacunae in the management of poisoning incidents and the need to establish a poison information center for the better management & prevention of poisoning cases. Depression is one of the commonest psychiatric diagnoses related to suicide. Patient with intentional poisoning must undergo psychiatry consultation during their stay in the hospital which will minimize the risk of next attempt of self-harm. Strict rules must be followed regarding sale of pesticides. Pattern of poisoning in present study is more or less similar to the pattern found in most of the other studies. This similarity is there in almost all parameters used in study. Mostly poisoning is by agricultural poison. As a conclusion, despite being a hospital-based study, we believe that these data provided important preliminary information on the pattern of poisoning in our place.

CONFLICT OF INTEREST

None declared.

REFERENCES

Abubakar S, Githa K, Kiran N, Sreebala. A study on pattern of poisoning cases in a tertiary care hospital, Bangalore. Indian Journal of Pharmacy Practice. 2014; 7(1):13-17.

Anju N, Shobha Rani RH, Nalini P. Comparison of efficacy and safety of atropine sulphate and glycopyrrolate in the treatment of organophosphorus poisoning at St. Martha's hospital, Bangalore. Indian Journal of Pharmacy Practice. 2011;3(1):43-6.

Batra AK, Keoliya AN, Jadhav GU. Poisoning: An unnatural cause of morbidity and mortality in rural India. Welcome to Journal of the Association of Physicians of India. 2003;51:955-959.

Das RK. Epidemiology of insecticide poisoning at A.I.I.M.S Emergency Services and role of its detection by gas liquid chromatography in diagnosis. Medico Legal Update. 2007; 7: 49–60.

Eddleston M. Patterns and problems of deliberate self-poisoning in the developing world. QJM: An International Journal of Medicine | Oxford Academic. 2000; 93(11):715- 731.

Garg R, Aggarwal S, Singh H, Kajal KS, Garg R, Pal R. Study of the relation of clinical and demographic factors with morbidity in a tertiary care teaching hospital in India. International Journal of Critical Illness and Injury Science. 2013; 3: 12–17.

Gunnell D, Eddleston M, Phillips MR, Konradsen F. The global distribution of fatal pesticide self-poisoning: systematic review. BMC Public Health. 2007; 7: 357.

Howlader MAR, Sardar MH, Amin MR, Morshed MG, Islam MS, Uddin MZ et al. Clinico epidemiological pattern of poisoning in a tertiary level hospital. Journal of Dhaka Medical College. 2008; 17(2): 11-112.

Jesslin J, Adepu R, Churi S. Assessment of prevalence and mortality incidence due to poisoning in a south indiantertiary care teaching hospital. Indian Journal of Pharmaceutical Sciences. 2010;72(5):587-591.

Kumar SV, Venkateswarlu B, Sasikala M, Kumar GV. A study on poisoning cases in a tertiary care hospital. Journal of Natural Science, Biology and Medicine. 2010; 1:35–39.

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 Medicine. 2013;1:2050312113504213.

Pillay VV. MKR Krishna's Hand Book of Forensic Medicine and Toxicology, 12th Ed., Paras Publications, Hyderabad, India, 2001.

Pillay,2013.Chapter 27 Hydrocarbons, Section 8 Hydrocarbons and Pesticides, Modern Medical Toxicology, 4 Edition, Jaypee Brothers Medical Publishers, New Delhi, India, PP 388, 389, 138, 139,140, 141, 149, 39.

Poklis A. Analytic/forensic Toxicology. Toxicology The Basic Science of Poisons. in Klassen CD ed. 7thedition. Mc Graw Hill New York, 2000.

Ramanath KV, Naveen Kumar HD. Study the assessment of poisoning cases in a rural tertiary care teaching hospital by a clinical pharmacist. Asian Journal of Pharmaceutical and Clinical Research. 2012;5(2):138-41.

Rao CHS, Venkateswarlu V, Surender T, Eddleston M, Buckley NA. Pesticide poisoning in south India–opportunities for prevention and improved medical management. Tropical Medicine & International Health. 2005; 10(6):581–588.

Sharma BR, Harish D, Sharma V, Vij K. Poisoning in northern India: Changing trends, causes and prevention thereof. Medicine, Science and the Law. 2002; 42(3):251-255.

Singh B, Unnikrishnan B. A profile of acute poisoning at Mangalore (South India). The Journal of Forensic and Legal Medicine. 2006;13(3):112–116

Taruni N, Bijoy T, Momonchand A. A Profile of Poisoning Cases Admitted to RIMS Hospital, Imphal. Journal of Forensic Medicne and Toxicology. 2001; 18:31-33.

Thomas M, Anandan S, Kuruvilla PJ, Singh PR, David S. Profile of hospital admissions following acute poisoning – experiences from a major teaching hospital in south India. "Adverse drug reactions and toxicological reviews"[Journal]. 2000; 19(4): 313–317.

UNEP (United Nations Environment Programme). International Labour Organization (ILO), World Health Organization (WHO). Guidelines for poison control. Geneva: WHO press, 1997.

Unnikrishnan B, Singh B, Rajeev A. Trends of acute poisoning in south Karnataka. Kathmandu University Medical Journal. 2005; 3(2): 149–154.

World Health Organisation. Guidelines for poison control. Bulletin; Geneva, 1999.

World Health Organization (WHO) 2009. The WHO recommended classification of pesticides by hazard and guidelines to classification: Geneva: WHO Press; 2010.