

Original Article

Access this article online	
Quick Response Code:	Website: www.annalsafmed.org
	DOI: 10.4103/1596-3519.129876
	PMID: *****

A retrospective analysis of acute organophosphorus poisoning cases admitted to the tertiary care teaching hospital in South India

Page | 71

M. Rajesh Kumar, G.P. Vignan Kumar¹, P. Ramesh Babu, S. Satish Kumar²,
B. V. Subrahmanyam³, M. Veeraprasad⁴, P. Rammohan⁵, M. Srinivas⁵, Amit Agrawal⁶

Departments of Medicine, ¹Departments of Pulmonary Medicine, ²Emergency Medicine, ³Forensic Medicine, ⁴Hospital Administration, ⁵Pharmacology, ⁶Neurosurgery, Narayana Medical College Hospital, Chinthareddypalem, Nellore, Andhra Pradesh, India

Correspondence to: Dr. M. R. Kumar, Department of Medicine, Narayana Medical College Hospital, Chinthareddypalem, Nellore - 524 003, Andhra Pradesh, India. E-mail: rajeshkumarmeriga@gmail.com

Abstract

Objectives: We have herein reported our experience with the pattern of presentation of cases of acute organophosphorus (OP) poisoning cases in a tertiary care hospital.

Materials and Methods: This retrospective study evaluated the hospital records of patients with acute OP poisoning. In a pre-structured proforma, data regarding age, sex, time elapsed after intake, circumstances of poisoning, duration of hospitalization, severity, complications, and outcome of the patients were recorded. The data were presented as mean \pm standard deviation, entered in the open office datasheet, and analyzed with PSPP software.

Results: A total 101 patients were included in the study. Young adult males were more commonly involved than females (M:F 2.5:1). The mean age of the patients was 28 years (range 2-72 years, SD \pm 14.3 years). Mean time to receive treatment was 5.2 ± 7.4 (range 1-48 h). About 45.5% patients received first aid before coming to the hospital. The reason was suicide in 88.1% cases and accident in 12 (11.9%, all children). Seventy-nine patients received pralidoxime (PAM) and the mean duration was 1.7 ± 1.1 (range 1-4 days). Atropine was given in all patients. Mean duration was 5.1 ± 3.1 (range 1-19 days). Mean hospital stay was 7.5 ± 4.7 days (range 1-26 days). Mortality was 9.9% in the present series.

Conclusion: Although the present study contribute substantial information regarding the epidemiology and outcome of acute OP poisoning in a tertiary care teaching hospital at a district level, its relatively small sample size and the retrospective record-based nature are the major limitations of the present study. There is a further need for prospective studies to understand the underlying socio-economic factors responsible for acute OP poisoning in our population, and, accordingly, address the problems to reduce the incidence of acute OP poisoning cases.

Keywords: Acute poisoning, organophosphate poisoning pattern, outcome, tertiary care hospital

Résumé

Objectifs: Nous avoir ci-après rapporté notre expérience avec le modèle de présentation des cas de courte durée organophosphorus (OP) empoisonnement cas dans un hôpital de soins tertiaires.

Matériel et méthodes: Cette étude rétrospective a évalué les dossiers de l'hôpital de patients avec aiguë OP empoisonnement. Dans un formulaire de type pré-structurée, de données concernant l'âge, le sexe, temps écoulé après l'apport, les circonstances d'intoxication, durée d'hospitalisation, de gravité, de complications, et le résultat des patients ont été enregistrés. Le données ont été présentées sous forme de moyenne \pm écart-type, est entré dans la feuille de données de bureau ouvert, et analysées avec le logiciel PSPP.

