Original Paper

A Study on Autopsy Cases of Suspected Poisoning Victims in an Urban Medical College Morgue

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Abstract

Introduction: **Bangladesh is a South Asian developing country where rural population are mostly dependant on agriculture. Organo-Phosphorus Compounds (OPC) are now a days routinely used as insecticides and readily available in shops . Self destruction or suicide by pesticide poisoning is a burning problem of the developing countries.**

Objective: **The objective of this study was to identify the different poisonous compounds in suspected poisoning cases and also to analyze the socio demographic factors related to the death by poisoning .**

Method: **This retrospective cross sectional study was conducted among victims of suspected poisoning at the Dhaka Medical College (DMC) Morgue during the period of November 2010- January 2012. Various identification data of the victims were noted from the inquest report accompanying the dead bodies. Other related information were gathered from the victims attendants and 3rd copy of post mortem reports preserved in the department. Specific identification of poisons were made from Chemical Examiner's report received by Forensic Medicine & Toxicology Department of DMC. From ethical points of view necessary consent of doctors who performed the autopsies and relatives of victims have been taken. All the data were later on analyzed.**

Results: **A total of 3047 autopsies were performed during the study period . Among these 315 cases (10.33%) were due to various poisoning . Out of these cases specific poisons were identified in 113 (35.87%) cases. Among the detected poisoning cases OPC was the commonest agent 91(80.53%) followed by alcohol/rectified spirit 10(8.85%) and diazepum 4(3.53%). No poison was detected (Negative results) in 157(49.84%) cases and no report from chemical examiner were received in 45(14.28%) cases during the study period. Out of 315 victims 179(56.82%) were male and 136(43.17%) were female. Highest incidence of poisoning was observed in 21-30 years age group(37.77%) followed by age group of 31-40 years(27.93%). Most of the victims were agricultural workers/ farmers 121(38.41%) followed by housewives 52(16.50%). Among the study subjects 181(57.46%) were illiterate and 203(64.44%) were married. Considering manner of death 285(90.47%) victims committed suicide by poisoning and rests 30(9.53%)were due to accidental poisoning.**

Conclusion: **Poisoning by agrochemical compounds is an important problem in our country . Proper emphasis should be given for safe use of pesticides and consciousness should be created among the population about poisonous compounds. Community education in rural area should be practiced. Detail study regarding death due to organophosphorus compounds poisoning is required to be carried out in this country**

Key Words: **Poisoning, OPC, Autopsy**

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Introduction

Bangladesh is a South Asian developing country where rural population are mostly dependant on agriculture. Pesticides specially Organo-Phosphorus Compounds(OPC) are now a days routinely used for crop protection and pest control. These insecticides are readily available in village shops and act as a common agent for suicidal purpose after trivial family problems. Now a days self destruction by pesticide poisoning has become a burning problem for the developing countries killing around 3,00,000 people each year[1-4]. Suicidal death in industrialized countries are also caused by pesticide ingestion[5,6]. Poisoning cases can also occur accidentally and rarely as homicidal purpose. Accidental poisoning can vary from the individual case of a child eating medicinal tablets mistaken for sweets to mass industrial disasters such as in Bhopal in India claiming thousands of lives. Accidental poisoning also occurs in manufacturers, users, childrens of users, packers, sprayers and due to contamination of food grains mixed with insecticides preserved for seedling purposes. Poisoning also occurs from fruits and vegetables[7]. Homicidal poisoning by insecticides usually does not occur because of the smell of the subject (aromax) used as diluents of the poison and also due to alarming signs and symptoms which appear rather early. Unfortunately death by poisoning is seldom included as a priority for heath research in our country.

Materials and methods

This retrospective cross sectional study was conducted among victims of poisoning at the Dhaka Medical College (DMC) Morgue during the period of November 2010- January 2012. Various identification data of the victims like age, sex, marital status, permanent address, educational background, incidents of poisoning were noted from the inquest report accompanying the dead bodies. This preliminary investigation report submitted by the police (inquest report), plays very important role in such data collection. Other related information were gathered from the victim's attendants and 3rd copy of post mortem reports preserved in the department.

Specific identification of poisons were made from Chemical Examiner's report received by Forensic Medicine Department of DMC. From ethical points of view necessary consent of doctors who performed the autopsies and relatives of victims have been taken. All the data were later on analyzed.

