International Journal of Advances in Medicine
Chintale KN et al. Int J Adv Med. 2016 May;3(2):268-274
http://www.ijmedicine.com
pISSN 2349-3925 | eISSN 2349-3933
DOI: http://dx.doi.org/10.18203/2349-3933.ijam20161074

Research Article

Clinical profile of organophosphorus poisoning patients at rural tertiary health care centre

Kailas N. Chintale[1]*, Sanjay V. Patne[2], Sanjay S. Chavan[1]

[1]Department of General Medicine, S. R. T. R. Medical College, Ambajogai, Dist.- Beed, Maharashtra, India
[2]Department of General Medicine, Indian Institute of Medical Science and Research Medical College, Badnapur, Dist.- Jalna, Maharashtra, India

Received: 19 April 2016
Accepted: 26 April 2016

***Correspondence:**
Dr. Kailas N. Chintale,
E-mail: drkailaschintale@gmail.com

ABSTRACT

Background: Acute pesticide poisoning has become major public health problem world-wide. Farmer suicide is burning issue in many states of India. Organophosphate causes most self-poisoning deaths in southern & central India. The aim was to study incidence, clinical and social profile, risk factors, and factors modifying outcome.
Methods: A hospital based cross-sectional study was carried out at government rural tertiary health care centre. This study comprises cases of acute pesticide poisoning of age more than 12 years admitted in intensive care unit of this institute during study period from January 2012 to June 2013.
Results: Incidence of acute pesticide poisoning was 0.36% of total hospital admissions. Pesticide poisoning was more common in males (74.26%) than females (25.73%) with M: F ratio of 2.9:1.82. 35% were suicidal cases followed by accidental cases 13.97% and only 3.67 were homicidal. Incidence of suicidal and accidental poisoning was more common in married population (75.73%). History of social and domestic problems (50.80%), alcohol abuse (13.39%) and marital friction (11.60%) were common risk factors. Ingestion route of poisoning was most common (71.73%). Excessive salivation was the most common symptom observed in 72.05%.
Conclusions: Mortality in case of organophosphorus poisoning depends on amount to which person exposed, type of compound, time lapse between exposure and initiation of treatment, the general health of the patient and facilities available for advanced supportive care.

Keywords: Farmer suicide, Pesticide poisoning, Organophosphorus compounds, Intoxication

INTRODUCTION

Acute pesticide poisoning has become major public health problem world-wide, following intensification of agriculture and globalization of agro-chemical sector in low and middle income countries like India. Pesticides have been used extensively in agriculture since 1950s, promoted as a tool without which developing countries could not develop & become self-sufficient. However, intentional and occupational poisoning from pesticides is a major problem with millions of cases and hundreds of thousands of deaths occurring each year.[1]

Pesticide poisoning is significant problem in India. Organophosphate causes most self-poisoning deaths in southern & central India. In parts of northern India, aluminum phosphide causes most deaths in epidemic that started two decades ago.[2]

Cases of acute pesticide poisoning (APP) cause significant morbidity and mortality worldwide especially in developing countries. There is no reliable estimate as

how many persons per year suffer from pesticide related health effects this is due to several reasons including lack of standardized case definition.[3] Present study comprises cases of acute pesticide poisoning admitted in intensive care unit of government rural tertiary care centre during study period. The aim was to study incidence, clinical and social profile, risk factors, and factors modifying outcome.

METHODS

This hospital based, cross-sectional study was carried out at Government rural tertiary health care centre, which is important referral centre for management of acute agricultural pesticide poisoning. This study comprises cases of acute pesticide poisoning of age more than 12 years admitted in intensive care unit of this institute during study period from January 2012 to June 2013.

Inclusion criteria

- Patients with history of acute organophosphorus poisoning of either sex and above 12 years of age admitted to hospital in study period were included in present study.
- Patients with history of suicidal, homicidal or accidental exposure/ingestion of organophosphorus poison were included.

Exclusion criteria

- Patients with chronic exposure to pesticide / organophosphorus poison were excluded.
- Non-Organophosphorus compound poison inhalation/ exposure/ consumption was not included in this study.
- Brought dead cases were excluded.