Résultats: A total 101 patients ont été inclus dans l'étude. Jeunes hommes adultes ont été plus fréquemment en

cause que les femelles (M:F 2.5: 1). L'âge moyen des patients a été de 28 ans (plage 2-72 ans, SD \pm ans 14,3). Temps moyen pour recevoir traitement a été de $5,2 \pm 7,4$ (plage 1-48 h). Environ 45,5% patients ont reçu des premiers soins avant de venir à l'hôpital. La raison était le suicide de 88.1% cas et accident en 12 (11,9%, tous les enfants). Soixante-dix-neuf patients ont reçu pralidoxime (PAM) et la durée moyenne a été de $1,7 \pm 1.1$ (plage 1-4 jours). L'atropine a été donné à tous les patients. Moyenne durée était 5.1 ± 3.1 (plage 1-19 jours). Moyen séjour hospitalier était $7,5 \pm 4,7$ jours (plage 1-26 jours). La mortalité a été de 9,9% dans la série.

Conclusion: Bien que la présente étude apportent des renseignements importants concernant l'épidémiologie et le résultat de l'aigu OP empoisonnement dans un hôpital d'enseignement de soins tertiaires à un niveau de district, son relativement petite taille de l'échantillon et la nature rétrospective de basé sur des enregistrements sont les principales limites de la présente étude. Il n'y a une nécessité d'études prospectives à comprendre les facteurs socio-économiques sous-jacentes responsables de l'intoxication aiguë d'OP dans notre population et, en conséquence, de régler les problèmes à réduire l'incidence des OP aigu empoisonnement cas.

Mots-clés: Aiguë organophosphate empoisonnement, intoxication par le patron, résultat, hôpital de soins tertiaires

Introduction

Organophosphorous (OP) compounds (the anticholinesterases) are used as insecticides, pesticides, herbicides, and chemical warfare agents.^[1-4] OP compound's easy availability is responsible for increasing incidences of pesticide poisoning and it being a major cause of morbidity/mortality that poses public health problem in developing countries, including India.^[1-21] World Health Organization (WHO) and several other studies have estimated that OP pesticides were responsible for majority of self-attempted deaths in the developing world.^[2,4-6,12-14,22,23] In this study, we have reported our experience with the pattern of presentation of cases of acute OP poisoning cases in a tertiary care hospital.

Materials and Methods

This retrospective study was conducted in a tertiary care teaching hospital in Andhra Pradesh, India. Hospital records of patients with acute OP poisoning from the year 2008 to 2012 were reviewed. In a pre-structured proforma, data regarding age, sex, time elapsed after intake, circumstances of poisoning, duration of hospitalization, severity, complications, and outcome of the patients were recorded along with the details of general physical examination, systemic examination, laboratory investigations, and management offered. Mild intoxications were defined by symptoms of miosis, rhinorrhea, lacrimation, and mild abdominal pain without difficulties in respiration and without disturbances of consciousness. Moderate cases were defined as having aggravation of the latter symptoms with additional complaints of the respiratory and gastrointestinal systems. Severe cases were defined as having, in addition to the previous symptoms, loss of consciousness, convulsions, or respiratory depression. Ethical clearance was obtained from the ethical review

committee, Narayana Medical College and Hospital. Patients included in the study followed a standard treatment guideline of organophosphate poisoning in our hospital. All the patients were given gastric lavage and their skin was thoroughly cleansed with water at the time of admission. Activated charcoal was administered in a selected group of patients. Atropine and pralidoxime (PAM) were administered in accordance with the protocol of the hospital. Injection PAM was given patients at a dose of 1-2 g intravenous (IV) bolus, followed by 500 mg/h (IV) for 3 days. Injection atropine 1-2 mg IV stat. was administered, followed by 5-10 mg/h according to the clinical condition. All the patients were closely monitored with ECG, SpO₂, ABG (define), and chest X-ray as per the requirement. Patients were ventilated when there was an evidence of respiratory failure. Injection glycopyrrolate was given to patients who had excessive bronchial secretions. Weaning from mechanical ventilation was as per the standard protocol. Data were presented as mean \pm standard deviation, entered in the open office datasheet, and analyzed with PSPP software. To analyze the variables multivariate linear regression and multivariate logistic regression analysis (as appropriate) were used. A *p*-value of less than 0.05 was considered statistically significant.