Results

A total of 3047 autopsies performed during the period of November 2010- January 2012. Among these 315 (10.33%) were cases of poisoning. Out of these cases specific poisons were identified in 113 (35.87%). Among the detected poisoning cases, OPC was the commonest agent 91(80.53%) followed by alcohol/ rectified spirit 10(8.85%) and diazepum 4(3.53%) (Table-I).

Table -I: Variation of detected poisonous compounds and their percentage (n=113)

Name of poisonous compounds	No. of victims	Percentage
Organo Phosphorus Compounds-OPC	91	80.53
Methyl Alcohol (Spirit)	10	08.84
Diazepum	04	03.53
Zinc Phosphide (Rat killer)	03	2.65
Savlon (Chlor hexidine-Anti septic)	01	
Harpic (Disinfectant)	01	
Nicotine (Excessive tobacco smoking)	01	
Permethrine (Mosquito coil)	01	
Organo carbamate	01	

No poison was detected (Negative results) in 157(49.84%) cases and no report were received in 45(14.28%) cases during the study period. Out of 315 victims 179(56.82%) were male and 136(43.17%) female. Highest incidence of poisoning was observed in 21-30 years age group(37.77%) followed by age group of 31-40 years(27.93%) (Table-II).

Table -II: Age distribution of suspected poisoning victims (n=315)

Age group in years	No. of victims	Percentage
<10	17	5.40
1-20	60	9.04
21-30	119	37.77
31-40	88	27.93
41-50	24	7.62
>50	07	2.22

Most of the victims were agricultural workers/farmers (38.41%) followed by housewives(16.50%) (Table-III).

Table -III: Distribution of suspected poisoning victims by profession (n=315)

Profession	No. of victims	Percentage
Agricultural workers/ Farmers	121	38.41
Housewives	52	16.50
Students	47	14.92
Day laborers	35	11.11
Business	31	09.84
Service holders	13	04.13
others	16	5.08

One hundred eighty one (57.46%) victims were illiterate and 203(64.44%) were married. Considering manner of death 285(90.47%) victims committed suicide by poisoning and 30(9.53%) were accidental cases.

Discussion

Death by poisoning is commonly suicidal or accidental in nature. Among chemicals organo-phosphorus compounds are the commonest one used for suicidal purpose. In South-East Asia, chemicals such as paraquat, parathion , acetic acid used for rubber preparation and Opium , diazepum, barbiturate are also used for self destruction. A study in India has shown that dichlorvos (76% EC) is also used as injectable suicidal agent[8-10].

During post mortem examination of a suspected poisoning case some typical points are noted like cyanosis which is usually found in lip , finger, nose of the victim. Blood stained froth is found in mouth and nostrils. The peculiar smell of OPC is detected in stomach contents.

All the internal organs are congested, since death occurs in most cases due to respiratory failure. Sub mucosal petechial haemorrhage are found in stomach. Excessive oedema and subpleural petechial haemorrhage are present. Heart is soft and flabby. Brain is also congested and oedematous.[11]

For the purpose of detection of poison in suspected cases, some visceras are preserved during post mortem examination and sent to the chief chemical examiner's laboratory, Dhaka for toxicological analysis. These includes (1) whole of stomach with its content, (2) portion of right lobe of liver, (500 grams), (3) longitudinal section of half of each kidney. In special cases other specimen like, blood, urine, brain, heart, lungs etc are preserved. In Bangladesh, the only Chemical Examiners Laboratory is situated in the Institute of Public Health, Mohakhali, Dhaka. It is under the jurisdiction of Criminal Investigation Department (CID) of Bangladesh Police. Age old methods for detection of poisons are used here.

Out of 3047 autopsies performed during this study period of November 2010-January 2012, 315 (10.33%) were cases of poisoning. Among these, specific poisons were identified in 113 (35.87%) cases. OPC was the commonest agent 91 (80.53%) among detected poisoning cases followed by alcohol/ rectified spirit 10(8.85%) and diazepum 4(3.53%). Although the autopsies of this study were performed in the medical college of urban area, a good number of the victims were patients referred from peripheral hospitals i.e Savar, Ashulia, Tongi, Narayangonj, Norsinghdi etc. Since these areas are densely populated and people live on agricultural cultivations, hence OPC poisoning are common. Illiterate people also take country made cheap alcohol (spirit, methyl alcohol) for leisure and addiction which is responsible for poisoning cases. There are also a good number of slums in and around Dhaka city where people of low socio economic condition resides and they take rectified spirit for leisure or addiction.Overdoses of spirit/ methyl alcohol causes accidental death of these victims. In urban area sedative like diazepum is the choice of drugs for suicide. House holds easily available poisons like Savlon, harpic, rat killer, mosquito coil are also responsible for poisoning.

