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Original Article

Epidemiological Evaluation of Suicidal Deaths due to Organophosphorus Compound Poisoning

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Abstract

Background: One of the most widespread suicide methods, especially emerging in developing countries like Bangladesh, is poisoning. Organophosphorus compound (OPC) is a common chemical used for self-poisoning that is also inexpensive and easily accessible. ***Objectives:*** To evaluate the demography of suicidal deaths due to OPC poisoning. ***Methods:*** This was a retrospective study with the departmental records of autopsy among deaths due to OPC poisoning. The study was carried out to ascertain the epidemiological evaluation of 242 OPC poisoning suicidal deaths during January, 2016 to December, 2017 at the mortuary of Sylhet MAG Osmani Medical College, Bangladesh. ***Results:*** Majority of the victims (184, 76.03%) were below 40 years of age and females were predominant (142, 58.67%). Most of the victims resided in Companygonj (47, 19.42%), followed by Kotwali (40, 16.52%), and Gowainghat (35, 14.52%) of Sylhet district. Most of the dead bodies (192, 79.33%) were brought to the morgue under Kotwali police station. The most common (218, 90.08%) cause of death was respiratory failure. ***Conclusion:*** Suicide with OPC was the most common in younger women. Establishment of national suicide surveillance is now a time-demanded step and responsible authority should take some necessary steps to address it.

Key Words: Suicidal deaths, OPC poisoning, Epidemiological evaluation

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Introduction

An important global public health issue, acute poisoning causes noticeable morbidity and mortality in low- and middle-income countries.[1] Young people are usually more prone to suicide attempts, while poisoning in children is owing to unintentional causes.[2] About 4.8 million deaths occurred globally each year due to unintended poisoning, where pesticide poisoning accounts for a remarkable portion.[3] The case fatality of self-poisoning in low- and middle-income countries is estimated at 10-20%, whereas organophosphorous compounds (OPCs) is accounted for 50-70%. In Bangladesh, annually 2,000 deaths occurred due to poisoning.[4] The availability of poisons, cultural diversity, socioeconomic status, and educational level of the population are all definitely linked to the prevalence of poisoning.[5]

Pesticide suicide poisoning is one of the major health problems in the current world, and it is the most common in South East Asia.[6]

Bangladesh is an agriculture-based country in South East Asia, where the rural population is mostly dependent on agricultural cultivation.[7] The OPCs are the most common suicidal poison in this country.[8] In rural areas, OPC and Endrin are commonly used due to their easy availability as insecticides.[9] The nerve ending's cholinesterase activity is inhibited as part of the mechanism of action, which causes an over-abundance of acetylcholine to build up. It repeatedly activates acetylcholine receptors, which has the unfortunate side effects of making person's autonomic, somatic, and central nervous systems malfunction.[10,11]

Almost half of all poisoning cases admitted to a hospital as considered to be suicidal or accidental poisoning.[12] Around 7.1% of total hospital admissions constitute poisoning cases, which is increasing threateningly in our country.[13]

Acute cholinergic crisis results from OPC poisoning clinical symptoms. High mortality is caused by common problems, such as cranial nerve palsies, respiratory arrest from failure of respiratory centre, paralysis of the respiratory muscles, and severe bronchoconstriction.[11] Atropine and oximes were widely used in the management of OPC poisoning cases in hospital settings.[14]

Considering the above information, the present study was conducted to ascertain the epidemiological aspects of suicidal deaths due to OPC poisoning in a small cohort in a tertiary level medical college.

Methodology

Study design and settings

This was a record-based retrospective observational study of postmortems conducted from January, 2016 to December, 2017 at the mortuary of the Forensic Medicine department of Sylhet MAG Osmani Medical College, Sylhet 3100, Bangladesh.

Data collection procedures

A total of 242 cases of suicidal deaths (124 in 2016 and 118 in 2017) were identified due to organophosphorous compound (OPC) poisoning. The cases were analyzed based on the inquest reports, hospital records, and postmortem examination findings. All medico-legal cases were referred from 17 different police stations located in Sylhet district. Data were collected using a pre-designed schedule from postmortem registers and reports on socio-demographic characteristics and causes of death from the autopsy examination.