Diagnosis of acute organophosphorus poisoning was made on the basis of reliable history obtained from patient if conscious or from relatives and suggestive clinical picture if patient unconscious. Patients were examined for various epidemiological aspects like age, sex, male to female ratio, occupation, education, socio-economic status, risk factors, marital status, mode of poisoning, type of poison, route of poisoning, alcohol abuse, history of psychiatric illness and chronic life threatening disorders were also determined from clinical history and examination. Patients were examined with special emphasis on level of consciousness, smell of poison, oro-nasal frothing, pulse rate, respiratory rate, blood pressure, size of pupils, cyanosis and fasciculation. Systemic examination was done to rule out any systemic disorder.

In all patients routine haemogram, urine examination, random blood sugar, blood urea, serum creatinine, serum bilirubin, serum alanine amino transferases (ALT) and aspartate amino tranferases (AST) were done. Fundus, ECG, X-ray chest was done whenever necessary. Specific investigation like serum butyryl (pseudo) choline esterase inhibition was analyzed in each and every patient. On admission in casualty all contaminated cloths were removed and contaminated skin or portion of body soiled with vomitus or saliva was washed with soap and water. Adequate airway was maintained in unconscious patients and if necessary endotracheal intubation was done and ventilatory support was given. All patients were managed according to standard line of management of organophosphorus poisoning. Specific antidotes were used whenever necessary. Other necessary treatment was given according to clinical condition of the patient whenever needed. Data collection was started after institutional ethical committee approval. Statistical significance was set at P- 0.05. Results were analyzed by using Statistical Package of Social Sciences (SPSS) version 16.0.

RESULTS

As Table 1 shows that during study period total number of admissions in the hospital were 37513, out of which total number of admissions due to acute pesticide poisoning were 136 (0.36%). Suicidal and accidental poisoning was more common in males. The male to female ratio was 2.9:1. There was no statistically significant difference in homicidal poisoning in either sex in present study. Suicidal cases were highest in number 112 (82.35%) followed by accidental cases and homicidal cases. Maximum numbers of cases i.e. 90 (66.17%) in the present study were in 21-40 years of age group. There were only 5 cases (3.67%) above age of 60 years. The youngest patient was 13 years old while the oldest was 74 years old. Incidence of poisoning decreases with higher educational level. Majority of the cases belonged to lower socioeconomic status i.e. 91 patients (66.91%) followed by middle socioeconomic status i.e. 36 patients (26.47%). Incidence of pesticide poisoning was more common in married population i.e. 103 (75.73%). Incidence of pesticide poisoning was more common in married male 77 (56.61%) and married female 26 (19.11%). Highest incidence of pesticide poisoning found between July to December 2012. In most of cases (71.32%) ingestion was mode of exposure. Out of total 136 patients 131 patients (96.32%) got cured and 5 patients (3.67%) succumbed to death.

As evident from Table 2, most common risk factor for suicidal consumption of poison was social and domestic problems seen in 57 patients i.e. in 50.80%.followed by marital friction (11.60%), alcohol abuse (13.39%) and in 6.25% patients cause was not known. Patient suffering from psychiatric illness were at high risk for suicidal consumption of pesticide poison. In present study 2 patients were suffering from depression and 1 patient was diagnosed case of schizophrenia.

It was evident from Table 3 that about symptoms, signs and complication among pesticide poisoning cases. Excessive salivation was the most common symptom

observed in 98 patients (72.05%). Other common symptoms were nausea (60.29%), giddiness (27.94%), vomiting (23.52%) abdominal pain (20.58%), breathlessness (11.76%), agitation (10.29%) and 2 (1.47%) patients had convulsion. Most common physical finding was miosis in 97 of total patients i.e. in 71.32%. Other common physical signs were fasciculation (63.23%), bradycardia (57.35%), increased bronchial secretions (39.70%), altered sensorium (5.88%), neck muscle weakness (16.91%) and oro-nasal frothing (10.29%). In present study, few patients developed complications. Respiratory failure was the most common complication found in 11 patients i.e. in 8.08% of the total patients. Other complications were Type II paralysis found in 6 cases (4.41%), 3 patient (2.20%) had aspiration pneumonia, 2 patients (1.47%) had circulatory collapse and 1 patient (0.73%) had septic shock.

Table 1: Bio-social characteristics of organophosphorus poisoning cases (n=136).

