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A Prospective Observational Study on Pattern and Outcomes of Poisoning Cases at a Tertiary Care Teaching Hospital

Afshan Naaz[1], Masarrat Naaz[1], Aliya Begum[1], Sayeda Naiyla[1], Dr. Sabiha Naseem[1], Dr. Ateequr Rahman[1], Dr. Rafia Sultana[2]

[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.
Email: afshannaaz213@gmail.com

Abstract: Background: *Poisoning is a global public health problem causing significant morbidity and mortality, with thousands of deaths occurring every year, mainly in the developing countries. India, holding 70% of agricultural land, accounts for one third of pesticide poisoning cases, the farm workers being the worst affected. Most of the poisonings occur due to deliberate self-ingestion of the poison in an attempt to suicide. Organo-phosphorus (OP) compounds occupy the greatest burden of poisoning related morbidity and mortality. It is important to know the prevalence, pattern and to identify factors associated with outcomes of acute poisoning in such cases and to suggest strategies to improve them.* ***Methods:*** *This is a prospective observational study conducted in the Emergency medicine department of a tertiary care hospital. All patients who were presented with any type of acute poisoning including snake bite during span of 6 months were included in this study. Cases excluded from the study are those with improper history of poisoning and brought dead patients. A total of 113 cases were enrolled in the study after obtaining Informed consent. Data regarding demographics, relation to Age, Gender, Mode of poisoning, Socio-economic Class, Marital Status, Occupation, Literacy, Domicile, Cause of poisoning, Type of poison, Lag time in treatment, first aid, co-morbid illness, and final outcome were collected in a pre-structured proforma. The details of the first aid given, outdoor and indoor treatment received along with the treatment outcome was included in the study. All the data were presented as numbers and percentage. The observation and results are deduced and discussed. Finally, conclusion of the study found out after the discussion.* ***Results:*** *The number of poisoning cases found was (n=113) among all medico-legal cases (n=113) registered during the study period. Males (57.52%) dominated over Females (42.48%) as per the number of poisoning cases registered. Most common age group found was [20-29] year (39.82%), which is also same for the males (24.78%); & females (15.05%). Most of the poisoning victims belonged to lower class (79.64%), followed by middle class (20.35%) and none from the high socio-economic class. Most of the victims found were married (60%). Married males (23.89%) and married females (18.58%) were more prone for poisoning. Suicide (Intentional) was the most common manner of poisoning (75.22%), followed by accidental pattern (24.77%). No homicidal poisoning cases were detected during the study period. Suicidal pattern was more common in males (42.48%) (mostly married, 23.89%) and accidental pattern was also common in males (15.04%) (mostly married, 23.89%). Organophosphates (22.12%) was the most common poison encountered in this region irrespective of gender, followed by Drugs (17.69%), Disinfectants (14.16%), Rodenticide (12.39%), Snake bite (11.50%), Insecticide (9.73%), Household Products (7.96%), Unknown Bite (1.77%), Scorpion Sting (0.88%), Cyanide poisoning (0.88%), Honeybee Sting (0.88%). More than [two third] of the patients were presented to the hospital within [four hours] of incident. Most of the patients had been completely cured (92.62%) after the treatment. Case fatality rate was also low (only 7.38%). However, there is a relation between the lag period of incident and hospital presentation to the outcome of the treatment. Maximum patients were completely cured when the lag period was within [four hours]. With the increase in lag period there was increase in the number of complicated and fatal cases. The lag period when compared with the treatment outcome the results are statistically significant.* ***Conclusion:*** *Poisoning was more common in young males. Organophosphates and Drugs were major cause of poisoning. The huge burden of poisoning cases encountered in emergency department in this part of the country may be attributed due to easy availability of insecticides and other household poisons and these resulted usually from self-inflicted action. Measures observed in this study include early presentation to hospital to reduce lag time and provide immediate treatment at initial encounter may be effective in reducing duration of hospitalisation and possibly mortality in poisoning and snake bite cases. Awareness to handle the toxic materials and counselling. The proper enforcement of law in sale and distribution of addictive medicines, setting the boundaries of electronic media in exposure of critical facts and creating awareness amongst the society for education are a few goals in due. Need of the hour is to generate resources on a national level to eradicate poverty and use the young blood in employment to make them useful and responsible member of the society. Improve social awareness among the rural areas. It will not only save the precious lives but also reduce the expenditure of the health budget in combating the diseases according to set goals of WHO in the developing countries.*

Keywords: Poisoning, pattern and outcome, pesticides, drugs, Snake bite, tertiary care hospital.