Data analysis

The data were checked and cleaned by Microsoft Excel 2010. Descriptive statistics such as mean and percent were computed for continuous variables of the victims. No analytical statistical analysis was performed.

Ethical approval

Ethical permission was obtained properly from Ethical Review Committee and the department of Forensic Medicine, Sylhet MAG Osmani Medical College, Sylhet 3100, Bangladesh.

Results

Considering age groups, most of the postmortem cases were below 40 years of age (184, 76.03%). Whereas, majority of them (102, 42.2%) were in the age group of 10-19 years, followed by 20-29 years (59, 24.38%), 40-49 years (25, 10.33%) and others. (Table-I)

Table I : Distribution of the age groups of cases (N=242)

	Study years		Total cases
	2016	2017	(N=242)
	(n=124)	(n=118)	
Age group			
Below 40 yrs			*184(76.03%)*
10-19 years	53(52.0%)	49(48.0%)	102(42.15%)
20-29 years	31(52.5%)	28(47.5%)	59(24.38%)
30-39 years	12(52.2%)	11(47.8%)	23(9.50%)
Above 40 yrs			*58(23.97%)*
40-49 years	11(44.0%)	14(56.0%)	25(10.33%)
50-59 years	09(45.0%)	11(55.0%)	20(8.26%)
≥60 years	08(61.5%)	05(38.5%)	13(5.37%)
Total	**124(100.00%)**	**118(100.00%)**	**242(100.00%)**

Majority of the cases (142, 58.67%) were females and the remaining 100(41.33%) were males. (Figure 1)

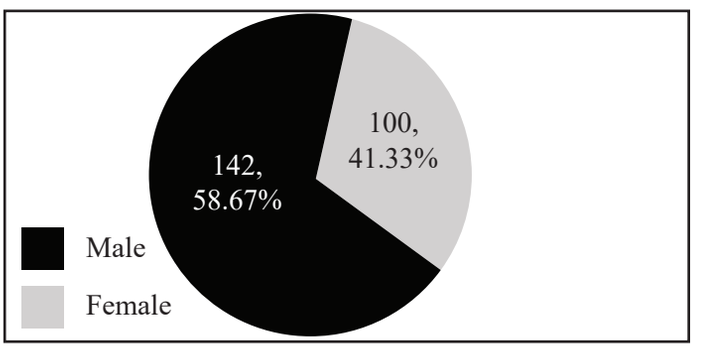

Figure 1: Distribution of the sex of cases (N=242)

Most of the victims resided in Companygonj (47, 19.42%) subdistrict (upazila) of Sylhet district, followed by Kotwali (40, 16.52%), Gowainghat (35, 14.52%) and others. Some (44, 18.18%) of victims' residences were in different areas outside of Sylhet district. (Figure 2)

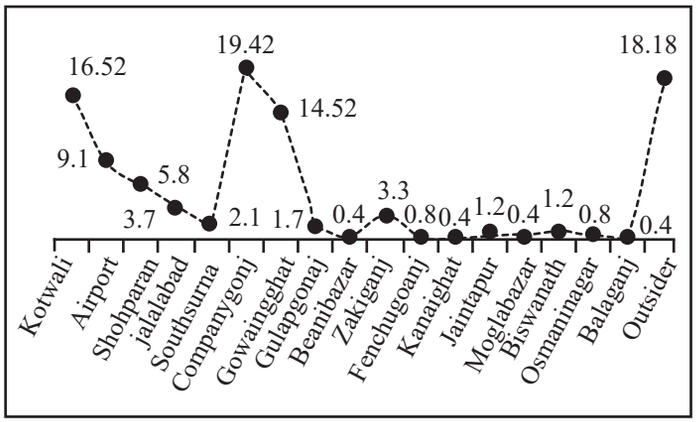

Figure 2: Locality of the cases (N=242)