In our study most of the victims were agricultural workers/farmers 121(38.41%) followed by housewives 52(16.50%) and students 47(14.92). Among the victims 181 (57.46%) were illiterate and 203 (64.44%) were married. Marital conflict, low socio-economic status, chronic illness, poverty, emotion, dowry cases, adultery are regarded as cause of death in farmers and house

wives. Where as for students failure in examinations, refusal in love affairs, sexual harassments, drug addiction etc. are the causes of self poisoning.

A study performed in Bangladesh from January 1991 to December 1994 showed that among 405 cases of poisoning, OPC poisoning was the commonest one (38.8%), followed by poisoning with sedative (29.1%). Out of those 405 cases; 310 were suicidal (76.54%) and 95 were homicidal (23.45%)[12] . In our study poisoning by OPC was also the commonest one 91(80.53%), which coincides with findings of this study. Considering manner of death we found 285 (90.47%) victims committed suicide by poisoning and 30 (9.53%) were accidental poisoning cases. We did not find any homicidal cases which differ from previous study performed almost two decades ago. May be it is because now a days people become more oriented to insecticides and applying OPC to other people for homicide is difficult for its peculiar kerosene like smell.

Farmers of our country use pesticides without knowing their harmful side effects. 15,376 M Ton of pesticides were sold in this country during 2001, which increased to 37,712 M Ton in 2007; a rise of 145.26%. Organo phosphate, ogano carbamate and synthetic pyrithroid are used as most popular pesticides in Bangladesh[13]. Epidemiological work from Spain supports link between chronic OPC exposure and increased suicidal rate[14]. Chronic exposure to OPC also give rise to a condition called COPIND- Chronic Organo Phosphate induced neuro-psychiatric disorder[15-17]. Genetic differences also play important role in Chronic OPC poisoning cases[18]. A study from India (1970-1979) showed that out of 312 cases of poisoning 30.12% were barbiturate, 19.23% organo chemicals and 17.95% metallic irritants and corrosive[19]. During 1980-1989, another 555 cases of poisoning were reported from the same region and 31.35% fatalities were attributed to aluminium-phosphide, 27.03% to organophosphates and carbamates, 8.83% to barbiturates and 9.36% to metallic irritants and corrosives[20]. A total of 1035 cases of acute poisoning were studied during 1983 to 1996 at New Delhi and the trends showed increasing use of agro-chemicals[21]. In our study we did not find barbiturate as commonest agent for poisoning because these drugs are not available as over the counter drugs in our country. Another study from Rohtak, India in 1993 –1994 analyzed 559 cases of poisoning[22-23]. and Aluminium Phosphide was found to be the most common poison. According to National Crime Records Bureau India, every 5 minutes a person commits suicide and 7 attempts to kill themselves, forming about 1,00,000 death per year[24]. Suicide rate is highest in the state of Kerala[25]. Majority of the victims belong to the group 14- 34 years[26]. and OPC was the most common agent used for suicide purpose[27]. In Sri Lanka, many thousands of hospitals admissions each year are for agrochemical poisoning, (16,649 in 1983) with over a thousands death annually (1521 in 1983). Of these, about three quarter are self administered, the remainder being occupational and accidental[28,29]. In Sri Lanka, another study showed, incidence of suicide due to poisoning was more than 80 %, followed by hanging, which constituted 10.7 %[30]. In this study no poison was detected (negative results) in 157(49.84%) cases and no report from chemical examiners were received in 45 (14.28%) cases. Faulty or negative results can be found when poison (irritant poisons) is eliminated by vomiting or diarrhoea; excreted by lungs through evaporation or oxidation; detoxified, eliminated or conjugated in alimentary system; rapidly metabolize drugs; vegetable alkaloids and also due to faulty technique of preservation, long time preservation; sample from decomposed body and even faults at the chemical examiners laboratory[11]. The lonely chemical examiner's laboratory of our country is already over burdened with toxicological samples from all around the country and sometimes cannot send the results in due time which explains the non availability of some reports during study period. In our study out of 315 victims 179 (56.82%) were male and 136 (43.17%) female. Among them 203 (64.44%) were married and 112 (35.55%) were unmarried. Highest incidence of poisoning was observed in 21-30 years age group