INTRODUCTION

A medieval physician, Paracelsus (1493-1541) stated: "All things are poisonous and there is nothing without poison. Solely the dose determines that a thing is not a poison". His words summed up one of the most important concepts in modern toxicology, that is, the dose makes the poison.[1]

The use of toxic materials is considered as old as mankind. To the earliest man, the poison was known for the utilization of hunting, waging war, and official execution consisted of plant extracts, animal venoms, and minerals including arsenic, lead, opium, and cyanogenic glycosides. A poison is defined as any physical or chemical agent that inflicts injury or perhaps death on living organisms. Living organisms that carry poison are called poisonous organisms. They might be poisonous plants or venomous/poisonous animals found either on land or in water.[1][2]

The terms "venomous" and "poisonous" organisms are often used synonymously but they have distinct meanings. a toxic organism is one that's harmful to consume, but a venomous organism uses poison/venom to defend itself against predators.[3]

Death because of poisoning has been known since time immemorial. Poisoning is a major problem all over the globe, although its type and the associated morbidity and mortality vary from country to country.

Organophosphorus poisoning occurs very commonly in southern India, where farmers form a major proportion of the population who commonly use organophosphorus compounds like parathion as insecticides. Thus, because of the effortless accessibility of these compounds, a large number of suicidal cases are encountered in this region.[3]

There is an ever-increasing use of chemicals with industrial and agricultural field revolution alongside the up-gradation and advances in medical sciences through the century, which has led to a huge number of toxic materials available. Exposure to these leads to severe toxicity has long been a concern in humans. The adverse effects caused by exposures of chemicals, drugs, or other xenobiotics, are accountable for morbidity and mortality which vary from country to country.[4]

Worldwide intentional poisoning is increasing day by day because of changes in lifestyle and social behaviour with leading mortality and morbidity. the assorted reasons accountable for intentional poisoning are distress due to loss in the business, differences with the Partner, Family problems, Failure in Examinations, Emotional disturbances, and Chronic diseases. Acute pesticide poisoning is one of the most common causes of suicide worldwide. [5]

The commonest cause of poisoning in India and other developing countries is by pesticides, the causes being agriculture-based economics, poverty, unsafe practices, illiteracy, ignorance, lack of protective clothing, and easy availability of highly toxic pesticides. The various bites and stings are accountable for accidental poisoning. The growing incidence of poisoning because of accidental, occupational, or intentional exposure to chemical agents has drawn worldwide attention. It's estimated that up to half a million people die annually as a result of poisoning, especially due to exposure to pesticides.[5]

World Health Organization (WHO) estimated 0.3 million people die each year because of various poisoning agents. Acute pesticide poisoning is the major cause of intentional deaths worldwide. High doses of analgesics, tranquilizers, and antidepressants are the commonly used agents for intentional poisoning in industrialized countries and agricultural pesticides are used in the Asian region for self-poisoning particularly in rural areas with a fatality range of 10-20%. The majority of pesticide exposure is seen more in middle- and low-income countries due to increased use of agrochemicals in the agricultural sector. Studies have revealed that pesticides are commonly used poisoning agents for intentional poisoning in India. As agriculture is a major profession in the rural part of India farmers stock the pesticides to eradicate the weeds and pests. Due to the easy availability of pesticides, they are commonly used by individuals to end their life in stressful situations.[6]

Poisoning is a common medico-social problem nowadays all over the world. It consumes not only valuable health service resources but also causes considerable morbidity and mortality. Every day around the world, almost 700 people die from poisonings and for every person that dies, several thousand more are affected by the poisoning. The severity and outcome in such cases are determined by several 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.[7][8]

Nearly a million people die annually as a result of suicide, and chemicals account for a major number of these deaths. The number of these deaths can be reduced by limiting the availability of, and access to, highly toxic pesticides.[9] Suicide is an important cause of premature mortality accounting for deaths every year.[10] Pesticide poisoning is the most frequently used method of suicide worldwide. The research and policy attention pesticide poisoning has received has been relatively small in comparison to the magnitude of the problem.[11][12]