Results

A total of 101 patients were included in this study. Young adult males were more commonly involved than females (M:F of 2.5:1) [Figure 1]. The mean age was 28.0 years (range 2-72 years, SD \pm 14.4 years). Mean time to receive treatment was 5.2 ± 7.4 (range 1-48 h). By occupation, non-farmers were 56.4% and farmers were 43.6%. About 45.5% patients received first aid before coming to the hospital, while 54.5% did not receive the same. The reason to consume OPC was suicide in

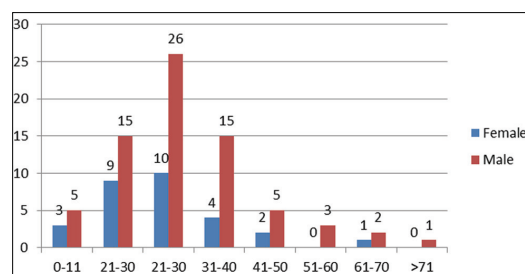


Figure 1: Graph showing age and sex distribution

88.1% cases and accident in 12 (11.9%, all children). About 42.6% patients were conscious at the time of presentation, 39.6% were drowsy, and 17.8% patients were unconscious at the time of presentation. In most of the patients, the temperature was normal (98%), only 2 patients had mild fever. About 47.5% patients had normally reactive pupils at the time of presentation, 44.6% patients had pinpoint pupils at the time of presentation, and 7.9% patients had dilated and non-reacting pupils. Nine patients had a history of convulsions. 13.9% had features of aspiration at the time of presentation, 55.4% had tachycardia at the time of presentation (pulse rate >100). Seventy-nine patients received PAM and the mean duration was 1.72 ± 1.08 (range 1-4 days). Atropine was given in all cases. Mean duration was 5.14 ± 3.12 (range 1-19 days). Also, 34.7% patients required mechanical ventilation; dialysis was needed in 2 patients with increase in serum creatinine. Mean hospital stay was 7.53 ± 4.68 days (range 1-26 days) and mortality was in 9.9% in the present series.

Discussion

In this study, as in most other studies, male dominated females (M:F ratio range 0.1-6.1),^[24-28] and young adults (2nd to 4th decade) were victims of OP self-poisoning.^[18-20,24,25,29] In contrast, in accordance with the literature, accidental poisoning was more common in children.^[26] Acute pesticides exposure can be accident or suicide, occupational, bystander exposure, or exposure because of consumption of food items containing pesticide residues.^[30,31] The commonest incidence of OP poisoning was suicidal attempt,^[2,5,12,15,26,28,32-35] as in this study. Accidental exposure is more common in children and female homemakers.^[17,24,26,36,37] Although we did not study these differences in details, it has been proposed that high proportion of poisoning among males might be due to change in the lifestyle and cultural patterns,^[38] reactive depression, and high degree of stress in academic, financial, and social sectors.^[17,39,40] Careful resuscitation with appropriate use of antidotes, followed by good supportive care and observation is helpful in achieving good outcome.^[12] In the present series, most of the patients could receive first aid

within hours of poisoning as timely transport and intervention of all critically poisoning cases were recognized to prevent the high mortality.^[17] In accordance with the previous findings, there was no significant difference in the mortality of the patients who received first aid and those who did not.^[17] Treatment of all patients was based on the well-established principles and included decontamination and gastric lavage, antidotal therapy with atropine and oximes, and supportive therapy with benzodiazepines and mechanical ventilation.^[11,30,31,41,42]

