Demographic Profile and Pattern of Presentation of Organophosphorus Poisoning at Tertiary Care Hospital Agra

Mustaria Pankaj Kumar Shusil[1], Ajay Agarwal[2]

[1]Assistant Professor, Forensic Medicine &Toxicology Department, MLB Medical College, Jhansi (UP),
[2]Prof &HOD, Forensic Medicine &Toxicology Department, S. N. Medical college, Agra (UP))

Abstract

India is agriculture dominant country and organophosphorus commonly used by former in agriculture field. Therefore, Organophosphorus poisoning is common India. Study done at emergency department to know the pattern of sign and symptoms presentation at the time of admission. Total number of cases was 160, out of them 102 (64%) were males and only 58 (36%) were females. Male to female ratio was 1.75:1. farmers 61 (38%) were commonly affected, followed by 35(22%) of patients were housewives and 26 (16%) of patients were students. symptoms presented were vomiting 150 (93.75%) and salivation 150 (93.75%), followed by sweating 147 (91.88%), lacrimation 102 (63.75%) and blurring of vision 80 (50%), breathlessness (40%), faecal incontinence (31.88%), urinary incontinence (18.13%), headache (18.13%) and convulsion (10%). commonest signs were smell of poison 150 (93.75%), followed by tachypnoea 134 (83.75%), altered consciousness 115 (71.88%), miosis 86 (53.75%), fasciculation 70 (43.75%), tachycardia (36.25%), bradycardia (28.13) and pulmonary oedema (06.25%). Increased body secretions were the commonest presentation then other symptoms followed were blurring vision, tachypnoea altered consciousness, and respiratory symptoms. It can be helpful to make diagnosis and take awareness, preventive measures about organophosphorus poisoning.

Key words: *Organophosphorus, Lacrimation, Tachycardia, Convulsion, Altered Consciousness, Respiratory symptoms.*

Introduction

Organophosphorus compounds poisoning is a not only the Indian problem but it's a global problem seen high number cases reported in other country died due to organophosphorus poisoning. Agricultural pesticide poisoning is a major public health problem in the developing world, killing at least 250,000-370,000 people each year. [(1)] Hospital- based studies from five major hospitals across the country in 1999-2000 showed OP compounds were the most common form of poisoning comprising 52% of total cases in Nepal .[(2)] Organophosphate poisoning is a major public health problem in South Africa. Individuals get exposed to organophosphate in both the domestic and industrial spheres.[(3)] organophosphorus poisoning is a familiar medical emergency which is associated with high rate of mortality if not diagnosed and treated in time. Acute organophosphate (OP) poisoning can be deadlier than any other type of chemical poisoning.[(4)] Organophosphorus compounds are used extensively in India to control insects so as to increase production of agricultural commodities. In addition to the accidental exposure from use of these compounds as agricultural insecticides these agents are frequently used for suicidal and homicidal purposes because of their low cost and easy availability.

Organophosphorus (OP) compounds are used as pesticides, herbicides, and chemical warfare agents in the form of new gases. Some have also been used in the medical treatment of myasthenia gravis's and glaucoma. [(5)] An estimated 3 million or more people worldwide are exposed to organophosphates each year, accounting for about 300,000 deaths. In the United States, there

Corresponding author:
Dr Ashok K Rastogi
Assistant Professor, Forensic Medicine &Toxicology Department, AIIMS Patna (Bihar) 801507)
Email id: ashokforensic@yahoo.com
Contact Number: 9300030477

are around 8000 exposures per year with very few deaths. While most often the exposure occurs from an agricultural pesticide, there are household items, such as ant and roach spray, that also contain organophosphate compounds.[6] Commonly used organophosphates have included monocrotophos, dimethoate, parathion, malathion, diazinon, etc. Organophosphorus pesticides can be absorbed by all routes, including inhalation, ingestion, and dermal absorption. Their toxicity is not limited to the acute phase, however, and chronic effects have been noted. Organophosphorus insecticides inhibit the enzyme acetyl cholinesterase leading to accumulation of acetylcholine, which binds to muscarinic and nicotinic receptors throughout nervous system. Signs and symptoms of poisoning are due to persistent acetylcholine hyperstimulation at muscarinic and nicotinic receptors sites. Signs of organophosphate poisoning include salivation, lacrimation, urinary incontinence, defecation, GI-upset / diarrhoea, emesis and miosis.