The part of the reason pesticide poisoning had not received the global attention it deserved was the lack of scientific evidence concerning the extent of the problem. Even though a global estimate is still not possible today, due to the lack of large-scale, rigorous surveillance data, the evidence is growing that the burden of pesticide poisoning has by no means been underestimated.[13]

Despite the issues in estimating the worldwide burden of poisoning, we may safely assume that we are confronted with many cases of poisoning, many thousands of which end in deaths annually in low- and middle-income countries. there's an urgent need for immediate action.[14]

A worldwide analysis of acute intoxications was attempted, trying to weigh their medical and economic burden and therefore the toll for acute poisoning in terms of morbidity and mortality. The explanation of acute intoxications reveals two common patterns, like the rise in number and therefore the changing profile of acute poisoning. However, the pattern of poisoning and therefore the motive behind poisoning may need changed over the years, which needs further study. Such will help manage and stop poisoning in our country.[15][16]

Organophosphorus compound forms the most typical poisoning substance in Asia, [17][18] commonest explanation for self-poisoning worldwide [19][20] with the proportion starting from 4% within the European region to over 50% within the Western Pacific region consistent with various studies.[24]

Data about the opposite quite poisonings are limited and are quite variable counting on the geographic area, socioeconomic factors, and cultural diversity. [21][22]

In developed countries, the speed of mortality from poisoning varies only from 1 to 2 percent but in developing countries like India, it varies between 15 to 30 percent and is that the fourth commonest explanation for mortality especially in rural India. [23][24]

Several studies have revealed that insecticides are commonly used poisoning agents for intentional poisoning in India. Pesticides are comprised of a good range of compounds including insecticides, herbicides, fungicides, rodenticides, and disinfectants.[25] Thus, much more than 1,000 active substances are incorporated in approximately 35,000 preparations of pesticides utilized in agriculture. OPCs are the foremost used among them and their use is gradually increasing with high morbidity and mortality rates, especially in developing countries.[26]

Apart from ingested poison, poisoning because of animal bites especially snake bites (ophitoxemia) and scorpion stings are quite common in India. The key to survival lies in early diagnosis followed by rapid decontamination and definitive therapy.[27]

Pesticide poisoning is a major problem in India. Because predominantly it is an agrarian country about 70 to 80% of the rural population depends 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 purposes. Another study from North India also reported Organophosphates as the commonest poisoning although a majority (76.60%) were unknown poisonings. Snakebite is additionally a serious problem worldwide with the majority of the deaths occurring in the rural population due to inadequate primary treatment and lack of tertiary care facilities.[28][29][30]

The treatment goals in poisoning and snakebite include support of important signs, prevention of further poison absorption, enhancement of elimination, administration of antidote, and prevention of re-exposure. Besides achieving early treatment initiation which is of utmost crucial, various first aid steps are quite significant in the treatment outcome. attributable to the magnitude of the problem, a study on the pattern of poisoning is vital and relevant. it'll help us to achieve a far better understanding of the present trend in acute poisoning and therefore the necessary antidotes and emergency medical treatment essentially required at the emergency department of all hospitals.[31]

The huge burden of poisoning and snakebite cases demands comprehensive strategies for reducing deaths. Hence, this prospective observational study was conducted with an aim to spot factors associated with outcomes in such cases and to suggest strategies to scale back associated morbidity and mortality.[32]

SUBJECTS AND METHODS

This study was conducted during November 2019-May 2020. Data was collected from all the poisoning and snakebite cases admitted during this period to the Emergency ward and Medical wards in Osmania General Hospital, Hyderabad, Telangana which is a large Tertiary Care teaching hospital in South India. Patients above 15 years of age, all types of chemical poisoning, Snake bite, Insect Bites, Scorpion sting, and Drug poisoning were included. However, the patients who were brought dead or died immediately upon arrival to the hospital before receiving any treatment, Pregnant women, paediatrics, patients who were not willing to participate in the study, food poisoning as well as patients with allergic reactions to drugs were excluded from the study.

Due to the incidence of Pandemic [COVID-19], the study was terminated in the month of March. Out of 120 cases, 113 cases were recorded in this study.

The study was conducted after getting approval from the Institutional Ethics Committee (MCP/IEC/PD/PR/47) and confidentiality of data was ensured. Treatment details were collected from the case sheet and the therapeutic outcome of the patient was identified by following the patient from the day of admission till discharge. Data were documented and statistically analyzed. Data were presented as numbers, percentages.