(37.77%) followed by age group of 31-40 years (27.93%). Males being predominantly the earning member of the family has more access to poisonous materials than females. Another study in Bangladesh performed from January 1993 to December 1997 showed that males (61.30%) were predominant than females (38.70%) in poisoning cases. The reports coincides with our study. Acute poisoning was observed more in married group (68.64%) than unmarried group (31.36%). Male female ratio was 6:1. Commonest poisoning agent was insecticides OPC[31]. Yet another study performed from October 2010-March 2011 also showed that majority of poisoning victims (43%) were below 25 years of age and 83% were male victims[32]. Faiz and Hasan (1998) also showed male female ratio as 2.21 : 1 in another study[33]. A recent study in Bangladesh performed during January–December 2009 in our same study institute showed that among all suicidal deaths 59% was due to hanging, followed by 31% poisoning and 10% due to other causes like burn, fall from height, gun shot injury etc[34]. Among the poisoning victims 162 (54%) were male and 138 (46%) were female. It also coincides with our study in which male are also predominant (56.82%).

Conclusion

Poisoning by agrochemical compounds is an important problem in this country . Proper emphasis should be given for safe use of pesticides . Consciousness should be created among the population about poisonous compounds. Community education in rural area should be practiced. Decrease literacy rate is a common problem which can be overcome in due time with proper efforts. Detail study regarding death due to organo-phosphorus compounds poisoning is required to be carried out in this country .

Fig-I: A victim of suspected poisoning of during autopsy

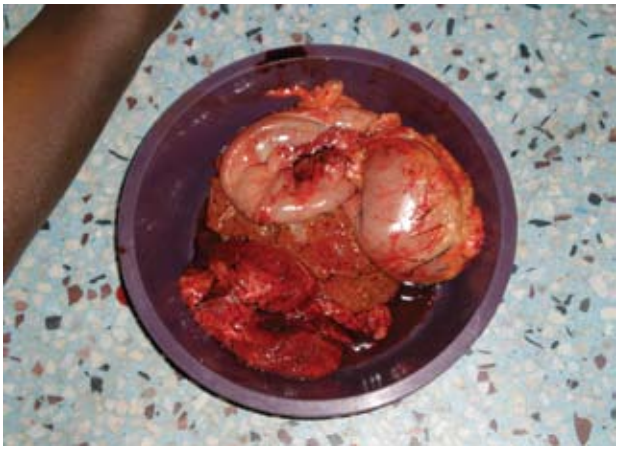

Fig-II: Collected viscera for toxicological analysis

References

1. Jeyaratnam J. Acute pesticide poisoning: a major global health problem. Wld Hlth Statist Q 1990; 43:139-144.

2. Eddleston M. Patterns and problems of deliberate self-poisoning in the developing world. Q J Med 2000; 93:715-731.

3. Eddleston M, Phillips M R. Self poisoning with pesticides. BMJ 2004; 328:42-44

4. Buckley NA, Karalliedde L, Dawson A, Senanayake N, Eddleston M. Where is the evidence for the management of pesticide poisoning – is clinical toxicology fiddling while the developing world burns? J Toxicol Clin Toxicol 2004; 42:113-116.

5. Bruyndonckx R B, Meulemans A I, Sabbe M B, Kumar A A, Delooz HH. Fatal intentional poisoning cases admitted to the University Hospitals of Leuven, Belgium, from 1993 to 1996. Eur J Emerg Med 2002, 9:238-243.

6. Langley R, Sumner D. Pesticide mortality in the United States, 1979–1998. Vet Hum Toxicol 2002, 44:101-105.

7. Lu C, Barr D B, Barr, Pearson M A, Waller L A.Dietary Intake and Its Contribution to Longitudinal Organophosphorus Pesticide Exposure in Urban/Suburban Children. .Environ Health Perspectives 2008; 116 (4) :537- 542

8. Carson. D J, Carson E D. The increasing use of Paraquat as a suicidal agent. Forensic Sci. 1976; 7:151-60.

9. Raina S, Mahesh D M, Sood V, Kaushal S S, Gupta D. Self injection of Dichlorvos, an Organophosphorus Compound. OJHAS 2008;7(2):01-03.