Material and Method

The study was conducted at S.N. Medical College & Hospital, Agra from February 2011 to July 2012. There were 240 patients of OP Compound poisoning admitting to the Department of Medicine during the study period. After applying inclusion and exclusion criteria, 160 patients were chosen as study subjects. It was Hospital based prospective study. All organophosphorus poisoning patient coming to SN Medical College Agra were considered as working unit and information collected from their Close relatives of victim, victim himself and police records. Following **Inclusion criteria were taken in consideration were**

1. A known case of organophosphorus poisoning

2. Patient with clinical signs and symptoms suggestive of` organophosphorus poisoning

3. Patient showing evidence of organophosphorus poisoning after being investigated

And following Exclusion Criteria: were taken in consideration

1. Patient brought dead in emergency department of S.N.M.C. Agra

2. Cases in which causes of poisoning is not known

3. Patient on Ventilator.

4. Patient with double insecticidal/ multiple poisoning with other drug such as opioids, diazepam, barbiturates etc.

5. Patients who received partial treatment outside and referred later to our hospital were excluded.

6. Patients who abscond ate or referred to higher centre.

Data collected by Thorough history and clinical examination was carried out with reference to vital parameters, pupil size, assessment of central nervous system, respiratory system, cardiovascular system as per prescribed proforma. This examination took place during initial resuscitation and treatment of the patient. Data processing and analysis: Required information is collected on open ended semi-structural scheduled and compiled analysis with the help of MS Excel software.

Observation and Discussion

Study done at Sarojini Naidu medical college and tertiary hospital Agra, in our study majority 62 (38.75%) of patients was in the age group of 21-30 years, followed 39 (24.37%) by the age group of 31-40years. In the present study, youngest patient was 10 years old and oldest patient is 64 years old. (Table No.02) commonly affected age group was middle age 21-50 years of age affected other study done by other researcher they also reported middle age group was commonly affected age group .study done in Tshwane district south Africa researcher reported same age group profile as our study maximum number of cases 21-30 years age group 23.7% cases and 31-40 year age group 16.9 %, significant almost equal number cases as age group 21-30 years reported in age group 01-10 years which was 23.2 % . in our study only 02 case reported in this age group. [3] study done at Turkeyo The most affected age group was 15-24 years (40.5%), in both sexes.[7] organophosphorus and carbamates poisoning patient admitted to a North Jordan Teaching Hospital over a five-year period were reviewed and found that The most cases occurred in the 15-19 year-old age group which is not correctly associated with our study our study reported maximum patient seen in age group 21-30 years.[8] max number

case seen in age group 16-30years were 66.15% south India.[9]

Sex wise distribution we observe that exposure of organophosphorus poisoning male predominant male affected 102 (64%) and female patient contributed 58 (36%).(Table no.03) Sex wise distribution compare with other studies and seen that almost all the study reported male predominantly affected than the female. There were 131 (59.5%) female and 89 (40.5%) male patients.[7] out of the 25 patients, 14 (56%) were male and 11 (44%) were female with a mean age of 34.8 + 17.66 years (Range: 14-77 years).[10] The proportion of OPPs was 15.1% among 564 poisonings. Other study male female ratio seen that the female to male ratio was 1.1:1 .Our study differ study done at Emergency Department of Yu¨ zu¨ ncu¨ Yil University Medical Faculty Hospital in Turkey there was Fifty-seven (67.1%) patients were female, 28 (32.9%) were male.[11]

In our study 61 (38.13%) of patients were farmer, followed by 35(21.88%) of patients were housewives and 26 (16.25%) of patients were students, labour contributed 19(11.88%), private employee 13(08.13%), unemployed/others (03.37%). (Table No.04) study done by other author in India distribution of patients did in respect to occupation maximum number seen in agriculture occupation 48% and housewife also contributed same numbers 48%, student contributed only 04%. In our study student contribution was 16.25%.[10] study done at Manipal majority of patients admitted, due to OP poisoning were agriculturists. Out of 100 patients, 51 patients were (45.1%) agriculture workers.[12] A study into OP poisoning were agriculturists. study conducted in Sri Lanka in 2006 by Hoek and Flemming showed that majority of acute poisoning occurs in Agriculture worker.[13]

In our study symptoms presented were vomiting 150 (93.75%) , salivation 150 (93.75%), followed by sweating 147 (91.88%), lacrimation 102 (63.75%) and blurring of vision 80 (50%), breathlessness (40%), faecal incontinence (31.88%), urinary incontinence (18.13%), headache (18.13%) and convulsion (10%). (Table 05)

Study done in Manipal they found symptoms Sweating 69 % cases, fasciculations 69% cases, miosis seen in78% cases, Respiratory system findings 22%, Tachycardia 34% cases, Loss of consciousness 28% cases, Hypertension12% cases, Seizure 01% cases ,Hypotension 02% cases.[14] comparative pattern of clinical presentation given in (Table No. 01) with other researcher.

