

A Clinical Study to See the Predictive Utility of Glasgow Coma Scale in Acute Organophosphorus Poisoning

*Hasan AM,¹ Haque MM²

Bangladesh is a developing country, which mostly depends upon agricultural resources. Pesticides like organophosphorus compounds (OPCs) are now routinely used in modern cultivation. So OPCs are easily available in our country and act as a common agent for self poisoning. This study was carried out to see the usefulness of Glasgow coma scale (GCS) in predicting outcome of acute OPC poisoning. Study revealed that most of the patients were of younger age group, male gender (83%), farmer (47%). 96% patient consumed it with suicidal intention. Pupillary manifestation was commonest clinical picture. 79% completely recovered, 18% died and 3% recovered with complication. In this study patients with GCS score between 13-15 mostly recovered (96.2%) and only 3.8% died. Mortality raised to 16.2% whose GCS score was between 10-12. Mortality was much more (61.5%) of whom GCS came down to between 7-9 and 38.5% recovered. None of the patient recovered with GCS score <7, that means mortality was 100% at this level of GCS. In this study we have seen, it is possible to predict outcome of indoor patient in acute OPC poisoning using a scoring system based on Glasgow coma scale. At the same time we found in this study that reduced systolic blood pressure is a very important prognostic indicator. This simple system based on clinical parameters recorded at admission is likely to be most useful in resource poor locations where the majority of OPC poisoning occurs.

[Dinajpur Med Col J 2011 Jul; 4 (2):56-61]

Key words: Organophosphorus, Glasgow Coma Scale

Introduction

One of the most common methods of self poisoning in Bangladesh is by ingestion of poisons especially organophosphorus compounds. Accidental poisoning during mixing and spraying are also found. OPC self poisoning is a major clinical problem in many parts of the world, estimated to kill around 300,000 people every year, largely in the Asia pacific region.¹ In some parts of the developing world, pesticides poisoning causes more deaths than infections disease.²

OPCs are diverse group of chemical used in domestic, industrial and agricultural setting. The principal pharmacological action of all

OPC is the inhibition of acetylcholinesterase and most patient die from cardio respiratory failure. Very small amount of OPC are required to kill a person. Fatal period is usually within 24 hours in untreated cases.³ The case fatality in developing world is commonly 10-20%, but for particular pesticides it may be as 50-70%.

Present scenario of OPC poisoning in Bangladesh is alarming. Any person from age 15-55 years can obtain pesticides sales permission by paying only 75.00 taka as government fees. No educational background is required for this.³ Farmers of this country use pesticides without knowing their harmful side effects.

1. *Dr. Abu Naim Mohmud Hasan, Assistant Registrar, Department of Medicine, Dinajpur Medical College

2. Dr. Md. Monjurul Haque, Associate Professor (CC), Department of Medicine, Dinajpur Medical College

*For correspondence

OPC poisoning has high inpatient mortality. So, it is necessary to predict outcome at admission to improve survival. A number of systems have been proposed for predicting outcome in acute OPC poisoning. But most of them are based on laboratory tests.⁴ Other that use clinical parameters are based on wide range of clinical features.⁵ Therefore these are less useful in peripheral parts of Bangladesh.

In this study we wished to see whether it is possible to predict prognosis of indoor patient in acute OPC poisoning using a scoring system based on Glasgow coma scale recorded at admission.

Methods

It was a simple observational study prospective in nature. The study was carried out in the Department of Medicine of Dinajpur Medical College Hospital, Dinajpur (DJMCH) from 1st October 2010 to 31st March 2011. All patients who were admitted with the history of OPC poisoning fulfilling the inclusion criteria were included.

Inclusion criteria

1. History and clinical features of OPC poisoning in men and women age between 15-60 years.
2. No other co-morbidity or illness.
3. Who brought samples of ingested poison.

Exclusion criteria

1. Concomitant ingestion of other drugs
2. Pregnant patients
3. Patient who received medication for this poisoning prior to admission.
4. Patient who could not bring sample.

