

A comprehensive study on insecticide poisoning patients brought to a tertiary government hospital in north eastern region of India

Antara Debbarma¹, Juthika Debbarma²

1 Assistant Professor, Department of Forensic Medicine, at Santosh Medical College & Hospital, Ghaziabad, UP

2 Associate Professor, Department of Forensic Medicine, at Agartala Government Medical College, Agartala, Tripura

Abstract

The commonest cause of poisoning in India and other developing countries are insecticide and pesticide, which are agriculturally based economics, poverty and easy availability. This study collected gastric lavage from all suspected and confirmed insecticide poisoning cases brought to the hospital. They are being analysed by the thin-layer chromatography method for the detection of the type of insecticide. This is a cross-sectional study, and statistical analysis is done by correlation and regression analysis method. Total 182 cases of insecticide poisoning were brought to the emergency services of a Government Hospital at Agartala, Tripura, during the period January 2013 to June 2014, out of which 79.1% were within the age group of 21 years to 40 years, 78.6% of the victims are male, 50% of the victims were farmers, 98% of the times the mode of poisoning were suicidal, 74% of the cases the insecticide involved was organophosphorus group of poison (OP), while 19% of the cases were Organochlorine group of poisons (OC), and only 7% of the cases were Carbamate group of poison (CAR). Due to undue pressure for performance and good lifestyle and failure to comply, the young productive age group tends to take such irreversible steps of committing suicide using easily available material. The need of the hour is a very restricted supply of insecticides with proper documentation and proper counselling sessions for survivors of such incidents.

Keywords

Insecticide poisoning; Organophosphorus poisoning; Suicide

Introduction

The commonest cause of poisoning in India and other developing countries are insecticide and pesticide, which are agriculturally based economics, poverty and easy availability. Since 1985, aluminium phosphide (a solid fumigant pesticide, insecticide and rodenticide) poisoning has been reported as the commonest cause of intentional poisoning in northern India viz; Haryana, Punjab, Rajasthan and Delhi. The exact incidence of poisoning in India is uncertain due to the lack of data at the central level. Most cases are not reported, and mortality data are poor indicators of incidence of poisoning. It has been estimated that about 5-6 persons per lakh die due to poisoning every year. Among the adults, females predominate in all age groups with an evident preponderance in the second and third decades of life.¹

Acute poisoning in children is almost entirely accidental, while in adults, it is mainly suicidal. Mortality varies from country to country depending on the nature of poison and the availability of facilities and treatment by qualified persons. Several

hospitals based retrospective studies in India have shown an increasing incidence of pesticide poisoning during the last decade. Organophosphates, aluminium phosphide and rodenticide are most commonly involved in such poisonings². Organophosphorous compounds are one of the gradually increasing causes of accidental and suicidal poisoning with high morbidity and mortality rates, especially in developing countries and are estimated to kill around 200,000 people each year, largely in the Asia Pacific region^{2,3}. Clinical and toxicological diagnostic and treatment facilities are often inadequate due to a lack of trained personnel^{4,5}. Thus there is a requirement of strengthening the diagnostic capabilities nationwide for better prevention and treatment of insecticide poisoning cases.

Further, the lack of information on the ingredients of various products makes it difficult to plan and develop poison policies and control programmes to help provide reliable information on time to doctors and other medical personnel and first responders for appropriate treatment^{4,5}. This study collected gastric lavage from all suspected and confirmed insecticide poisoning cases brought to the hospital. They are being analysed by the thin-layer chromatography method to detect the type of insecticides present in the poisoning sample. The study was conducted to detect the type of insecticides in poisoning cases admitted at AGMC & GBPH, Agartala and to study the demographic profile of the subjects admitted with insecticide poisoning.

Corresponding Author

Dr Antara Debbarma (Assistant Professor)

Email: antaradebbarma@gmail.com

Mobile: +91-9205623401

Article History

Received: 12th October, 2020; Revision received on: 12th August, 2021

Accepted: 18th August, 2021

Material and Methods

From January 2013 to June 2014, 182 cases of insecticide poisoning, which were brought to the emergency services of a Government Hospital at Agartala, Tripura, were included in the study. After due consent, history taking and gastric lavage sample collection were done and same taken to State Forensic Science laboratory, Narsingarh, for chemical analysis by thin-layer chromatography method. This is a cross-sectional study, and statistical analysis is done by correlation and regression analysis method. Inclusion criteria: All the cases of confirmed and suspected insecticide poisoning were taken. Exclusion criteria: Poisonings other than insecticide were not taken. This is a cross-sectional study, and statistical analysis is done by correlation and regression analysis method.