Duration of the hospital stay varied according to the severity of clinical condition and could range from 1 day (mild cases) to 14 days (severe cases),^[26] it may be longer in patients who need prolonged duration of mechanical ventilation.^[43-45] In comparison to the western literature,^[46,47] OP poisoning has high mortality in resource poor settings and the causes of this high mortality are multifactorial and include the high toxicity of locally available poisons, difficulties in transporting patients, the paucity of health care, and the lack of facilities and antidotes.^[13,14,42,48] The mortality in the present series was comparable to that in the literature where it has been reported to be 10-20%.^[13,19,49] The explanation for this high mortality include intentional poisoning^[16,26] and availability of highly toxic OP pesticides (WHO Class I toxicity).^[50,51] In developing countries, with the widespread use of OP pesticides by farmers, it will be very difficult to reduce mortality by primary prevention.^[15] Clinical OP poisoning recognition is very important, as pesticide poisoning is associated with a high fatality rate.^[52] The possible steps to reduce the incidence of OP poisoning-related mortality include immediate shifting of the victim to a well-equipped and well-staffed hospital, careful resuscitation improvement in medical management, and provision of antidotes, intensive care beds, awareness, and education.^[5,14,15]

Conclusion

OP poisoning is a medical emergency that needs rapid diagnosis and treatment. Early recognition, careful monitoring, and appropriate management will decrease the complication and the mortality rate. Although the present study contribute substantial information regarding the epidemiology and outcome of acute OP poisoning in a tertiary care teaching hospital at a district level, relatively small sample size and the retrospective record-based nature are the major limitations of the present study. There is a further need for prospective studies to understand underlying socio-economic factors responsible for OPC poisoning in our population

and, accordingly, address the problems to reduce the incidence of OPC poisoning cases.