A total of 100 cases were selected who have fulfilled the inclusion and exclusion criteria. All the data were recorded in a preformed structured questionnaire. In this study socio-demographic variables were age, sex, nature of poisoning and occupation. Patient related

variables were Glasgow coma scale, pupil size, blood pressure, neurological features and respiratory features. Outcome variables were complete recovery, recovery with complication and death. All data were compiled and edited meticulously by thorough checking and rechecking. All omissions and inconsistencies were corrected, data analyzed methodically and presented in tables.

Results

Age distribution of OPC poisoning is shown in the Table I. Majority of OPC poisoning were found in between 15-25 years (43%) and 26-35 years (34%) of age group. Only 7% were above 45 years of age.

Table I: Age distribution of OPC poisoning (n-100)

Age group in year	Number
15-25	43
26-35	34
36-45	26
>45	07

Out of 100 cases of OPC poisoning 83% were male and 17% were female. Male-female ratio was 4.9:1. Occupation of OPC poisoning cases are shown in the Table II. OPC poisoning was highest among farmers (47%) followed by students (16%). Sixty eight percent patients received that substance from prior purchased for agricultural use, 23% received from left over sample and 9% purchased self with suicidal intention. Suicidal intention observed in 96% cases and accidental poisoning was only 4%. Twelve percent patients of OPC poisoning admitted within 1 hour, 45% admitted in between 1 to 4 hours, 32% admitted in 4 to 8 hours and 11% admitted after 8 hours of poisoning.

Table II: Occupation of OPC poisoning case (n=100)

Occupations	Number (%)
Farmers	47(47%)
Student	16(16%)
Labour	11(11%)
Housewife	13(13%)
Business	11(11%)
Service	02(02%)

Types of compound consumed by the patients is shown in the Table III. Quinalfos was found to be highest in number (16%).

Table III. Types of compound consumed (n=100)

Compounds	Number(%)
Quinalfos	16(16%)
Chlorpyrifos	15(15%)
Protilachlor	14(14%)
Fenathion	11(11%)
Fenothoate	08(08%)
Monocrotofos	07(07%)
Other OPCs	29(29%)

Manifestation of poisoning is shown in the Table IV. Commonest manifestation was pupillary (93%) followed by neurological (84%).

Table IV: Manifestation of poisoning (n=100)

Manifestations	Number (%)
Pupillary	93(93%)
Neurological	84(84%)
GIT	78(78%)
Glandular	83(83%)
Cardiovascular	58(58%)

Ten percent of the patients required less than 100 amp atropine, 30% required 201-300 amp atropine, 19% required 401-500 amp atropine and only 2% required more than 600 amp atropine. Eleven percent of study patients required <10 amp pralidoxime, 62% required 10-20 amp and 27% required 21-30 amp pralidoxime (each amp contain 500mg). Seventy nine percent patients were recovered

completely, 3% recovered with complication and 18% were died. In this study none of fatal patients admitted within one hour of poisoning in comparison 14.6% of recovered patients admitted within one hour of poisoning. Only 11.1% of fatal patients and 52.5% of recovered patients admitted in between 1-4 hours. 61.1% of fatal patients and 25.6% of recovered patients admitted in between 4-8 hours. 27.8% of fatal patients in comparison only 7.3% of recovered patients admitted after 8 hours of poisoning.

Table V: Relationship of GCS with outcome of cases (n=100)

GCS on admission	No. of recovered patients (%)	No. of fatal patients (%)
13-15	51 (96.2)	2 (3.8)
10-12	26 (83.8)	5 (16.2)
7-9	5 (38.5)	8 (61.5)
<7	0 (0.0)	3 (100)

In this study patients with GCS score between 13-15 mostly recovered (96.2%) and only 3.8% died (table V). Mortality raised to 16.2% whose GCS score was between 10-12. Mortality was much more (61.5%) of whom GCS came down to between 7-9 & 38.5% recovered. None of the patient recovered with GCS score <7, that means mortality was 100% at this level of GCS. In this study 73.2% of recovered patients and 72.2% of fatal patients pupil size were ≤ 2 mm. 63.4% of recovered patients and 55.6% of fatal patients pulse rate were <60/min. 23.2% recovered patients and 88.9% of fatal patients systolic BP were <80mmHg. Hospital stay of most of the patients were between 5-8 days, 10% stayed <5 days, 24% stayed >8 days. 72.2% of patients died on 1st day, 16.7% died on 2nd day, 11.1% died on 4th day. None died after 4th day.