Bio-social characteristics		No. of cases (%)
Gender	Male	101 (74.26)
	Female	35 (25.74)
Age (in years)	12 to 20	12 (8.82)
	21 to 30	59 (43.38)
	31 to 40	31 (22.79)
	41 to 50	18 (13.23)
	51 to 60	11 (8.08)
	>60	5 (3.67)
Education	Illiterate	73 (53.67)
	1-9th standard	19 (13.97)
	10-12th standard	38 (27.94)
	Graduation & above	6 (4.41)
Socio-economic status	High	9 (6.61%)
	Middle	36 (26.47)
	Low	91 (66.91)
Marital status	Married	103 (75.73)
	Unmarried	33 (24.27)
Mode of poisoning	Suicidal	112 (82.35)
	Accidental	19 (13.97)
	Homicidal	5 (3.67)
Mode of exposure	Ingestion	97 (71.32)
	Dermal + inhalation	24 (17.64)
	Inhalation only	9 (6.61)
	Dermal only	6 (4.4)
Quarterly variation	Jan-Mar 2012	15 (11.03)
	Apr-Jun 2012	13 (9.56)
	Jul-Sep 2012	31 (22.79)
	Oct-Dec 2012	43 (31.62)
	Jan-Mar 2013	18 (13.24)
	Apr-Jun 2013	16 (11.76)
Outcome	Cured	131 (96.33)
	Death	5 (3.67)

Table 2: Various risk factors for suicidal pesticide poisoning (n=112).

Risk factors	No. of cases	Percentage
Social and domestic problems	57	50.80
Marital friction	13	11.60
Financial stress	4	3.57
Love affairs	1	0.89
Job problems	6	5.35
Chronic illnesses	5	4.46
Psychiatric disorder	3	1.21
Failure in examination	1	0.89
Unknown reason	7	6.25
Alcohol abuse	15	13.39

Table 3: Incidence of various symptoms, signs and complications among pesticide poisoning cases.

Symptoms / Signs / Complications		No. of cases (%)
Symptoms	Nausea	82 (60.29)
	Vomiting	32 (23.52)
	Abdominal pain	28 (20.58)
	Excessive salivation	98 (72.05)
	Giddiness	38 (27.94)
	Breathlessness	16 (11.76)
	Convulsion	2 (1.47)
	Diarrhoea	19 (13.97)
	Agitation	14 (10.29)
Signs	Miosis	97 (71.32)
	Fasciculation	86 (63.23)
	Increased bronchial secretions	54 (39.7)
	Bradycardia	78 (57.35)
	Neck muscle weakness	23 (16.91)
	Altered sensorium	8 (5.88)
	Oro-nasal frothing	14 (10.29)
	Others	9 (6.61)
Complication	Respiratory failure	11 (8.08)
	Type ii paralysis or intermediate syndrome	6 (4.41)
	Aspiration pneumonia	3 (2.20)
	Circulatory collapse	2 (1.47)
	Septic shock	1 (0.73)

*multiple responses

As Figure 1 shows, out of 136 patients 69 patients (50.73%) showed the level of serum Pseudo cholinesterase <4500IU i.e. below the normal range. 31 patients (22.79%) had the value below threshold level i.e. between 4500-5500, whereas 25 patients (18.38%)

showed between 5500-10000 IU and 11 cases(8.08%) showed serum cholinesterase level >10000IU.

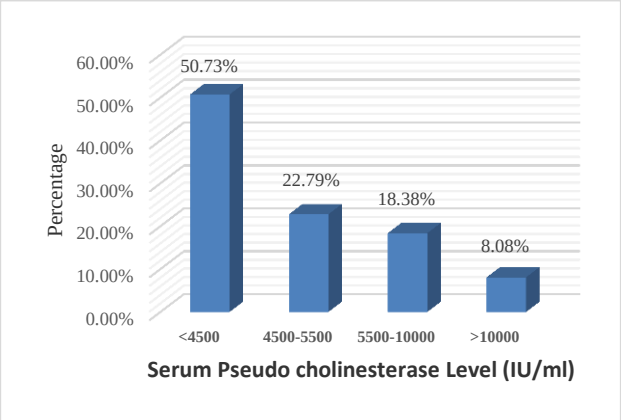

Figure 1: Serum pseudo cholinesterase level in pesticide poisoning cases (n=136).

