RESEARCH ARTICLE

The Scenario of Pesticide Poisoning (Organo Phosphorus Poison) in Rural Area of Bangladesh

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Abstract :

Background: Pesticide poisoning is a common cause of death in Bangladesh, specially in the rural area by organo phosphorus compound poison. Here the usual manner are accidental and suicidal cases. Homicidal poisoning by opc or other pesticide poisonoing is very rare. Accidental case occurs in case of children and fermers during spray of insecticides.OPC is a common suicidal poison in the rural of Bangladesh. **Objective:** The objective of this study was to find out socio- demographic characteristics of victim common age, sex and different chemical agents used byvictim. **Materials and method:** A retrospective cross sectional study was done in Rajshahi medical college mortuary during the period of January 2018 to January 2019. During this period data was collected from 280 cases of medico-legal autopsies by pesticide poisoning (170 by opc poison). **Results:** A total of 280 medico-legal autopsies were analyzed of which 170 (60.71%) were death due to opc poisoning. Out of this cases maximum 170(60.71%) death due to opc poison where the age group of was between 41-50 years. Majority of this cases 80(50.00%) were observed in males. Majority of victims had use dmalathion 35 (20.58%), dichlorvos 23 (13.52%), chlorpyrifos 23 (13.52%), dimethoate 22 (12.94%) as a common chemical agents. **Conclusion:** Pesticide or insecticide poisoning is observed in this study mostly within the middle and young age group ranging from 30-50 years. So awareness at the level of all family and community and specially in the rural area should be increased to pesticide poisoning should also be investigated for this stoppage before long.

Keywords: Bangladesh; Pesticides; Organophosphates; Poisoning.

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Introduction:

Pesticide poisoning is a common method of suicidal and accidental poisoning in developing countries[(1)]. Which is based on types of pests controlled, pesticides include insecticides, herbicides, acaricides, fungicides, rodenticides, etc [(2)]. Until 2013; 2894 different types of pesticides are officially agreed in Bangladesh [(3)]. Organophosphate compounds (OPCs) are the most frequently indicated pesticides used for poisoning in Bangladesh [(4-6)]. Very few non-OPCs are allowed as poisoning agent. Why are other groups of pesticides less importent in Bangladesh? The biggest shortcoming is probably the lack of facility for toxicological applause. Only one toxicological analysis center is present in the country that is known as the chief chemical examiner's office situated in Institute of Public Health, Mohakhali in Dhaka. It has been maintained by Criminal Investigation Department (CID) of Bangladesh police [(7)]. All the Industrialized countries are also affected by this poison, where a great proportion of suicidal death are caused by Pesticide ingestion [(8,9)]. Therefore, inpractice, clinicians have to confidence on history and toxidromic approach to decide how to manage the patient as well as making a diagnosis and records. Sometimes, there is no other choice. Even in well-decorated settings, chemical confirmation of poisoning agent may take time. Moreover, toxidromic approach is anfavourable method for rapid assessment of patient and decision making. In Bangladesh, only if container of ingested poison is

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brought and particular nature of poison can be identified. Although this practice is not scientific, it serves the practical need. It is further true that not in all circumstances such samples are available or can be provided to clinicians. The reported frequency of different kind of pesticides used for poisoning may not be representative of the real scenario in Bangladesh. Then consequently, different methodologies used in poisoning studies of Bangladesh were carefully inspect closely to observe whether they had influenced on final output. In there, first time estimated the extent and characteristics of pesticide poisoning in Bangladesh and look for existing limitations that are needed to increase the improvement be in order to assess the situation appropriately. Best practical methodology that may be applied for future poisoning studies in Bangladesh to make it more accurate results was also revealed

Of course, such poisoning is ever included as a priority for heath research in this country.

Materials and method :

This retrospective cross sectional study was done in Rajshahi Medical College Mortuary, Rajshahi, Bangladesh during the period of January 2018 to January 2019. During this period data were collected from 280 cases of medico-legal used for poisoning and 170 death were due to pesticide poison of organo phosphorus poisoning.. The terms used there "Bangladesh", "pesticide", "poisoning" and "organophosphate". Episodic studies were gathered and assessed for their originality. Methodologies of studies were cautiously scrutinized. Studies before the year 2000 was only selected in an effort to reduce the possible influence of changing trend on use of pesticides in Bangladesh.