Microsoft word is used to organize the data collection forms to record patient data.

Microsoft Excel is used for preparing spreadsheets - Graphical representation of patient demographics.

At study sites, patients present to the emergency department unit. The data was collected in an exceedingly well-designed, pre-structured proforma.

Information was collected about the type of poison and quantity consumed, age, gender, educational qualification, marital status, religion, duration of hospitalization, their Domicile, mode of poisoning, depression, residence, occupation of the patient, time of hospital arrival, the lag time in reaching the hospital and reasons for the same.

Data referring to the diagnosis, any co-morbid illness, any previous history of poisoning, mode of poisoning whether accidental/suicidal and any recent precipitating event were also recorded.

The patients/attendants were asked about first aid received, the details of first aid, timing, and by whom. The records of any outside treatment, setting, and qualification of treating doctors were checked.

The details of indoor treatment; door-to-needle time (defined as the time from hospital arrival to administration of first treatment); requirement of antidote, including reasons for the same; and the availability of antidote, whether in hospital supply or procured by the patient were recorded and also the outcomes of the victims of poisoning.

RESULTS

The distribution of the cases with regards to their socio demographic characteristics is presented according to the plan of work. A total of (n=113) patients of various poisoning cases were registered during the study period. Males (57.52%) dominated over Females (42.48%) as per the number of poisoning cases registered. Most common age group found was [20-29] year (39.82%), which is also same for the males (24.78%); & females (15.05%) as shown in (Table 1). Most of the poisoning victims belonged to lower class (79.64%), followed by middle class (20.35%) and none from the high socio-economic class.

Most of the victims found were married (60%). Married males (23.89%) and married females (18.58%) were more prone for poisoning. Suicide (Intentional) was the most common manner of poisoning (75.22%), followed by accidental pattern (24.77%). No homicidal poisoning cases were detected during the study period. Suicidal pattern was more common in males (42.48%) (mostly married, 23.89%) and accidental pattern was also common in males (15.04%) (mostly married, 23.89%). Organophosphates (22.12%) was the most common poison encountered in this region irrespective of gender, followed by Drugs (17.69%), Disinfectants (14.16%), Rodenticide (12.39%), Snake bite (11.50%), Insecticide (9.73%), Household Products (7.96%), Unknown Bite (1.77%), Scorpion Sting (0.88%), Cyanide poisoning (0.88%), Honeybee Sting (0.88%) depicted in (Figure 1).

Table 1: Distribution of Patients based on Age and Gender.

Age (years)	Male	Female	Total
>15-19	8	15	20.35%
20-29	28	17	39.82%
30-39	12	7	16.81%
40-49	11	7	15.93%
>50	6	2	7.08%
Total	**65 (57.52%)**	**48 (42.48%)**	**100.00%**

Table 1 shows the distribution of patients based on Age and Gender. The total number of patients recorded were (n=113) out of which Males were (n=65) and Females were (n=48). However, Males outnumbered Females in poisoning with higher in Males (58%) than in Females (42%). The higher incidence of poisoning was seen in young Age group (20-29) with (39.82%).

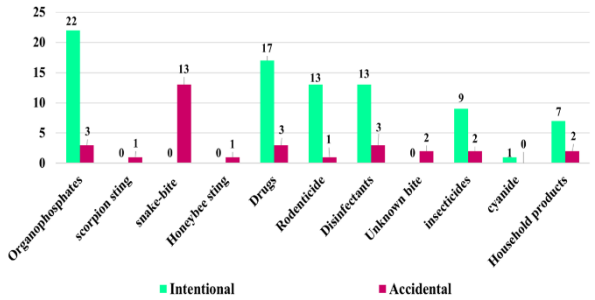

Fig 1 shows the Distribution of Patients based on Type of Poisoning and Mode of Poisoning. According to the data collected there were more number of Intentional poisoning cases (n=82) of total (n=113) cases. Under this Organophosphate poisoning was most common type of poisoning with highest cases recorded (n=22).

Table 2: Distribution of Patients based on their Gender and Cause of Poisoning.

Gender	Male	Female	Total
FD	18	3	18.58%
DP	2	5	6.19%
LJ	2	0	1.77%
FP	17	15	28.32%
SDP	0	1	0.88%
MD	8	14	19.47%
Assault	0	2	1.77%
Other	18	8	23.01%
Total %	57.52%	42.48%	100.00%

In the above Table 2, FD-Financial difficulties, DP-Discord with parents, LJ-Loss of job, FP-Family problems, SDP-Separation or death of partner, MD-Marital discord, Assault (harassment), Other.