Considering Police stations under which postmortems were done, it was found that the majority of the dead bodies (192, 79.33%) came in the mortuary under Kotwali police station and the rest came under the other 16 police stations. (Table 2)

Table 2: Police stations under which postmortems were done (N=242)

Police stations	Study years		Total cases (N=242)
	2016 (n=124)	2017 (n=118)	
Kotwali	93	99	192(79.33%)
Airport	04	01	05(2.07%)
Shahparan	03	02	05(2.07%)
Jalalabad	02	02	04(1.65%)
South surma	03	03	06(2.48%)
Companygon	03	02	05(2.07%)
Gowainghat	04	02	06(2.48%)
Gulapgonj	01	02	03(1.24%)
Beanibazar	01	00	01(0.41%)
Zakigonj	02	01	03(1.24%)
Fenchugonj	01	01	02(0.83%)
Kanaighat	01	00	01(0.41%)
Jaintapur	02	01	03(1.24%)
Moglabazar	01	00	01(0.41%)
Biswanath	01	01	02(0.83%)
Osmaninagor	01	01	02(0.83%)
Balaganj	01	00	01(0.41%)
Total			**242(100)**

During the analysis of postmortem reports, the most common cause of death was found asphyxia (respiratory failure) (218, 90.08%), followed by delayed complications (14, 5.79%), CNS effects (7, 2.89%), and apoplexy (3, 1.24%). (Figure 3)

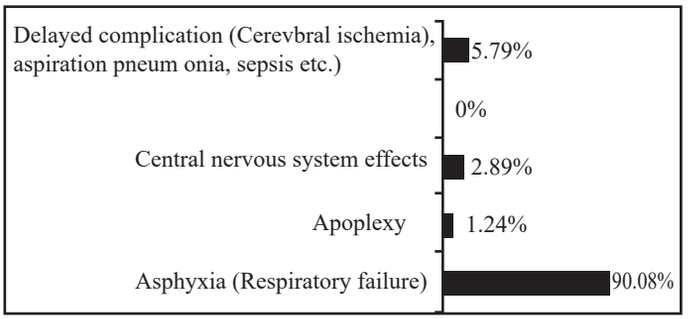

Figure 3: Cause of deaths among OPC poisoing cases (n=242)

Discussion

Most of the postmortem cases were in the age group of 10-19 years (102, 42.2%) and 20-39 years (59, 24.38%), which approximates two-thirds of the total deaths. The age group below 40 years represents the young adults, which is the most growing and productive phase of an individual. The young adult groups are more vulnerable to commit suicide found in the studies conducted in different parts of Bangladesh and Southern India.[8,15-17]

This study reveals that females used OPC poison more often than males (58.67% versus 41.33%). In other parts of Bangladesh, male was found predominant in OPC poisoning deaths.[5,8,18] Most of the victims resided in Companygonj (19.4%) and Gowainghat (14.5%) which are the rural parts of Sylhet. The OPC poisoning suicides were found particularly common in the rural population.[19] The most common cause of suicidal deaths by OPC poisoning was asphyxia or respiratory failure (218, 90.08%). In case of OPC poisoning, the central nervous system is severely affected, which causes paralysis of respiratory muscles and respiratory arrest due to failure of the respiratory center.[11]

The present study was conducted in the subdistricts of greater Sylhet. Countrywide extended prospective study can actually represent the country data and predict the possible causes of suicidal deaths by OPC poisoning in Bangladesh.

Conclusion

The organophosphorous compound (OPC) poisoning predominantly affected the younger age groups and puts more women than men at high risk. Their most frequent motivations were suicide attempts and ultimate suicides.

Public awareness and education on the potentially fatal effects of such poisoning are necessary for all age groups, particularly for the younger ones.

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Conflict of Interest: None declared.