Results :

A total of 280 cases of medicolegal used for poisoning autopsies were conducted during the period of January, 2018 to January, 2019 of which 170 (60.71%) deaths were due to organo phosphorus poisoning. Majority of the victims 85 (50.00%) were males. Maximum (40.58%) deaths due to opc poisoning were in the age group of 41-50 years. Most commonly used potential chemical agents of opc is malathion 35 (20.58%) then dichlorvos 23 (13.52%), chlorpyrifos 23 (13.52%), dimethoate 22 (12.94%) then less potential is diazinon 21 (12.35).

Table I : Distribution of victims according to sex (n= 170)

Sex	Frequency	Percentage
Male	85	50.00%
Female	40	23.52%
Children	45	26.47%

Table II : Distribution of victims according to age (n = 170)

Age group	Frequency	Percentage
10-20	14	08.23%
21-30	20	11.76%
31-40	45	26.47%
41-50	69	40.58%
51-60	22	12.94%

(Table III) Out of 170 cases, most common potential chemical agent used malathion 35 (20.58%) then dichlorvos 23 (13.52%), Chlorpyrifos 20 (11.76%), Dimethoate 22 (12.94%), Diazinon 21 (12.35%), Quinalphos 14 (08.23%), Fenitrothion 12 (07.05%), Fenthion 11 (06.47%), Phenthoate 07 (04.11%) , Monocrotophos 05 (02.94%) cases.

Table III . Chemical nature and hazard potential of identified pesticides in poisoning studies in Bangladesh (No. of cases = 170)

Pesticide type Organophosphates	WHO (PHC)	*GHS category**	No. (%)
Malathion	II	5	35 (20.58)
Dichlorvos	Ib	3	23 (13.52)
Chlorpyrifos	II	5	20 (11.76)
Dimethoate	II	3	22 (12.94)
Diazinon	II	4	21 (12.35)
Quinalphos	II	3	14 (08.23)
Fenitrothion	II	4	12 (07.05)
Fenthion	II	3	11 (06.47)
Phenthoate	II	4	07 (04.11)
Monocrotophos	II	2	05 (02.94)

Mortality Rate :

Mortality rate Based on studies done in Bangladesh, poisoning related mortality rate (irrespective of type of agent) was estimated to be 5.1% (CI 4.6-5.6) [10,11,12,13,14]. However, among the fatal cases, 72.6% (CI 68.0-76.8) were due to pesticides. Estimated mortality rate solely among cases of pesticide poisoning has been reported to be 9.2% (CI 8.0-10.5) [12,13,15-16]. Group wise mortality rate was 8.9% (CI 7.7- 10.4) for OPCs, 1.4% (CI 0.2-7.7) for carbamates and 3.0% (CI 0.8-10.4) for rodenticides [11,12-13,15-16]. Except for malathion with mortality rate of 20%, this rate is not determined for the other specifically identified OPCs [13]. Empiric treatment of pesticide poisoning Diagnostic limitations and unavailable sample at presentation has resulted in management of some non-OPC poisonings as OPC poisoning. In DMCH, 40% of cases with pyrethroid poisoning were treated with atropine before exact confirmation via sample identification [12].Majumder et al. reported cases with paraquat poisoning that were treated with atropine despite clinical features were distinct from OPC poisoning [17]. They also showed that when sample identification has not been done for patients, all of them might have been recorded as OPC poisoning and real diagnosis would never have been known. It is a fact that other than research purposes, chemical analysis and sample identification are not practiced in Bangladesh. Knowledge about poisonings in and economic impacts of poisoning on general population A knowledge, attitude and practice (KAP) survey among rural people in Bangladesh showed inadequate knowledge regarding poisoning agents [18]. All respondents mentioned easy availability of pesticides in locality. One third claimed to know safe use of pesticides. Although most respondents claimed to keep poisons in safe places, the poisons were not adequately kept safe. Following the poisoning, majority of respondents stated that they would try local remedy/ traditional treatments prior to hospital admission. Average income in a family in Bangladesh was estimated to be about 1200 Tk (US17$) in a study [18], but mean expenditure for a single event of poisoning occurred for a family member was about 3500 Tk (US 50$), which clearly indicates the economic impact of poisoning on the society.