Table 2 shows the Distribution of patients based on their Gender and Cause of Poisoning. According to the data collected in the study the most common cause of poisoning was due to Family problems (n=32) with 28.32% followed by Marital Discord (19.47%) and Financial Discord (n=21) with (18.58%).

According to the data collected in the study the most common cause of poisoning was due to Family problems (n=32) with 28.32% followed by Marital Discord (19.47%) and Financial Discord (n=21) with (18.58%) as shown in Table 2. The High degree of stress in academic, financial, and social sectors as well as inability to achieve the targets on professional, educational, and socio-economic fronts leading to limited alternatives were the contributory factors in taking suicidal actions. More than [two third] of the patients were presented to the hospital within [four hours] of incident. Most of the patients had been completely cured (92.62%) after the treatment. Case fatality rate was also low (only 7.38%). However, there is a relation between the lag period of incident and hospital presentation to the outcome of the treatment. Maximum patients were completely cured when the lag period was within [four hours]. With the increase in lag period there was increase in the number of complicated and fatal cases. The lag period when compared with the treatment outcome the results are statistically significant.

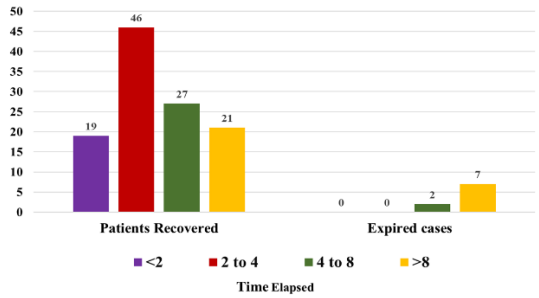

Fig. 2 Time Elapsed since exposure to Hospital arrival and Mortality. [Lag-Time]. According to the data collected in this study with total number of 113 cases, 9 were expired during the treatment in the hospital reason being the increased lag period due to late presentation of Patient to the hospital.

This study shows the importance of the presence of the poison information centres in the rural areas. Lack of the primary care centres in the rural areas, lack of basic knowledge of how to deliver the first aid to the patients. Lack of awareness amongst the population regarding the safe use of the chemicals and related instructions. Moreover, the Emotional instability of the youth population lead to the highest poisoning cases in the younger age group. There is a need of awareness programs to the youth to make them more understanding and intellectually more powerful.

DISCUSSION

During the study period, 113 poisoning cases were reviewed prospectively. 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.

The present study indicates that there were a greater number of male poisoning cases (57.52%) compared to females (42.48%). Most of the patients in this study were among the Age group of (20–29) years 39.82% followed by (30-39) years 16.81% with Male predominance. It was also observed that the incidence of poisoning was decreased with the increasing age.

Among them, Intentional poisoning cases were 72.57% and 27.43% cases were due to Accidental poisoning. Intentional poisoning was seen more in Male group (42.48%) than female (32.74%) because they are more often exposed to the stress and strain in their profession in work places and in day to day life. Among Accidental poisoning 15.04% were Males and 9.73% were Females.

Most commonly used agents for poisoning are Organophosphates 22.12% next being Drugs 17.70%, Rodenticides 12.39% and followed by Snake bite 11.50%. Organophosphates were the most common agents used in Intentional poisoning 26.83% followed by Drugs 20.73%. Snake bite 41.94% was the most common type of poisoning among the Accidental Poisoning cases. This study shows that the Drugs and Pesticides are the most common cause of Poisoning. Since most of the cases were suicidal (Intentional) in nature, the distribution pattern shows the mental vulnerability and impulsiveness of youth population, majorly among the male population than in females. The study suggests that the suicide by using Pesticides has increased because of their high fatality rate, easy availability in the market at lower prices and there is a general belief that poison terminates life with minimal suffering.

Overall mortality 7.38% in the present study was low due to better management strategies of the Hospital. Most of the cases of poisoning belonged to the Poor class 79.65% and followed by Middle class 20.35%. These socio-economic groups signify the fact that financial and social problems may have an important bearing in the daily lives of these groups. Based on the predominant agricultural background of the study population, a significant use of Insecticides and Rodenticides as poisons is not unusual in both urban and rural set ups. Majority of the suicidal cases were associated with reactive depression due to Family problems 28.32% followed by Marital Discord 19.47% and Financial difficulties 18.58%. High degree of stress in academic, financial, and social sectors as well as inability to achieve the targets on professional, educational, and socio-economic

fronts leading to limited alternatives were the contributory factors in taking suicidal actions.