Discussion

The objective of the present study was to assess the clinico-epidemiological condition of OPC poisoning and to see the usefulness of Glasgow coma scale in predicting outcome of acute OPC poisoning. We enrolled 100 cases of OPC poisoning admitted in medicine department of Dinajpur Medical College Hospital fulfilling the inclusion criteria.

Majority (43%) of the patients were below 25 years of age. It reflects that young peoples are commonly affected by OPC poisoning. Faiz and Hasan (1998) reported 76% of OPC poisoning was 11-30 years of age group. Ibrahim (2005) in Chittagong Medical College also reported similar result.⁷ So, this study is consistent with findings of other study carried out in Bangladesh.

In this study 83% patients were male and 17% female. Male-female ratio is 4.9:1. Rahman and Samad (2000)⁸ showed male-female ratio in OPC poisoning 1.6:1, Faiz and Hasan (1998)⁶ showed male-female ration 2.21:1. So, this study shows increasing trend of OPC poisoning in male. The incidence of OPC poisoning was highest among farmers (47%). In this area most male persons are involved in farming, they are the main user group of OPC substances. This could be the reason behind high incidence among male and farmer.

Regarding chemical composition of OPC quinalfos (16%) and chlorpyrifos (15%) are frequently used.. This data suggest that these preparations are most commonly used by farmers in Bangladesh.

Regarding nature of poisoning, 96% of the poisoning were suicidal, 4% were accidental. There was no homicidal case. Ahmed et al. (1995) also showed that most common reason for poisoning was suicide (93.3%). Khan et al. (1995) also claimed that homicidal poisoning by insecticides usually does not

occur, due to smell of the subject used as diluents (aromax).

Pupillary manifestation was most common clinical features were pupillary (93%) followed by neurological (84%). Similar result was reported by ShivaKumar et al. (2002) at Stanley Medical College and Hospital Chennai, India.⁹

In our study 79% patients completely recovered, 3% patient recovered with complication and 18% patient died. In Bangladesh Faiz and Hasan (1998) found case fatality 16.7% Sharif et al. (2008) reported mortality due to pesticide poisoning has been found to be 14-15% in Bangladesh. Anwar et al. (2004) reported overall mortality to be 21.7% in pesticide poisoning.¹¹ So, the result is consistent with other study performed in Bangladesh.

During treatment 31% patients required less than 200 amp atropine, 44% required 201-400 amp atropine, 25% required more than 400 amp atropine. Anwar S et al. (2004) showed mean atropine requirement to be 245.22 ampoules. Ibrahim (2005) in Chittagong Medical College showed 24% patients required more than 700 amp, 19% required 201-300 amp, 12% required in between 601-700 amp of atropine. So there is wide variation in requirement of atropine for OPC poisoning. For initial atropinization 22% required <10 amp 67% required 11-20 amp atropine.

Most of the patient (62%) required 10-20 amp PAM. In contrast Ibrahim(2005) showed much lower dose of PAM requirement, Shivakumar et al. (2002) reported patient on high dose of PAM had better survival compared to those on low dose PAM (83.7% vs 53.3%).

Most of the patients (72.2%) died on 1st day. None died after fourth day. 67.1% of recovered patient admitted within 4 hours of poisoning, on the other hand 88.9% of fatal patients admitted after 4 hours of poisoning. So early hospitalization and initial management is very important to reduce case fatality.