References

- Bowls BJ, Freeman JM Jr, Luna JA, Meggs WJ. Oral treatment of organophosphate poisoning in mice. *Acad Emerg Med* 2003;10:286-8.
- Malik GM, Mubarik M, Romshoo GJ. Organophosphorus poisoning in the Kashmir Valley, 1994 to 1997. *N Engl J Med* 1998;338:1078.
- Sungur M, Guven M. Intensive care management of organophosphate insecticide poisoning. *Crit Care* 2001;5:211-5.
- Senanayake N, Karalliedde L. Acute poisoning in Sri Lanka: An overview. *Ceylon Med J* 1986;31:61-71.
- Eddleston M, Phillips MR. Self poisoning with pesticides. *BMJ* 2004;328:42-4.
- Jeyaratnam J. Acute pesticide poisoning: A major global health problem. *World Health Stat Q* 1990;43:139-44.
- Van der Hoek W, Konradsen F, Athukorala K, Wanigadewa T. Pesticide poisoning: A major health problem in Sri Lanka. *Soc Sci Med* 1998;46:495-504.
- Singh S, Wig N, Chaudhary D, Sood N, Sharma B. Changing pattern of acute poisoning in adults: Experience of a large North-West Indian Hospital 1970-1989. *J Assoc Physicians India* 1997;45:194-7.
- Lall SB, Peshin SS, Seth SD. Acute poisoning: A ten years retrospective hospital based study. *Ann Natl Acad Med Sci* 1994;30:35-44.
- Singh S, Sharma N. Neurological syndromes following organophosphate poisoning. *Neurol India* 2000;48:308-13.
- Leibson T, Lifshitz M. Organophosphate and carbamate poisoning: Review of the current literature and summary of clinical and laboratory experience in southern Israel. *Isr Med Assoc J* 2008;10:767-70.
- Eddleston M, Dawson A, Karalliedde L, Dissanayake W, Hittarage A, Azher S, *et al.* Early management after self-poisoning with an organophosphorus or carbamate pesticide - A treatment protocol for junior doctors. *Crit Care* 2004;8:391-7.
- Eddleston M. Patterns and problems of deliberate self-poisoning in the developing world. *QJM* 2000;93:715-31.
- Buckley NA, Karalliedde L, Dawson A, Senanayake N, Eddleston M. Where is the evidence for treatments used in pesticide poisoning? Is clinical toxicology fiddling while the developing world burns? *J Toxicol Clin Toxicol* 2004;42:113-6.
- Shaikh JM, Siddiqui FG, Soomro AG. Management of acute organophosphorus insecticide poisoning: An experience at a university hospital. *JLUMHS* 2008;97-101.
- World Health Organisation. Public health impact of pesticides used in agriculture. Ginebra: World Health Organisation, 1990.
- Ramesha KN, Rao KB, Kumar GS. Pattern and outcome of acute poisoning cases in a tertiary care hospital in Karnataka, India. *Indian J Crit Care Med* 2009;13:152-5.
- Unnikrishnan B, Singh B, Rajeev A. Trends of acute poisoning in south Karnataka. *Kathmandu Univ Med J (KUMJ)* 2005;3:149-54.
- 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 React Toxicol Rev* 2000;19:313-7.
- Das RK. Epidemiology of insecticide poisoning at AIIMS emergency services and role of its detection by gas liquid chromatography in diagnosis. *Medico Update* 2007;7:49-60.
- O'Malley M. Clinical evaluation of pesticide exposure and poisonings. *Lancet* 1997;349:1161-6.
- Eddleston M, Eyer P, Worek F, Mohamed F, Senarathna L, von Meyer L, *et al.* Differences between organophosphorus insecticides in human self-poisoning: A prospective cohort study. *Lancet* 2005;366:1452-9.
- Eddleston M, Gunnell D, Karunaratne A, de Silva D, Sheriff MH, Buckley NA. Epidemiology of intentional self-poisoning in rural Sri Lanka. *Br J Psychiatry* 2005;187:583-4.
- Karalliedde L, Senanayake N. Acute organophosphorus insecticide poisoning in Sri Lanka. *Forensic Sci Int* 1988;36:97-100.
- Delilkan AE, Namazie M, Ong G. Organophosphate poisoning: A Malaysian intensive care experience of one hundred cases. *Med J Malaysia* 1984;39:229-33.
- Weissmann-Brenner A, Friedman LM, David A, Vidan A, Hourvitz A. Organophosphate poisoning: A multihospital survey. *Isr Med Assoc J* 2002;4:573-6.
- Tagwireyi D, Ball DE, Nhachi CF. Poisoning in Zimbabwe: A survey of eight major referral hospitals. *J Appl Toxicol* 2002;22:99-105.
- Singh DP, Aacharya RP. Pattern of poisoning cases in Bir Hospital. *J Institute Med* 2006;28:3-6.
- Dash SK, Raju AS, Mohanty MK, Patnaik KK, Mohanty S. Sociodemographic profile of poisoning cases. *JIAFM* 2005;27:133-8.
- Ecobichon DJ. Toxic effects of pesticides. *CASARETT and DOLLs Toxicology: The basic science of poisons* 1996;6:763-810.
- Ellenhorn MJ, Barceloux DG. Chapter 38: Pesticides. *Med Toxicol* 1988:1069-77.
- Adlakha A, Philip PJ, Dhar KL. Organophosphorus and carbamate poisoning in Punjab. *J Assoc Physicians India* 1988;36:210-2.
- Ganesvaran T, Subramaniam S, Mahadevan K. Suicide in a northern town of Sri Lanka. *Acta Psychiatr Scand* 1984;69:420-5.
- Jamil H. Organophosphorus insecticide poisoning. *J Pak Med Assoc* 1989;39:27-31.
- Wesseling C, McConnell R, Partanen T, Hogstedt C. Agricultural pesticide use in developing countries: Health effects and research needs. *Int J Health Serv* 1997;27:273-308.
- Finkelstein Y, Kushnir A, Raikhlin-Eisenkraft B, Taitelman U. Antidotal therapy of severe acute organophosphate poisoning: A multihospital study. *Neurotoxicol Teratol* 1989;11:593-6.
- Turabi A, Danyal A, Hasan S, Durrani A, Ahmed M. Organophosphate poisoning in the urban population; study conducted at national poison control center, Karachi. *Biomedica* 2008;24:124-9.
- Singh S, Sharma BK, Wahi PL, Anand BS, Chugh KS. Spectrum of acute poisoning in adults (10 year experience). *J Assoc Physicians India* 1984;32:561-3.
- Law S, Liu P. Suicide in China: Unique demographic patterns and relationship to depressive disorder. *Curr Psychiatry Rep* 2008;10:80-6.
- Agarwal SB. A clinical, biochemical, neurobehavioral, and sociopsychological study of 190 patients admitted to hospital as a result of acute organophosphorus poisoning. *Environ Res* 1993;62:63-70.
- Eddleston M, Singh S, Buckley N. Organophosphorus poisoning (acute). *Clin Evid* 2005;1744-55.
- Eddleston M, Buckley NA, Eyer P, Dawson AH. Management of acute organophosphorus pesticide poisoning. *Lancet* 2008;371:597-607.
- Nalin DR. Epidemic of suicide by malathion poisoning in Guyana. Report of 264 cases. *Trop Geogr Med* 1973;25:8-14.