Poisoning was more common in the married group 60.00% irrespective of the gender and shows that married persons may become victims of greater stress than single individuals in their day-to-day lives.

The early presentation of patients to hospital played a crucial role in the successful treatment. The patients who were brought to hospital earlier i.e., less than 8 hrs from the incident were recovered with time. On the other side the patients who were brought to the hospital late i.e., more than 8hrs were brought dead or eventually died due to extensive organ damage. Mortality is directly proportion to the time elapsed for the patient to get first aid.

The majority of the poisoning cases were from Rural areas 64% the urban population being 36.30%. The poisoning cases were higher among the illiterate group 52.21% than the group with basic education like primary or secondary School. The high school educational group being the least with only 10% of cases. The poisoning was seen very common among the Homemakers 25.66% and the next occupation badly effected were the labours 22.12% and farmers 19.47%. The students who resorted for suicidal attempt had an Academic pressure, poor performance and mentally disturbed, cases reported were 16.81%.

SUMMARY

The findings of the present study revealed a higher incidence of poisoning in males than in females in all age groups. Majority of cases were from age group of 19-30 years. The present study revealed that Intentional poisoning is the most common manner of acute poisoning. The mortality/morbidity in any case of acute poisoning depends on a number of factors such as nature of poison, dose consumed, level of available medical facilities and the time of interval between intake of poison and arrival at hospital, etc. Approximately, one third of the patients were illiterate. Poison consumption was found to be more prevalent in rural population. Most common profession of patients was Housewife followed by Labour and Farmer. Organophosphates were the most common type of poison consumed for suicidal purposes followed by Drugs and Rodenticides. Poisoning was more common in the married group irrespective of the gender and shows that married persons may become victims of greater stress than single individuals in their day-to-day lives. Most of the suicidal cases were associated with reactive depression. High degree of stress in academic, financial, and social sectors as well as inability to achieve the targets on professional, educational, and socioeconomic fronts leading to limited alternatives were the contributory factors in taking suicidal actions. Similar factors were observed by others.

The reasons observed for the mortality in poisoned individuals were the delay in admission to hospital, improper management of the poisoned patients, lack of information regarding the poisonous agent and its antidote.

Overall, the current study has managed to contribute substantial additional information regarding the epidemiology and outcome of poisoning in a tertiary care hospital. Educational and legislative interventions may be required to make the changes.

CONCLUSION

The huge burden of poisoning cases encountered in emergency department in this part of the country may be attributed due to easy availability of insecticides and other household poisons and these resulted usually from self-inflicted action. Measures observed in this study include early presentation to hospital, awareness to handle the toxic materials and counselling.

Measures to reduce lag time and provide immediate treatment at initial encounter may be effective in reducing duration of hospitalisation and possibly mortality in poisoning and snake bite cases.

Effective legislation & strict control for sale of dangerous drugs and poisons, awareness amongst the society and vigorous efforts by the trained medical staff can save precious lives from poisoning.

Training of peripheral health centre personnel to manage cases of poisoning, to provide ventilatory support and escalation in public awareness about the importance of problem should be done.

The proper enforcement of law in sale and distribution of addictive medicines, setting the boundaries of electronic media in exposure of critical facts and creating awareness amongst the society for education are a few goals in due.

To reduce the poison induced morbidity and mortality following steps such as having a centralised poison information centre, availability of standard treatment protocols for managing various poisons, and educational programs for rural population may be more appropriate.

Need of the hour is to generate resources on a national level to eradicate poverty and use the young blood in employment to make them useful and responsible member of the society thereby relieving the stress of unemployment both among the Rural and Urban population. Improve social awareness among the rural areas. It may not only save the precious lives but also reduce the expenditure of the health budget in combating the diseases according to set goals of WHO in the developing countries.

The tertiary care hospitals of the Telangana region, indicate that significant opportunities for reducing mortality exist by better medical management and further restrictions on the most toxic pesticides. This study highlighted the lacunae in the services of tertiary care hospitals and the need to

establish better management strategies and prevention of poisoning cases.