Discussion :

In Bangladesh World Bank (WB) estimated that, within different pesticide classes, insecticides were used for about 1365 million tons, fungicides for 708 million, herbicides for 62 million and rodenticide for 6 million tons in 2004.So insecticides and fungicides accounted for 97% of pesticide use. Analysis about this active ingredients showed high share of carbamates and OPCs in insecticides and dithiocarbamates in fungicides .Under the sold insecticides, according to chemical in nature, OPCs accounted for 74.7% followed by carbamates (21.9%) and pyrethroids (0.1%) [19]. Miah et al. found insecticides (76%) as a commanding form of pesticides used by Bangladeshi farmers in their study . They published that the leading pesticides used by the farmers are cypermethrin, dichlorvos, malathion, carbofuran, mancozeb and diazinon which depending on the fall onpests . Apart from, they revealed that many pesticides banned or restricted under international agreements are still available and within use in Bangladesh [28].Their observation are supported by the study of WB and Miah et al [19,20].In 80 WHO class I (extremely toxic) and class-II (moderately toxic) pesticides are used by 77.7% of Bangladeshi farmers [19,21].The turning of pesticide poisoning in South East Asia region of WHO was estimated to be 20.7% by Gunnell et al. in 2007,In the global estimates was 30% (range: 27-37%) [22].In 2002, a study in nine medical college and hospitals in Bangladesh edify a case load of 40%

for pesticide poisoning [23]. A study investigated at Rajshahi Medical College 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%). With in 405 cases; 310 were suicidal (76.54%) and 95 were homicidal (23.45%) 18 . Duplicate study preformed in Urban area like Dhaka Medical College proved that for suicidal purpose, sedative poisoning is the commonest followed by OPC poisoning 28% . Study performed at Dhaka Medical College from January 2004 to December 2004 showed that out of 4378 admitted patients 40% were male an 60% were female. 44% patient came from urban area, while 56% from rural area. Incidence was severe among students (35%), followed by house wives (30%). The general reason for poisoning was suicide (93.3%) and sudden anger was the commonest drive (53.3%). All the same study done in paediatric ward at Sir Salimullah Medical College, showed that in case of children, all the cases of poisoning were accidental in nature 29 .The another study at Dhamrai Thana Health Complex performed from January 1993 to December 1997 showed that males (61.30%) were predominant than females (38.70%) in poisoning cases . Acute poisoning was watched more in married group (68.64%) than unmarried group (31.36%).Commonest poisoning agent was insecticides OPC[22]. The epidemiological work from Spain supports link between chronic OPC exposure and increased suicidal rate 23% .

Conclusion :

Bangladesh is capitally an agro based country and insecticide or pesticide poisoning is responsible for noted number of admissions and deaths in Bangladesh. A great number of them is due to OPCs; nevertheless, non-OPC poisoning is main cause underreported domestic violence. Fixing a register of common pesticides in each location for rapid identification what type of nature of the pesticide is suggested as suitable. Pesticide Poisoning studies in Bangladesh require more strict rules and standard for case definition. Undoubtedly, carrying expecting to be something particular studies by application of sample identification to determine the nature of toxicant will rise accuracy of findings and solveall the problems quickly to minimize on death due to organo phosphorus compound poisoning.