References

1. Kar SM, Timsinha S, Agrawal P. An epidemiological study of organophosphorus poisoning at Manipal Teaching Hospital, Pokhara, Nepal. J Indian Acad Forens Med. 2010;32(2):108-109.
2. Das RK. Epidemiology of insecticide poisoning at AIIMS emergency services and role of its detection by gas liquid chromatography in diagnosis. Medico Update. 2007;7(2):49-60.
3. Kassebaum NJ, Arora M, Barber RM, Bhutta ZA, Brown J, Carter A, et al. Global, regional, and national disability-adjusted life-years (DALYs) for 315 diseases and injuries and healthy life expectancy (HALE), 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet. 2016;388(10053):1603-1658.
4. Gunnell D, Eddleston M. Suicide by intentional ingestion of pesticides: a continuing tragedy in developing countries. Int J Epidemiol. 2003;32(6):902-909.
5. Sarkar DN, Hossain MI, Ahmed M, Shaheduzzaman AK, Mohammad N. Organophosphorus Compounds Poisoning: Picture in Rangpur Medical College Hospital, Bangladesh. Med Today. 2014;26(1):46-48.
6. Mew EJ, Padmanathan P, Konradsen F, Eddleston M, Chang SS, Phillips MR, et al. The global burden of fatal self-poisoning with pesticides 2006-15: systematic review. J Affect Disord. 2017;219:93-104.
7. Ahmad M, Rahman FN, Ashrafuzzaman M, Chowdhury DK, Ali M. Overview of Organo-phosphorus Compound Poisoning in Bangladesh and Medico-legal Aspects Related to Fatal Cases. J Armed Forces Med Coll Bangladesh. 2009;5(1):41-45.
8. Khan NT, Bose PK, Haque ST, Mahmud S, Sultana R. Suicidal Death due to OPC Poisoning: an Experience of 67 Cases. J Enam Med Coll. 2016;6(2):97-100.
9. Azhar MA, Mahmood TA, Rafiqueuddin AK. Pattern of poisoning and its mortality in Rajshahi Medical College Hospital. J Med Teachers Fed. 1996;1(2):56.
10. Roberts DM, Aaron CK. Management of acute organophosphorus pesticide poisoning. Br Med J. 2007;334(7594):629-634.
11. Debnath J, Basak AK, Rahman MZ, Saha A. Profile of Organophosphorus Poisoning. Khwaja Yunus Ali Med Coll J. 2018;9(3):133-135.
12. Zawar SD. Correlation between plasma cholinesterase levels and clinical severity of acute organophosphate and carbamate poisoning. J Assoc Physicians India. 2001;149:91.
13. Dewan G. Analysis of recent situation of pesticide poisoning in Bangladesh: Is there a proper estimate?. Asia Pac J Med Toxicol. 2014;3(2):76-83.
14. Nandy A. Organic Chemical Irritants. In: Principle of Forensic Medicine including Toxicology. 3rd edition. India: Central Book Agency; 2010:pp.517-518.
15. Ahmad M, Mazumder MR, Al-Azad MA, Rahman FN, Rahman MM. Study of autopsy cases of suspected poisoning victims in an urban medical college morgue. J Armed Forces Med Coll Bangladesh. 2012;8(1):46-52.
16. Uddin MJ. Evaluation of Autopsy Study of Organo Phosphorus Poisoning in Patients. Saudi J Med. 2021;6(11):348-351.
17. Peranantham S, Shaha KK, Sahai A, Das S, Manigandan G, Shanmugam K. A hospital based epidemiological study of deaths due to organophosphorus compound poisoning. Indo American J Pharm Res. 2014;4(9):3773-3779.
18. Howlader MA, Hossain MZ, Morshed MG, Begum H, Sardar MH, Uddin MZ, Azad KA. Changing trends of poisoning in Bangladesh. J Dhaka Med Coll. 2011;20(1):51-56.
19. Mishra A, Shukla SK, Yadav MK, Gupta AK. Epidemiological study of medicolegal organophosphorus poisoning in central region of Nepal. J Forens Res. 2012;3(9):1-5.