CONFLICT OF INTEREST

None declared.

BIBLIOGRAPHY

1. Alphonse Poklis; Analytic/forensic Toxicology. Toxicology the Basic Science of Poisons. in Klassen CD ed.

2. Dhanya SP et al. A Retrospective Analysis of The Pattern of Poisoning in Patients Admitted to Medical College Hospital. Calicut Medical Journal 2009;7(2):3 edition. Mc Graw Hill New York. Pp-1238, 2000.

3. Koh, Dawn Chin Ing, Tok Pei Loo, Chai Siaw Ching, Arunmozhiarasi Armugam and Kandiah Jeyaseelan. Department of Biochemistry.

4. A study on poisoning cases in a tertiary care hospital Subash Vijaya Kumar, B. Venkateswarlu, M. Sasikala, and G. Vijay Kumar

5. Bhoopendra sing, Unnikrishnan. A profile of acute poisoning at Mangalore (South India). jcfm2006; 13:112–116 9. Jesslin J, Adepu R, Churi S.

6. Assessment of prevalence and mortality incidence due to poisoning in a south Indian tertiary care teaching hospital. Indian J.Pharm. sci 2010;72(5):587-591

7. A Study on Pattern of Poisoning Cases in a Tertiary Care Hospital, Bangalore Abubakar S, Githa K, Kiran N, Sreebala

8. EDDLESTON M. (2000): Patterns and Problems of Deliberate Self-Poisoning in the Developing World. Q J Med, 93: 715- 731.

9. World health organisation-international-ipcs, International Programme on Chemical Safety.

10. The world health report 2002 - reducing risks, promoting healthy life. Guilbert JJ, Educ Health (Abingdon). 2003 Jul; 16(2):230.

11. Suicide by intentional ingestion of pesticides: a continuing tragedy in developing countries. Gunnell D, Eddleston M Int J Epidemiology. 2003 Dec; 32(6):902-9.

12. Overcoming apathy in research on organophosphate poisoning. Buckley NA, Roberts D, Eddleston M BMJ. 2004 Nov 20; 329(7476):1231-3.

13. Health problems of pesticide usage in the Third World. Jeyaratnam J Br J Ind Med. 1985 Aug; 42(8):505-6.

14. Deaths from Pesticide Poisoning: Are we lacking a global response? JM Bertolote, A Fleischmann, M Eddleston, and D Gunnell

15. Mannaim PF. Pattern of acute intoxication in Florence: A comparative investigation. Intensive Care Med. 1991; 17(1): 24-31.

16. Begum JA, Chowdhury MM. G Ara. A study of poisoning cases in four hospitals of Bangladesh. Bangladesh Med J. 1989; 18(2): 64

17. Vinay B S, Gurudatta S, Pawar, Inamadaa P I. Profile of poisoning cases in district and medical college hospitals of north Karnataka. Indian journal of forensic medicine and toxicology. 2008; 2(2):07-12

18. Suliman MI, Jibran R, Rai M. The analysis of organophosphorus poisoning cases treated at Bahawalpur Victoria Hospital, Bahawalpur in 2000- 2003. Pak J med Sci 2006; 244-49.

19. Bertolote JM, Fleischmann A, Butchart A, et al. Suicide, suicide attempts and pesticides: a major hidden public health problem. Bull World Health Organ 2006; 84: 260.

20. RA. Environmental risks of insecticides cholinesterase inhibitors. Toxicol Int 2013; 20: 30–34.

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

22. 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. Med Leg Update 2007; 7: 49–60.

23. Thomas M, Anandan S, Kuruvilla PJ, et al. Profile of hospital admissions following acute poisoning – experiences from a major teaching hospital in south India. Adverse Drug React Toxicol Rev 2000; 19: 313–317.

24. TARUNI N.G., BIJOY T.H. & MOMONCHAND A. (2001): A Profile of Poisoning Cases Admitted to RIMS Hospital, Imphal; J Forensic Med Toxicol, 18: 31-33.

25. PILLAY V.V. (2001): In: MKR Krishna's Hand Book of Forensic Medicine and Toxicology, 12th Ed., Paras Publications, Hyderabad, p 276-299.

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

27. Singh B, Unnikrishnan B. A profile of acute poisoning at Mangalore (South India). J Clin Forensic Med 2006 Apr;13(3):112-6.