In our study commonest signs were smell of poison 150 (93.75%), followed by tachypnoea 134 (83.75%), altered consciousness 115 (71.88%), miosis 86 (53.75%), fasciculation 70 (43.75%), tachycardia (36.25%), bradycardia (28.13) and pulmonary oedema (06.25%). (Table No 06) increased body secretions were the commonest presentation then other symptoms followed were blurring vision, tachypnoea altered consciousness, and respiratory symptoms. Miosis was the most frequent symptom and was seen in 80.66% of the patients.[16]

Table 01: Pattern of presentation compression with other study

SN	Symptoms /sign	Present study %	Girish Thunga et al %(14)	Yusuf Yurumez et al%(7)	Anurag srivastava et al %(15)
1.	Miosis	78.00	78.00	74.50	75.60
2.	Vomiting	93.75	-	32.7	-
3.	Increased secretions 91.88		69.00	28.6	71.40
4.	Fasciculations	43.75	69.00	8.20	14.60
5.	Loss of consciousness	71.88	28.00	30.4	-
6.	Respiratory symptoms	40.00	22.00	54.6	78.10
7.	Tachycardia	83.75	34.00	35.4	-
8.	Convulsion	10.00	01.00	1.80	00.00

Table No. 02: Distribution of Study Subjects According to their Age.

Age Group (in Years)	No. of Cases	Percentage (%)
<11	02	01.25
11 – 20	20	12.50
21 – 30	62	38.75
31 – 40	39	24.37
41 – 50	31	19.38
51 – 60	03	01.86
> 60	03	01.86
Total	160	100.0

Table No. 03: Distribution of Study Subjects According to their Sex.

Sex	**No. of Cases**	**Percentage (%)**
Male	102	64
Female	58	36
Total	160	100

Table No. 04: Distribution of Study Subjects According to their Occupation

Occupation	**No. of Cases**	**Percentage (%)**
Agriculture (Farmer)	61	38.13
Housewife	35	21.88
Students	26	16.25
Labour	19	11.88
Private employee	13	8.13
Unemployed / Others	06	3.75
Total	160	100.0

Table No. 05: Distribution of Study Subjects According to their Presenting Symptoms.

Symptoms	**No. of Cases**	**Percentage (%)**
Vomiting	150	93.75
Salivation	150	93.75
Sweating	147	91.88
Lacrimation	102	63.75

Blurring of vision	80	50.00
Breathlessness	64	40.00
Faecal incontinence	51	31.88
Urinary Incontinence	29	18.13
Headache	29	18.13
Convulsions	16	10.00

Table No. 06: Distribution of Study Subjects According to their Clinical Signs.

Signs	No. of Cases	Percentage (%)
Smell of poison	150	93.75
Tachypnoea	134	83.75
Altered consciousness	115	71.88
Miosis	86	53.75
Fasciculation	70	43.75
Tachycardia	58	36.25
Bradycardia	45	28.13
Pulmonary oedema	10	06.25

Conclusion

Demographic profile and pattern of sign and symptoms presentation of organophosphorus poisoning can be helpful to make the diagnosis of the poisoning. Demographic profile of the poisoned person can be used take preventive measure as organophosphorus poisoning common poisoning in our country because in India most of the people livelihood base on agriculture. This information may be useful in future for preventing the incidence of poisoning by educating the target population can restrict the availability of the organophosphorus.

Acknowledgement: Thankful to all S N Medical college Agra emergency department employee who help to complete this research project.

Ethical Clearance: Taken from the institutional ethical committee (SN Medical College Agra)

Funding Agency: Self-funded.

Conflict of Interest: Nil

References

1. Dawson AH, Eddleston M, Senarathna L, Mohamed F, Gawarammana I, Bowe SJ, et al. Acute Human Lethal Toxicity of Agricultural Pesticides: A Prospective Cohort Study. PLoS Med | www.plosmedicine.org [Internet]. 2010 [cited 2019 Aug 10];7(10):1–9. Available from: www.plosmedicine.org
2. Gupta SK, Joshi MP. Pesticide poisoning cases attending five major hospitals of Nepal. J Nep Med Assoc. 2002;41:447–56.
3. LL Razwiedani and PGD Rautenbach. Epidemiology of Organophosphate Poisoning in the Tshwane District of South Africa. Environ Heal Insights Vol [Internet]. 2017 [cited 2019 Aug 10];11:1–4. Available from: https://doi.org/10.1177/1178630217694149
4. Haliga RE, Morarasu BC, Ursaru M, Irimioaia V, Sorodoc L. New insights into the organophosphate-induced intermediate syndrome. Arch Ind Hyg