The study shows highest fatality with GCS score <7 and lowest with GCS between 13-15, which was 100% and 3.8% respectively. Mortality gradually increased as the GCS decreased from 13 to 7. So using a cut off for GCS ≥ 13 the patients could be divided into low risk group with high survival rate and a moderate risk group between 7-12 and a high risk group with GCS <7. Similar study was done in Sri Lanka by Davies et al. (2008) showed that patients presenting with GCS 14 or 15 had mortality of 2.7% compared to a fatality rate of 50.3% if GCS was ≤ 13 at presentation.

The heart rate and pupil size at presentation had little value in predicting outcome. Systolic BP had some predictive value. Patients with symptomatic BP <80mm Hg had a fatality rate of 88.9%.

Conclusion

Much of the success in the agricultural field in our country is due to the knowledge and use of agricultural insecticides. Their preparations are most popular on one side and on the other side also take many lives every year, though mostly in the rural areas but also to a considerable extent in the urban areas. OPCs are not ideal pesticides because of lack of target vector selectivity and severe toxicity and even death in human and domestic animals. Now a day's OPC poisoning is the leading cause of morbidity and mortality due to poisoning especially in agriculture based developing country like Bangladesh. Community education in rural area where small and large-scale farming is practiced is

very important. Doctors working in the primary care centers must be aware of the dangers posed by OPCs used by farmers. In this study we have seen, it is possible to predict outcome of indoor patient in acute OPC poisoning using a scoring system based on Glasgow coma scale. At the same time we found in this study that reduced systolic blood pressure is a very important prognostic indicator. This simple system based on clinical parameters recorded at admission is likely to be most useful in resource poor locations where the majority of OPC poisoning occurs.

References

1. Davies JOJ, Eddleston M, Buckley NA. Predicting Outcome in Acute Organophosphorus Poisoning with a Poison Severity Score or the Glasgow Coma Scale. *QJM*. 2008 May; 101(5): 371-379.
2. Forget G. Pesticides and the Third World. *J Toxicol Environ Health*. 1991 Jan;32(1):11-31.
3. Ahmad M, Rahman FN, Ashrafuzzaman M, Chowdhury DKP, Ali M. Overview of Organo-phosphorus Compound Poisoning in Bangladesh and Medico-legal Aspect Related to Fatal Cases. *JAFMC Bangladesh*. 2009;5(1):43-44
4. Grmec S, Mally S, Klemen P. Glasgow coma scale score and QTc interval in the prognosis of organophosphate poisoning. *Acad Emerg Med* 2004;11:925-30.
5. Senanayake N, de Silva HJ, Karalliedde L. A scale to assess severity in organophosphorus intoxication: POP scale. *Hum Exp Toxicol* 1993;12:297-9.
6. Faiz MA, Rahman MR, Ahmed T. Management of acute poisoning with organophosphorus insecticide. *J Bang. Coll Phys Surg*. 1994;12:59-62.
7. Ibrahim K. A clinical study of organophosphorus compound in CMCH. [FCPS medicine dissertation] Chittagong

- Medical College Hospital Chittagong, Bangladesh, 2005.
8. Rahman MH and Samad MA. An epidemiological Study on Acute Poisoning in a rural Hospital of Bangladesh. JOPSOM 2000; 19(1), 40-46
 9. Shivakumar S, Mohammed Ishaq R, Raghavan K, Geetha S. Organophosphorus poisoning- a study of 165 cases from Chennai, India. Dr.Shivakumar's Academy, 2002. www.drshivakumar.org
 10. Sharif MZA, Uddin MOF, Chakrabarti H, Faiz MA. Poisoning in hill tracks of Bangladesh. Health Bulletin 2001. DGHS, Peoples Republic of Bangladesh, 2008. www.dghs.gov.bd
 11. Anwar S, Islam AHM, Alam MS, Quddus MR, Arif SM, Faiz MA. A clinico-epidemiological study on pesticide poisoning. MCH. Jan 2004.