Results

Out of 182 cases, the maximum number of cases were within 21 to 40 years, constituting 79.1% of the total cases. The maximum number of victims are male, constituting 78.6% of all cases. 50% of the victims were farmers, while 13.2% were housewives, followed by labourers (12.1%), and the least being 1.1% of victims, had their own business. 98% of the time, the mode of poisoning was suicidal while the rest 2% was because of accidental poisoning. It was observed that 92.3% of the cases were from the low socioeconomic background, whilst the rest of the minimal percentage were from middle-class families. In contrast, no cases were being seen from upper-class families. In 74% of the cases, the insecticide involved was the Organophosphorous group of poison (OP). In comparison, in 19% of the cases, the insecticide involved was the Organochlorine group of poisons (OC). Only 7% of the cases showed the presence of the Carbamate group of poison (CAR). 92.9% of the victims had no significant history of any previous poisoning attempts. 78.6% of the victims died due to poisoning even after being admitted to the hospital, while 21.4% of the victims recovered after treatment. 21.4% of the cases who survived were asked for a psychiatric referral to fight the ordeal the victims have gone through.

Discussion

In this present study, it was found that a maximum number of the victims belongs to the age group of 21 to 40 years with a total number of 144 cases (79.1%). The findings of this study are consistent with the studies conducted by Guntheti et al.⁶, Khade et al.⁷, Kavya et al.⁸, Ashwini et al.⁹ In this present study; it has been reflected that 78.60% of the victim were male, thereby constituting a maximum number of cases while 21.40% of the victim were female. The findings are consistent with the studies conducted by Guntheti et al.⁶, Bashir et al.⁷,

Kavya et al.⁸ and Ashwini et al.⁹, Sandhu et al.¹⁰, Patel et al.¹¹, and Kumar et al.¹². From the data analysis of this study, it was found that the majority of the victims were farmers with a total number of 91 cases, thereby constituting 50% of all the cases. Similar findings are recorded in the studies conducted by Kavya et al.⁸, Ashwini et al.⁹ and Joshi et al.¹³. This present study depicts that 98% of the victims had a history of suicidal ingestion of insecticide poison while 2% had a history of accidental ingestion. Similar findings were reported in the studies conducted by Xinqi et al.¹⁴, L Verhulst et al.¹⁵, Kumar et al.¹⁶ and Ashwin et al.⁹. The socioeconomic status of the victims of insecticide poisoning cases was studied. The majority of the victims (92.3%) were of low socioeconomic status, while 7.7% were of middle socioeconomic status. There were no reported cases of insecticide poisoning from upper socioeconomic status. This finding is consistent with the findings of Agarwal SB.¹⁷, Gupta et al.¹⁸, Guntheti et al.⁶ and Mrinal et al.¹⁹. After the laboratory analysis of the samples collected from the victims, it has been seen that 74.2% of the cases were positive for Organophosphorous group of poison, 18.7% of the cases were positive for Organochlorous group of poison while only 7.1% of the cases were positive for Carbamate group of poison. Similar results were seen in Subhash et al.¹³, Tejash et al.⁵, and Ashwini Kumar Sahoo⁹. However, in the study conducted by Garg et al.²⁰, aluminium phosphide was the commonest poison involved in the poisoning, followed by the Organophosphorous group of poison and in the study conducted by Kumar et al.¹⁶. The carbamate group of poison was commonest, followed by the Organophosphorous group of poison.

Out of all the victims of insecticide poisoning, only 21.4% of the victims recovered after treatment, while 78.6% of the patients died due to poisoning. Those patients who recovered were given a psychiatric referral to assess their mental status and further management, similar to the study conducted by Indiana et al.²¹. In the study conducted by Ashwini et al.⁹, it has been shown that 64% of the victims recovered, which is not consistent with the present study.

Conclusion

Insecticide poisoning is one of the emerging problems worldwide, especially in developing countries, with millions and thousands of deaths occurring every year, particularly in young people²². In present times, the unrestricted easy availability of the poison makes it an easy tool for self-ingestion. In 1985, the UN Food and Agriculture Organization (FAO) produced a voluntary code of conduct for the pesticide industry to limit the harmful effects of pesticides. Unfortunately, a lack of adequate government resources in the developing world makes this code ineffective, and thousands of deaths continue to occur today²³. The majority of the victims in

the study were young males from an agricultural background. In today's world of fierce competition, everyone wants to fair a good lifestyle and thus, in turn, adding extra pressure over the person, especially the young productive age group and failure to comply that leads to such irreversible steps of committing suicide using easily available material. The need of the hour is a very restricted supply of insecticides with proper documentation and proper counselling sessions for survivors of such incidents.