44. Mathewson I, Hardy EA. Treatment of malathion poisoning. Experience of two cases in Sarawak. *Anaesthesia* 1970;25:265-71.
45. Namba T, Nolte CT, Jackrel J, Grob D. Poisoning due to organophosphate insecticides. Acute and chronic manifestations. *Am J Med* 1971;50:475-92.
46. Langley R, Sumner D. Pesticide mortality in the United States 1979-1998. *Vet Hum Toxicol* 2002;44:101-5.
47. Bruyndonckx RB, Meulemans AI, Sabbe MB, Kumar AA, Delooz HH. Fatal intentional poisoning cases admitted to the University Hospitals of Leuven, Belgium from 1993 to 1996. *Eur J Emerg Med* 2002;9:238-43.
48. Srinivas Rao Ch, Venkateswarlu V, Surender T, Eddleston M, Buckley NA. Pesticide poisoning in south India: Opportunities for prevention and improved medical management. *Trop Med Int Health* 2005;10:581-8.
49. Rajasuriar R, Awang R, Hashim SB, Rahmat HR. Profile of poisoning admissions in Malaysia. *Hum Exp Toxicol* 2007;26:73-81.
50. McConnell R, Hruska AJ. An epidemic of pesticide poisoning in Nicaragua: Implications for prevention in developing countries. *Am J Public Health* 1993;83:1559-62.
51. Rosenthal E. The tragedy of Taucddmarca: A human rights perspective on the pesticide poisoning deaths of 24 children in the Peruvian Andes. *Int J Occup Environ Health* 2003;9:53-8.
52. Aardema H, Meertens JH, Ligtenberg JJ, Peters-Polman OM, Tulleken JE, Zijlstra JG. Organophosphorus pesticide poisoning: Cases and developments. *Neth J Med* 2008;66:149-53.

Cite this article as: Kumar MR, Vignan Kumar GP, Babu PR, Kumar SS, Subrahmanyam BV, Veeraprasad M, *et al.* A retrospective analysis of acute organophosphorus poisoning cases admitted to the tertiary care teaching hospital in South India. *Ann Afr Med* 2014;13:71-5.

Source of Support: Nil, **Conflict of Interest:** None exist

Announcement

Android App



Download
Android
application

FREE

A free application to browse and search the journal's content is now available for Android based mobiles and devices. The application provides "Table of Contents" of the latest issues, which are stored on the device for future offline browsing. Internet connection is required to access the back issues and search facility. The application is compatible with all the versions of Android. The application can be downloaded from <https://market.android.com/details?id=comm.app.medknow>. For suggestions and comments do write back to us.