Toxicol [Internet]. 2018 Jun 1 [cited 2019 Jul 29];69(2):191–5. Available from: http://www.ncbi.nlm.nih.gov/pubmed/29990296

5. Gupta RC. Classification and uses of organophosphates and carbamates. In: Toxicology of Organophosphate & Carbamate Compounds. kentucky: Elsevier; 2006. p. 5–24.
6. Robb EL, Baker MB. Organophosphate Toxicity [Internet]. StatPearls. StatPearls Publishing; 2019 [cited 2019 Aug 10]. Available from: http://www.ncbi.nlm.nih.gov/pubmed/29261901
7. Yurumez Y, Durukan P, Yavuz Y, Ikizceli I, Avsarogullari L, Ozkan S, et al. Acute Organophosphate Poisoning in University Hospital Emergency Room Patients. Intern Med [Internet]. 2007 [cited 2019 Aug 10];46(13):965–9. Available from:http://joi.jlc.jst.go.jp/JST.JSTAGE/internalmedicine/ 46.6304? from=CrossRef
8. Saadeh AM, al-Ali MK, Farsakh NA, Ghani MA. Clinical and sociodemographic features of acute carbamate and organophosphate poisoning: a study of 70 adult patients in north Jordan. J Toxicol Clin Toxicol [Internet]. 1996 [cited 2019 Jul 29];34(1):45–51. Available from: http://www.ncbi.nlm.nih.gov/pubmed/8632512
9. Kar SM, Timsinha S, Agrawal P. Original research paper An Epidemiological study of Organophosphorus Poisoning at Manipal Teaching Hospital, Pokhara, Nepal. J Indian Acad Forensic Med [Internet]. 2010 [cited 2019 Aug 12];32(2). Available from: http://medind.nic.in/jal/t10/i2/jalt10i2p108.pdf
10. Karakus A, Murat Celik M, Karcioglu M, Tuzcu K, Erden ES, Zeren C. Cases of organophosphate poisoning treated with high-dose of atropine in intensive care unit and the novel treatment approaches. [cited 2019 Aug 10]; Available from:http://citeseerx.ist.psu.edu/ viewdoc/download?doi=10.1.1.836.1237&rep=rep1&type=pdf
11. Sahin HA, Sahin I, Arabaci F. Sociodemographic factors in organophosphate poisonings: a prospective study Huseyin. [cited 2019 Aug 10]; Available from: www.hetjournal.com
12. University of Pennsylvania. Press. VR, Thunga G, Gnana Sam K, Pandey S, Kehra K. Journal of medical toxicology. [Internet]. Vol. 5, Journal of medical toxicology. University of Pennsylvania Press; 2009 [cited 2019 Aug 10]. Available from: http://bases.bireme.br/cgi-bin/wxislind.exe/iah/ online/?Isis Script=iah/iah.xis&src=google& base= MedCarib & lang= p&nextAction=lnk&exprSearch=17889& indexSearch=ID
13. Van der Hoek W. Analysis of 8000 Hospital Admissions for Acute Poisoning in a Rural Area of Sri Lanka. Clin Toxicol [Internet]. 2006 Jan 7 [cited 2019 Aug 10];44(3):225–31. Available from: http://www. tandfonline.com/doi/full/10.1080/15563650600584246
14. Khera K, Pandey S. Evaluation of incidence, clinical characteristics and management in organophosphorus poisoning patients in a tertiary care hospital [Internet]. 2010 [cited 2019 Jul 29]. Available from: https://www.researchgate.net/publication/228794261
15. Srivastava A, Kumar Mishra P, Garg AK, Srivastava A, Srivastava P. The study of clinical features of organophosphorus poisoning in indian society. Orig Artic J Evol Med Dent Sci [Internet]. 2016 [cited 2019 Aug 10];5. Available from: https://www.jemds.com/data_pdf/Anurag-.pdf
16. Adnan Öztürk M, Kelestimur F, Kurtoglu S, Güven K, Arslan D. Anticholinesterase Poisoning in Turkey - Clinical, Laboratory and Radiologic Evaluation of 269 cases. Hum Exp Toxicol [Internet]. 1990 Sep 2 [cited 2019 Jul 29];9(5):273–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/2261240