TRENDS OF ORGANOPHOSPHORUS POISONING IN BHOPAL REGION
AN AUTOPSY BASED STUDY

Dr. Manish Nigam, Assistant Professor
Dr. Ashok Kumar Jain, Assistant Professor
Deptt of Forensic Medicine, R.D. Gardi Medical College, Surasa, Ujjain (M.P.)
Dr. B.P. Dubey, Professor & Head,
Deptt of Forensic Medicine & Toxicology, Gandhi Medical College, Bhopal (M.P.)
Dr. V.K. Sharma, Senior Chemical Examiner, Medicolegal Institute, Bhopal (M.P.)

ABSTRACT

Organophosphorus pesticides are frequently used group in agriculture, forestry and public health and hence they are easily accessible. The study was therefore undertaken to evaluate in depth the various trends of acute organophosphorus poisoning cases and to evaluate the influencing factors and precipitating factors. This study which was made in Gandhi Medical College, Bhopal from June 1999, to May 2001, deciphers the various individual compounds belonging to Organophosphorus group in accordance with the chemical analysis done in Forensic Science laboratory of Medicolegal Institute Bhopal.

KEY WORDS: Organophosphorus, Cypermethrine, Pyrethroids.

INTRODUCTION

The incidence of organophosphorus poisoning has steadily increased in recent past and has reached a level where it can be called "a Social Calamity". Though these substances have been in market only for few decades in our country, they have created many serious problems since these compounds are been preferred in most suicides because of their rapid action, ready availability and knowledge of lethal potency. So this study was undertaken to know the Epidemiological factors in relation to poisoning.

Organophosphorus compound as such is not a single compound rather a broad category of compounds with LD 50 range from 1 to 5000 + mg/kg. This suggests that compounds having high LD 50 might not be fatal indicating that magnitude of Organophosphorus poisoning faced by autopsy surgeon is only a tip of iceberg.

MATERIAL & METHOD

This study is an autopsy-based study of 117 cases of Organophosphorus Poisoning brought to the mortuary of Gandhi Medical College, Bhopal, in the time span of 24 months, from June 1999 to May 2001.

Following procedure was adopted:
1. Relevant history taken from police & relatives - Detailed information of each case was recorded on the pre-coded proforma.
2. Procedure of taking samples in Mortuary: Care was taken to prevent contamination of viscera. Stomach and its contents taken in one clean wide mouth plastic jar and small pieces of liver, kidney, spleen and lungs in separate bottle.
3. Methodology adopted in Toxicology Laboratory:
   A) Solvent Extraction Methods for insecticides
      i. Isolation - By mixing macerated tissue with equal amount of anhydrous sodium sulphate and 100 ml acetone then extraction is done.
      ii. Clean up procedure - The concentrated acetone extract further diluted and then extracted thrice, with 25ml of chloroform which is then combined, washed with 50 ml of water and acetone mixture (1:1) and finally with 50ml water. The washed chloroform layer is passed through anhydrous Sodium sulphate and then evaporated, just to dryness.
   B) Screening test
      i. Color test
      ii. Paper chromatography method
   C) Thin layer chromatography method
   D) High performance liquid chromatography method

OBSERVATIONS

A statistical observations made during the study has been represented in the form of pictorial diagram.
DISCUSSION

Recent developments concerning Pyrethroids are quite remarkable. They are fast becoming the most potent group of synthetic insecticide ever to enter in the market. With the modification of both alcohol and acid sides, they are also becoming stable enough to be used for agricultural purposes. Cyano groups at a - position of alcohol moiety increases insecticidal activity of Cypermethrine. This trend however varies with the area concerned and easy accessibility, like studies carried out at metropolitan cities like Chennai, Pune, and Mumbai; showed household insecticides like TIK-20 (Diazinon), a common offending agent. Similarly a study at Aurangabad revealed a highest trend of Monocil, Thimate, Endosulphan and Rogar (Dimethoate) in decreasing frequency. In SriLanka most agents are Dimethoate, Methamidophos, Malathion, Monocrotophos and Fenthion. Death from pesticides poisoning in England and Wales suggest that although Paraquat poisoning has decreased but still is the commonest compound detected.

38 cases out of the total 117 cases belong to 3rd decade of life (21 to 30 Years) i.e. 32.4 %. Next in frequency is the age group 31-40 age i.e. 27.3 % and then 11- 20 years i.e. 23 %. Only 4 cases occurred in age group 03 to 07 years when the manner of death was accidental. No cases were seen in age group between 8-13 yrs. It was suggested that, on account of better understanding of dangers associated with poison, they can differentiate between a poison and non poison. Moreover stress related with problem of life does not seem to have mounted over their innocent and careless attitude.

The common risk factors associated with 2nd decade of life are stresses of school work, bullying, failure at school, unsuccessful in love affairs, conflicts with parents etc. In group associated with 3Td decade is the most active group physically, mentally and socially and hence highest number of suicides is seen in this section of population.

According to a study made in Ahmedabad about half of the cases belonged to 3rd decade of life. According to Siwach et al 70 % of poisoning is seen in age group between 15 – 30 years. Similarly Gupta & Patel et al & Vishwanathan & Shrinivasan et al had highest incidence in 3rd decade of life.

Males significantly outnumbering the females, indicating a high turmoil in them due to their direct touch with changing values of society & life and scientifically proved less patience and resistance becoming an ideal victim of some evil mind. Similar results were projected in various studies like - Mutalik et al, Mehta et al, etc.

Most of the victims are either partly educated or illiterate, which coincides with the
It is interesting to note that out of 34 females 25 were married and 9 were unmarried i.e. Married females are almost three times in frequency to that of unmarried females. In Indian conditions the women after marriage has to leave her house and join an entirely new family with different conditions, rituals and customs. If the age is a tender one the circumstances become very sensitive. Social, financial stresses and devil of dowry causes the loss of patience.

Most of the married females who consumed Organophosphorus were from the joint family while married males were from nuclear family explaining the fact that males are in greater tension when alone since they have no one from his family to console or encourage the morals in difficult situation. Dattarwal et al observed 66.55 % cases of poisoning among married, coinciding to the observation of our study.

Highest incidence of Organophosphorus Poisoning is seen in persons engaged with agricultural fields constituting 39.60 % followed by house wives 20 % and students 16.85 %. This subgroup has easy accessibility and more turmoil. Student in addition to this have tender age to bear the turmoil hence bad results.

Studies made by Siwach et al, Dattarwal et al and Rathod et al correlate well with the present study.

CONCLUSIONS
1. The most common compound involved in this time span of 24 month was Cypermethrine.
2. In 24 cases of Organophosphorus Poisoning, alcohol in significant concentration was also detected during chemical analysis.
3. Males outnumbered females in Organophosphorus Poisoning. Male to female ratio in Bhopal region was 2.44: 1.
4. Married candidates were more affected than Unmarried candidate. Married female committing suicides by Organophosphorus Poisoning were above three times the unmarried females.
5. Most common age group involved in Organophosphorus Poisoning in Bhopal region was 21 - 30 years, which form 32.47 % of total study case. Most of the cases belong to the age group between 14 years to 40 years accounting for 82.9 % cases. Only three cases were observed to be below 14 years and 16 cases above 40 years.
6. Poisoning was observed to be most common in persons involved associated with farming. Housewives and students came in subservient sense.
7. Most of the cases were partly educated while 33.33 % were illiterates. None of the graduate or professional was found to be the victim.

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