DISCUSSION

Recent WHO estimates suggest that more than 3.1 million cases of acute pesticide poisoning occur worldwide annually, the majority of them were being caused by organophosphorus compounds used for agricultural purposes in developing countries.[4] Present study reported 0.36% rate of admission of acute poisoning cases in study period which was slightly less than findings of study done by Gannur DG et al.[5] Out of total 136 cases, 112 (82.35%) cases were suicidal, accidental cases were 19 (13.67%) and 5 (3.67%) cases were homicidal. Study done by Agarwal et al reported that 67.4% of the cases had the intention of committing suicide, 16.8% of the cases were the result of occupational exposure, and 15.8% of the cases were from accidental poisoning.[6] Khan FY et al reported that 87.3% patients were exposed accidentally in state of Qatar.[7] This shows much higher incidence of accidental organophosphorus poisoning as compared to our study. In studies done by Gannur DG et al, Nigam M et al and Kar SM et al, highest incidence of poisoning was observed in young age group i.e. in 16-30 years.[5,8,9] This was comparable to present study. The reason may be that this was the main working age group and have the whole responsibility of their family and also exposed to organophosphorus compounds while working in farm. Our study showed male predominance in OP poisoning which was comparable to studies done by Khan FY et al and Raja KS et al.[7,10] The reason behind this may be males are main working group in outdoor field, i.e. they are more involved in spraying crops in the farms. Our study reported higher incidence of poisoning in illiterates than literates. Similar trend was noted in studies done by Nigam M et al, Gupta BD et al and Muhammad IS et al which suggest illiteracy predispose to poisoning.[8,11,12] Thus promotion of necessary precautions through education and training the farmers may prevent accidental organophosphorus poisoning. Study done by Kora SA. et al also showed that incidence of pesticide poisoning was more common in married (67%) population than unmarried (33%).[13]

Present study reported cases of poisoning were distributed throughout the year. Cases of organophosphorus poisoning was more common in the month of August to December due to increased exposure to organophosphorus insecticide while spraying in farm and easy availability of pesticides in the farm during that period. However Kar SM et al demonstrated that incidences were very large in the month during May to august (56.92%).[9] The reason may be that this was main harvesting season in Nepal. Muhammad IS et al showed that most of poisoning occurred in summer months: July, August and September.[12] This may be due to the fact that August, September, October November and December are the usual month of spraying crops in the geographical area and agrochemical are easily accessible during this period of the year leads to increase in accidentally exposed cases of poisoning. Ingestion route was the most common mode of exposure found in 97 patients (71.32%) followed by combined dermal+inhalation mode of exposure found in 24 patients (17.64%) then inhalational exposure found in 9 patients (6.61%) and dermal mode of exposure was rarest mode of exposure 4 (2.94%). This is partially comparable to study done by Paul prabhakar et al in Tamilnadu.[14]

In present study social and domestic problems (50.80%), marital friction (11.60%) and alcohol abuse (9.82%) were important risk factors for suicidal pesticide consumption. Risk factors for pesticide poisoning according to Konrodsen FV were young age, low socioeconomic status, unemployment, unstable emotional status, psychiatric disorders and alcohol abuse.[15] Findings of present study is partially comparable to study conducted by Agarwal et al which reported social and domestic problems (37.5%), marital friction (15.6%), financial stress (15.6%), love affairs (14.1%), job problems (10.9%), chronic illness (4.7%), and failure in examination (1.6%) were observed as the precipitating factors.[6]

Study done by Khan FY et al reported that most common symptoms were excessive salivation (100%), agitation (87.5%), disturbances of consciousness (75%), abdominal pain (62.5%) and abdominal cramps (50%) which was comparable to our study.[7] In our study excessive salivation was the most common symptom observed in 98 patients (72.05%). Study done by Gannur DG et al partially comparable to present study as incidence of diarrhoea was only 13.97% in present study which was much lower than this study.[5] In present study, most common physical finding was Miosis found in 97 patients (71.32%). Other common physical signs were fasciculation 86 (63.23%), increased bronchiolar secretions (39.70%), bradycardia (57.35%), altered sensorium (5.88%), neck muscle weakness (16.91%) and oronasal frothing (10.29%). Similar trend was noted in

studies done by Gannur DG et al and Muhammad IS et al.[5,12] Studies done by Khan FY et al and Sugunadevan MS showed much higher incidence of complications than present study.[7,16]

According to Turabi A et al out of 1999 patients, 899 (44.97%) showed the level of serum cholinesterase <4500 IU i.e. below normal range.[17] This was consistent with results of present study. Mortality in Present study was less as compared to study conducted by Agarwal SB et al.[6]