10. Parkinson C. The changing patern of paraquat poisoning in man. Histopathology 1980; 4: 171-183.

11. Nandy, Apurba. Principles of Forensic Medicine . 2nd ed. India:Central Book agency; 2001. p- 439-494

12. Azhar M A, Mahmood T A K, Rafiqueuddin A K M. Pattern of poisoning and its Mortality in Rajshahi Medical College Hospital. J Medical Teachers Federation 1996; 1 (2): 56

13. Ahmad M, rahman FN, Ashrafuzzaman M, Chowdhury DKP, Ali M. Overview of Organophosphorus Compound Poisoning in Bangladesh and Medicolegal Aspects Related to Fatal Cases. JAFMC 2009;5(1):41-45

14. Parron T, Hernandez A T, Villanueva E . Increased risk of suicide with exposure to pesticides in an intensive agricultural area. A 12 year retrospective study. Forensic Science Internal 1996; 79: 53-63.

15. Ahmed G M, Davies D R. Chronic Organo phosphates exposure : toward the definition of a neuro psychiatric Syndrome . Journal of nutritional and Environmental Medicine 1997; 7: 169- 176.

16. Davies D R, Ahmed G M, Freer T. Chronic organo phosphates induced neuro psychiatric disorder (COPIND)result of two postal questionnaire surveys. Journal of nutritional and Environmental Medicine 1999; 9: 123- 134.

17. Jamal G A. Neurological syndroms of organo phosphorus compounds. Adverse drug reaction and Toxicological Review 1997;16: 133- 170.

18. Yaamasaki Y, Sakamoto K, Watada H . The arg 192 isoform of paraoxonase with low sarin hydrolyzing activity is dominant in the Japanese. Human Genetics 1997; 101: 67-68

19. Singh S, Sharma B K, Wahi P L, et al. Spectrum of acute poisoning in adults (10 year experience) JAPI 1984; 32: 561-563

20. Singh S, Wig N, Sharma B R, et al. Changing pattern of acute poisoning in adults. JAPI 1997; 45: 194-197

21. Aggarwal P, Handa R, Wali JP. Common poisoning in India; Proceedings of National Workshop on Practical and Emergency Toxicology1998; 1: 09-15

22. Siwach S B , Gupta A. The profile of acute poisoning in Haryana. JAPI 1995; 43: 756-759

23. Sharma B R, Harish D, Sharma V. Poisoning in Northern India – Changing Trends, Causes and Prevention Thereof. Med Sci Law 2002; 42(3): 251-257

24. Baby S, Haridas M P, Yesudas K F. Psychiatric diagnosis in attempted suicide . Calicut Med Journal 2006; 4(3):e2.

25. Indrayan A, Wysocki M J, Kumar R, Chawla A, Singh N. Estimates of the years of life lost due to the top nine causes of death in rural areas of major states in India in 1995. Nat Med J of India 2002; 15:1.

26. Kandamuthan M. Preliminary findings on the psychosocial factors for attempt of suicide in Kerala. NIMHANS Journal 1998;1: 261-270

27. Galgali R B, Sanjeeb R, Ashok M V, Appaya P, Srinivasan K. Psychiatric diagnosis of Self Poisoning cases ; A general Hospital study. Indian Journal of Psychiatry 1998; 40(3): 254- 259.

28. Knight B, Saukko P. Knight's Forensic Pathology. 3rd ed. London : Arnold; 2004. p-566-569

29. Karalliede L, Senanayake N. Acute organophosphorus insecticides poisoning in Sri Lanka.. Forensic Sci Int. 1988; 36: 97-100

30. Hettiarachchi J, Kodithuwakka G C S , Chandrasiri N. Suicide in Southern SriLanka. Medicine, Science and Law 1988 ; 28 3:248-251.

31. Rahman M H, Samad M A. An epidemiological Study on Acute Poisoning in a rural Hospital of Bangladesh. JOPSOM 2000; 19(1): 40-46

32. Hasan AM, Haque MM. A Clinial study to see the Predictive Utility of Glasgow Coma Scale in Acute Orgnophosphorus Poisoning.Dinajpur Med Col J 2011;4(2):56-61

33. Faiz MA, Rahman MR, Ahmed T. Management of Acute poisoning with Organophosphorus insecticides. J Bang Coll Phys Surg.1994;12:59-62

34. Hossain MN, RahmanZ, Akhter S. Suicidal Death Autopsy Analysis at Dhaka Medical College. Bangladesh Med J.2011;40(1):18-21.