References:

1. Eddleston M, Phillips MR. Self-poisoning with pesticides. BMJ 2004;328:42-4.
2. Marer PJ. Landscape Maintenance Pest Control. Canada: UCANR publications; 2006.
3. Schroeder A, Martinez N, Hossain A. 2013 Bangladesh AgroInputs Project (AIP) Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP). Washington DC: United States Agency for International Development; 2013.
4. Chowdhury FR, Bari MS, Alam MJ, Rahman MM, Bhattacharjee B, Qayyum JA, et al. Organophosphate poisoning presenting with muscular weakness and abdominal pain- a case report. BMC Res Notes 2014;7:140.
5. Yusuf HR, Akhter HH, Rahman MH, Chowdhury ME, Rochat RW. Injury-related deaths among women aged 10-50 years in Bangladesh, 1996-97. Lancet 2000;355:1220-4.
6. Konradsen F. Acute pesticide poisoning--a global public health problem. Dan Med Bull 2007; 54:58- 9.
7. Ahmad M, Rahman F N, Ashrafuzzaman M, Chowdhury DKP, Ali M. Overview of Organo- phosphorus Compound Poisoning in Bangladesh and Medico-legal Aspects Related to Fatal Cases. JAFMC Bangladesh 2009;5:41-5.
8. 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, 9:238-243.

9. Langley R, Sumner D. Pesticide mortality in the United States, 1979- 1998. Vet Hum Toxicol 2002, 44:101-105.
10. FaizMA ,Swapon MR , Basher A, Ghose A, Amin R. Baseline survey on cases of Poisoning and its Outcome in Bangladesh. Abstract presented at the 6th APAMT Congress; 2007 Dec 12-14; Bangkok, Thailand.
11. Chowdhury FR, Rahman AU, Mohammed FR, Chowdhury A, Ahasan HA, Bakar MA. Acute poisoning in southern part of Bangladesh--the case load is decreasing. Bangladesh Med Res Counc Bull 2011;37:61-5.
12. Shadequl-Islam AHM , Basher A, Rashid M, Islam M, Arif SM, Faiz MA. Pattern of Pre- Hospital Treatment Received by Cases of Pesticide Poisoning.Int J Med Toxicol Forensic Med 2012;2:88-96.
13. Haque MO, Hasan MK, Haque MM, Alam SJ, Alam MM, Hasan MM, et al. Clinical Study and Hospital Outcome of Different Types of OPCs and Carbamate Poisoning in a Tertiary Level Hospital. Dinajpur Med Col J 2012;5:22-5.
14. Sarkar D, Shaheduzzaman M, Hossain MI, Ahmed M, Mohammad N, Basher A. Spectrum of Acute Pharmaceutical and Chemical Poisoning in Northern Bangladesh. Asia Pac J Med Toxicol 2013;2:2-5.
15. Mahmood I, Rahman MK, Khan MMR, Haque MA, Ekram ARMS. OrganophosphorusPoisioning-Still a Challenging Proposition. TAJ 2009;22:115-8.
16. Ahmed AS, Basher A, Amin MR, Faiz MA. Effect of Intensive Atropine Doses (Rapid Incremental Loading and Titration) for Management of Organophosphorus Pesticide Poisoning: a Case Series. Asia Pac J Med Toxicol 2014;3:23- 6.
17. Majumder MI, Hoque MM, Ahmed BW, Rahman AW, Noore-alam SM, Faiz MA. Fatal Deliberate Self Harm with Paraquat. J Medicine (Bangladesh) 2010;11:176-9.
18. Sharif MZA, Uddin MOF, Chakrabarti H, Faiz MA, Basher A. KAP Study on Pesticide Poison and Poisoning in a Hilly Subdistrict of Bangladesh. Abstract presented at the 8th APAMT Congress; 2009 Oct 20-22; Beijing, China.
19. Meisner C. Report of pesticide hotspots in Bangladesh. The World Bank: Infrastructure and environment department; 2004.
20. Miah SJ, Hoque A, Paul A, Rahman A. Unsafe Use of Pesticide and Its Impact on Health of Farmers: A Case Study in BurichongUpazila, Bangladesh. IOSR J Environ SciToxicol Food Technol 2014;8:57-67.
21. World health Organization. The WHO Recommended Classification of Pesticides by Hazard and guidelines to classification 2009. Geneva: WHO Press; 2010.
22. Gunnell D, Eddleston M, Phillips MR, Konradsen F. The global distribution of fatal pesticide self-poisoning: Systematic Review. BMC Public Health 2007;7:357.
23. Hossain MN, Rahman Z, Akhter S. Suicidal Death Autopsy Analysis at Dhaka Medical College. Bangladesh Med J 2011;40:18-21.