Ethical clearance: A prior approval was obtained from the Institutional Ethics Committee

Conflict of interest: None to declare

Source of funding: None to declare

References

- Reddy, N. K. (2017). *Essentials of Forensic Medicine and Toxicology*. India: Jaypee Brothers Medical Publishers Pvt. Limited. 33rd ed. Hyderabad ;2014: 500-2.
- Strengthening poison control centres in the region towards sustainable development through sound management of chemicals; regional committee. Provisional agenda item 12 fifty-second session SEA/RC52/8 .25June 1999. Available from <http://repository.searo.who.int/handle/123456789/16653> [cited on 29th November 2014]
- Kora SA, Doddamani GB, Halagali GR, Vijayamahantesh SN, Boke U. Socio-Demographic Profile of the Organophosphorous Poisoning Cases in Southern India. *J Clin Diagn Res* 2011;5(5):953-6.
- Srivastava A, Peshin SS, Kaleekal T, Gupta SK. An epidemiological study of poisoning cases reported to the national poisons information centre, All India Institute of Medical Sciences, New Delhi; *Hum Exp Toxicol*.2005; 24(6):279-85.
- Prajapati T, Prajapati K, Tandon R N, Merchant S. A study of acute poisoning cases excluding animal bites at civil hospital, Ahmedabad. *J Indian Acad Forensic Med*. 2013 ;35(2):120-2.
- Gunther BK, Singh UP. The pattern of poisoning in Khammam. *J Indian Acad Forensic Med*.2011; 33(4):296-300.
- Bashir MSM, Khade A, Bhagat S, Irfanuddin M. Gender differences in the pattern of Organophosphorous poisoning in a tribal district of Andhra Pradesh. *Indian J. Forensic Med. Toxicol*. [Internet].2011[Cited 2020 Oct 8]; 5(1):54-7.
- Kavya ST, Srinivas V, Chandana, Madhumati, R (2012). Clinical profile of patient with Organophosphorous poisoning in an intensive care unit in a tertiary hospital. *Int. J. Clin. Cases Invest*. 4(3): 24-31
- Sahoo A, Sastry A, Rauta S, A M M P, Mahapatra S. Study of organophosphorous poisoning cases at maharajah institute of medical sciences, A.P. *J. evol. med. dent. sci.* (Online). 2014;3(35):9201-9206.
- Sandhu SS, Garg A, Gorea RK. Poisoning Trend in Faridkot Region: A retrospective study. *J Punjab Acad Forensic Med Toxicol*. 2010; 10(1):20-3.
- Patel DJ, Tekade PR. Profile of Organophosphorous poisoning at Maharani Hospital, Jagdalpur, Chhattisgarh: A Three Years Study. *J Indian Acad Forensic Med*. 2011; 33(2):102-5.
- Kumar S, Pathak A, Mangal HM. Trends of Fatal Poisoning in Saurashtra Region of Gujrat (A prospective study). *J Indian Acad Forensic Med*.2011; 33(3):197-9.
- Joshi SC, Prakash C, Joshi A, Joshi G. Profile of Organophosphorus Poisoning at Tertiary Care Hospital in Uttarakhand. *J Indian Acad Forensic Med*.2013Oct-Dec; 35(4): 346-8.
- Dong X, Simon M. The Epidemiology of Organophosphate Poisoning in Urban Zimbabwe from 1995 to 2000. *Int J Occup Med Environ Health*. 2001;7(4):333-338.
- Verhulst L, Waggie Z, Hatherill M, Reynolds L, Argent A. Presentation and outcome of severe anticholinesterase insecticide poisoning. *Arch Dis Child*. 2002; 86: 352-55.
- Kumar S, Verma AK. A study of elderly unnatural deaths in medico-legal autopsies at Lucknow locality. *Med Sci Law*. 2014;54(3):127-31. doi: 10.1177/0025802413502783. PMID: 24166690.
- Agarwal SB. A clinical, biochemical, neurobehavioral and socio-psychological study of 190 patients admitted to hospital as a result of acute Organophosphorous poisoning. *Environ. Res*.1993; 62(1):63-70.]
- Gupta BD, Vaghela PC. Profile of fatal poisoning in and around Jamnagar. *J. Ind Acad Forensic Med*.2005; 27 (3): 145-8
- Halo M, Halo M D, Patowary A. Death due to poisoning in District of Kamrup, Assam A Medico-legal Study. *J Indian Acad Forensic Med*. 2013; 35(1):17-20.]
- Garg V, Verma SK. Trends of poisoning in Rural area of Southwest, Punjab, *J. Indian Acad Forensic Med*. 2010;32(3):189-93.
- Indiana J, Herrero R, Albertazzi C. Comparative study of cases of poisoning by Organophosphorous insecticides in various regions of Costa Rica. *Revista de Biologia Tropical*.1983; 31(1):139-44.
- Bertolote JM, Fleischmann A, Eddleston M, Gunnell D. Deaths from pesticide poisoning: a global response. *Br J Psychiatry*. 2006 Sep; 189:201-3.
- Turabi A, Danyal A, Hasan S, Durrani A, Ahmed M. Organophosphate Poisoning in The Urban Population; Study Conducted at National Population Centre, Karachi. *Biomedica*. 2008; 24:124-9.