CONCLUSION

There may be regional difference in mortality possibly explained by the fact that mortality in case of organophosphorus poisoning depends on amount to which person exposed, type of compound, time lapse between exposure and initiation of treatment, the general health of the patient and facilities available for advanced supportive care. The overall aim of agricultural policies must be to reduce the use of pesticides to the lowest feasible level. This will reduce number of agricultural pesticide poisoning and minimize the overall exposure to pesticides at the community level.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Roberts DM, Karunarathna A, Buckley NA ,Manuweera G, Sheriff MH Rezvi, Eddleston M. Influence of pesticide regulation on acute poisoning deaths in Sri Lanka. Bulletin of WHO Health Organization. 2003;81(11):789-98.
2. Shrinivas RCH, Venkateshwarlu V, Surrender T, Eddelstone M, Nick AB. Pesticide poisoning in south india-opportunities for prevention and improved clinical management. Tropical medicine int. health. 2005;10(6):581-8.
3. Thundiyil JG, Stober J, Besbelli N, Pronczuk J. Acute pesticide poisoning: a proposed classification tool. WHO Bulletin. 2008;86(3):205-9.
4. WHO. Clinical management of acute pesticide poisoning, intoxication: prevention of suicidal behaviors. WHO 2012;1-25.
5. Gannur DG, Maka P, Narayan Reddy KS. Organophosphorus compound poisoning in Gulbarga region - A five year study. Indian Journal of Forensic Medicine and Toxicology. 2008;2(1).
6. Agarwal SB, Bhatnagar VK , Agarwal A, Agarwal U, Venkaiah K, Nigam SK, et al. Impairment in clinical indices in acute organophosphate insecticide poisoning patients in India. The Internet Journal of Toxicology. 2007;4(1).
7. Khan FY, Kamha AM, Ibrahim AS, D'souza A. One year study of patients with acute organophosphate insecticide poisoning admitted to the intensive care unit of Hamad General Hospital, Doha, State of Qatar. Journal of Emergency Medicine Trauma and Acute Care. 2006;6(2):16-20.
8. Nigam M, Jain AK, Dubey BP, Sharma VK. Trends of Organophosphorus Poisoning in Bhopal region an autopsy based study. Journal of Indian Academy of Forensic Medicine. 2004;26(2):61-5.
9. Kar SM, Timsinha S, Agrawal P. An Epidemiological study of Organophosphorus Poisoning at Manipal Teaching Hospital, Pokhara, Nepal. Journal of Indian Academy of Forensic Medicine. 2010;32(2):108-9.
10. Raja KS, Fazal MO, Bilal A, Qurashi FS, Shaheen M. Organophosphorus compound poisoning; Epidemiology and Management (atropinization vs pralidoxime)a descriptive analysis, in allied hospital Faisalab. Professional Med J. 2008;15(4):518-23.
11. Gupta BD, Vaghela PC. Profile of Fatal Poisoning in and around Jamnagar. Journal of Indian Academy of Forensic Medicine 2005;27(3):145-8.
12. Muhammad IS, Rushd J, Rai M. The analysis of organophosphates poisoning cases treated at Bahawal Victoria Hospital, Bahawalpur in 2000-2003. Pakistan Journal of Medical Sciences. 2006; 22(3):244-9.
13. Kora SA, Doddamani GB, Halagali GR, Vijayamahantesh SN, Boke Umakanth. Socio-demographic Profile of the Organoposphorus Poisoning Cases. Journal of Clinical and Diagnostic Research. 2011;5(5): 953-6.
14. Kundavaram PA, Majumdar S, Das S. Intra-aural route of insecticide poisoning. Toxicol Int. 2013;20:192-3.
15. Vander hoek W, Konrodsen F. Risk factor for acute pesticide poisoning in srilanka. Trop med int health. 2005;10.589-96.
16. Sugunadevan MS, Warnakulasuriya A. Audit on Organophosphate poisoning Requiring Intensive Care Unit Admission. SAARC Journal of Anaesthesia. 2008;1(2):112-5.
17. Turabi A. Poisoning cases in and around Karachi and their Management along with Medico legal Aspects.University of Karachi. 2004. Available at URL: http://eprints.hec.gov.pk/ 1335/ 1/ 1040. html.html. Accessed on March 12, 2016.

Cite this article as: Chintale KN, Patne SV, Chavan SS. Clinical profile of organophosphorus poisoning patients at rural tertiary health care centre. Int J Adv Med 2016;3:268-74.