28. Srinivas rao CH et al. Pesticide poisoning in south India – opportunities for prevention and improved medical management. Trop Med Int Health 2005;10(6):581–588.

29. 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. ijopp 2010;3(1):43-6.

30. Ramesha KN, Rao KB and Kumar GS. Pattern and outcome of acute poisoning cases in a tertiary care hospital in Karnataka, India. Indian J Crit Care Med 2009; 13: 152–155.

31. Aggarwal P and Jamshed N. What's new in emergencies, trauma, and shock? Snake envenomation and organophosphate poisoning in the emergency department. J Emerg Trauma Shock 2008; 1: 59–62.

32. Pattern of Acute Poisoning Presenting at a Tertiary Care Hospital Surya Diana Sande, Padmaja Uday kumar

33. National Institute of Environmental Health Sciences. NIH-health and education, Toxicology.

34. Robert James, Stephen M. Roberts and Phillip L. William 1, General Principles of Toxicology, 2 Edition, John Wiley & Sons, INC. New York, PP 3, 2000.

35. Ramnath, Naveen Kumar H D Study the Assessment of Poisoning Cases in a Rural Tertiary Care Teaching Hospital by a Clinical Pharmacist, Asian Journal of Pharmaceutical and Clinical Research Vol 5, Issue 2, 2012 ISSN – 0974- 2441, PP 1, 2012.

36. Maharani and Vijaykumari, Profile of Poisoning Cases in a Tertiary Care Hospital, Tamil Nadu, Indian Journal of Applied Pharmaceutical Science Vol. 3(01), January, Doi: 10.7324/JAPS. 2013.30177 ISSN 2231-3354 PP 1,2013.

37. VPT 421: Veterinary Toxicology (2+0)

38. Poison-Encyclopædia Britannica, Curtis D. Klaassen, Bruce W. Halstead and Others [https://www.britannica.com/science/poison-biochemistry].

39. VV Pillay, Section 4 - Organic Poisons (Toxins), Chapter - 12 Venomous Bites and Stings, Modern Medical Toxicology, 4 Edition, Jaypee Brothers Medical Publishers, New Delhi, India, pages no: 137 to 156, 160 to 163.

40. VV Pillay, 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. [2013]

41. Harrisons Manual of Internal Medicine 17 Edition Section 2 Chapter 26 Table 31-3 Medical Emergencies PP142.

42. Lewis Goldfrank, Chapter 80 – Ethanol, Goldfrank's Toxicologic Emergencies, 10 Edition, Mc Graw Hill, New York, USA, PP 2661, 3442, 3415, 3434-3436, 3214, 3169, 3170, 2470, 2473, 2476-2478, 2669, (2015).

43. Partha Pratim Kalita, Babulal Daulagajau, Siddharth Sankar Saikia. IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 18, Issue 9 Ser.8 (September. 2019), PP 13-17

44. A. Prashar and M. Ramesh Department of Pharmacy Practice, Maharishi Markandeshwar College of Pharmacy, Mullana (Ambala), India- Assessment of pattern and outcomes of pesticides poisoning in a tertiary care hospital

45. Ali I, Sawlani KK, Himanshu D, et al. Study of pattern and outcome of acute poisoning cases at tertiary care hospital in North India. J. Evid. Based Med. Health. 2017; 4(6), 326-331. DOI: 10.18410/jebmh/2017/62

46. Kumar RGK, Nagabhushana S, Ranganatha M, et al. Clinical pattern and outcome of organophosphorus compound poisoning. J. Evolution Med. Dent. Sci. 2016;5(47): 3030-3033, DOI: 10.14260/jemds/2016/705

47. J Indian Acad Forensic Med. April-June 2015, Vol. 37, No. 2

48. J Indian Acad Forensic Med. July-September 2015, Vol. 37, No. 3 ISSN 0971-0973 278 Original Research Paper Trend of Male Poisoning at North Karnataka from 2008-2013

49. Yarramsetti V Rao, Arunkumar Ajjappa, Shivakumar K P in a tertiary care hospital. International Journal of Recent Trends in Science a http://www.statperson.com (accessed 15 December 2015)

50. International Journal of Recent Trends in Science and Technology, ISSN 2277-2812 E-ISSN 2249-8109, Volume 10, Issue 2, 2014 pp 365-368 Copyright © 2014, Stat person Publications, Retrospective Analysis of Poisoning Cases Admitted in a Tertiary Care Hospital