FACTORS PREDICTING OUTCOME OF PATIENTS WITH ORGANOPHOSPHORUS POISONING

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INTRODUCTION

- Poisoning with organophosphorus compounds (OP) is a global problem.

- World Health Organization estimates that one million serious unintentional poisonings occur every year and an additional two million people are hospitalized for suicide attempts with pesticides (Gunnell et al. 2007).

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- **In Bangladesh, at Dhaka Medical College Hospital, the central tertiary care hospital, in its year registry in 2010, revealed that a total 12643 patients were admitted, among them 3215(25.5%) were diagnosed as poisoning case and out of them 670 (5.3%) gave definite history of OPC poisoning or circumstantial evidence of OPC poisoning was undoubtful.**

- **Joynal et al. (2012) at Chittagong medical college enrolled 156 confirmed cases of OPC over 4 months period and Haque et al.(2012) enrolled 100 cases of OPC and 68 cases of carbamate at Dinajpur Medical College Hospital over 6 months period.**

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- The factors that predict the outcome of OPC poisoning includes dose of the drug, chemical property, pharmacokinetic and pharmacodynamic property of the drug and most importantly management points following poisoning.

- The identity of the OP substance is an important factor predicting poor outcome.

- Highly lipid soluble poisons such as fenthion can cause delayed effects and half of all patients that die from this type of poisoning only have mild symptoms at presentation.

- Patients poisoned with such organophosphate therefore need close monitoring even if they are asymptomatic at presentation. (Davies et al. 2008).

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- Organophosphorus poisoning has a high in patient mortality.

- A number of factors have been proposed for predicting outcome in OP poisoning. A simple system based on clinical features to be most useful in low income countries to identify patient at high risk of dying soon after presentation.

- The international program on chemical safety poison severity score (IPCS PSS) was developed by international program on chemical safety, the European community and the European Association of Poisons Centers and Clinical Toxicologists that produces a qualitative evaluation of the morbidity. (Davis et al.2008).

HYPOTHESIS

There are multiple factors relating organophosphours compound and their management which can predict outcome.

OBJECTIVES

General Objective:

- To observe the factors associated with outcome of patients with organophosphorus compound poisoning.

Specific Objectives:

- To observe the socio demographic characteristics and clinical profile of organophosphorus compound poisoning patients.
- To observe the treatment schedule in hospital including supportive treatment and antidotes administered.
- To observe the morbidity and mortality rate in OPC poisoning.
- To observe any complications of patient under treatment and after discharge from hospital.

MATERIALS AND METHOD

Study design:

• This was a cross-sectional observational study

Place of study:

• This study was carried out in the Department of Medicine, Dhaka Medical College Hospital (DMCH).

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Sampling method:

- Purposive sampling.

Study population:

- This study was carried out on 80 patients admitted in DMCH with history and clinical evidence of OP poisoning within the study period.

Period of study:

- September, 2012 to June, 2013.

SELECTION CRITERIA

Inclusion criteria

- Patient admitted with features of acute cholinergic crisis due to history of taking organophosphorus compound.

- Age of patient will be 13 years or above.

- Willing to give informed consent by patient's guardian.

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Exclusion criteria

- Patient with ingestion of organophosphorus compound with co-morbid condition like bronchial asthma, heart disease, renal disease.

- Ingestion of organophosphorus compound with pregnancy.

- Unwilling to give informed consent by patient's guardian.

STUDY PROCEDURE

- **The patients admitted into Dhaka Medical College Hospital with history of OP pesticide ingestion as indicated by the patients or relatives, the transferring doctor or the pesticide bottle, initially evaluated and resuscitated.**

- **After admission, assessment and management was started by attending doctor of the respective unit.**

- **Then the patient was evaluated by principal investigator.**

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- It was sometime obvious from the history on admission that the patients take OP pesticide but the identity of the particular OPC sometimes only confirmed later by sample.

- Data regarding personal, demographic profile, background of self poisoning, pattern of drug used with its procurement and mode of availability was recorded in a structured case record form at the time of admission or later.

- Clinical severity was recorded according to GCS (Glasgow coma scale) and IPCS poison severity score (IPCS PSS) developed by international program on chemical safety, the European community and the European association of poisons centers and Clinical Toxicologists to create a scoring system that produces a qualitative evaluation of the morbidity.

Criteria used to calculate the IPCS poison severity score (IPCS PSS)

	Grade 1	Grade 2	Grade 3
Respiratory			
Intubated	No	-	yes
Neurological			
GCS	14-15	9-13	3-8
Seizure	No	-	Yes
CVS			
Bradycardia (Pulse)	>50	41-50	<40
Tachycardia (Pulse)	<140	141-180	>180
Hypotension (Systolic BP)	>100	81-100	<80

The highest grade scored in any category dictated the overall grade.
Source: Davies, Eddleston and Buckley (2008)

Table I: Age distribution of the study patients (n=80)

Age (in years)	Number of patients	Percentage
≤20	29	36.3
21-30	34	42.5
31-40	10	12.5
41-50	3	3.8
>50	4	5.0
Mean±SD	26.5±10.6	
Range (min-max)	(13-65)	

Regarding age distribution of the study patients, majority belonged to 21-30 years. Mean age was found 26.5±10.6 years.

# Table II: Socio-economic condition of the study patients (n=80)

Socio-economic condition	Number of patients	Percentage
Low income	51	63.8
Lower middle	16	20.0
Upper middle	12	15.0
High income	1	1.2

Ref. The state of the world's children, UNICEF 2012.

Table III: Distribution of the study patients according to causal factors (n=80)

| Causal factors	Number of patients	Percentage
Familial dysharmony	32	40.0
Disappointment in love	29	36.3
Extramarital relation	7	8.8
Failure to pass examination	3	3.8
Features of chronic ill health	3	3.8
Others	5	6.3
Poverty	1	1.3
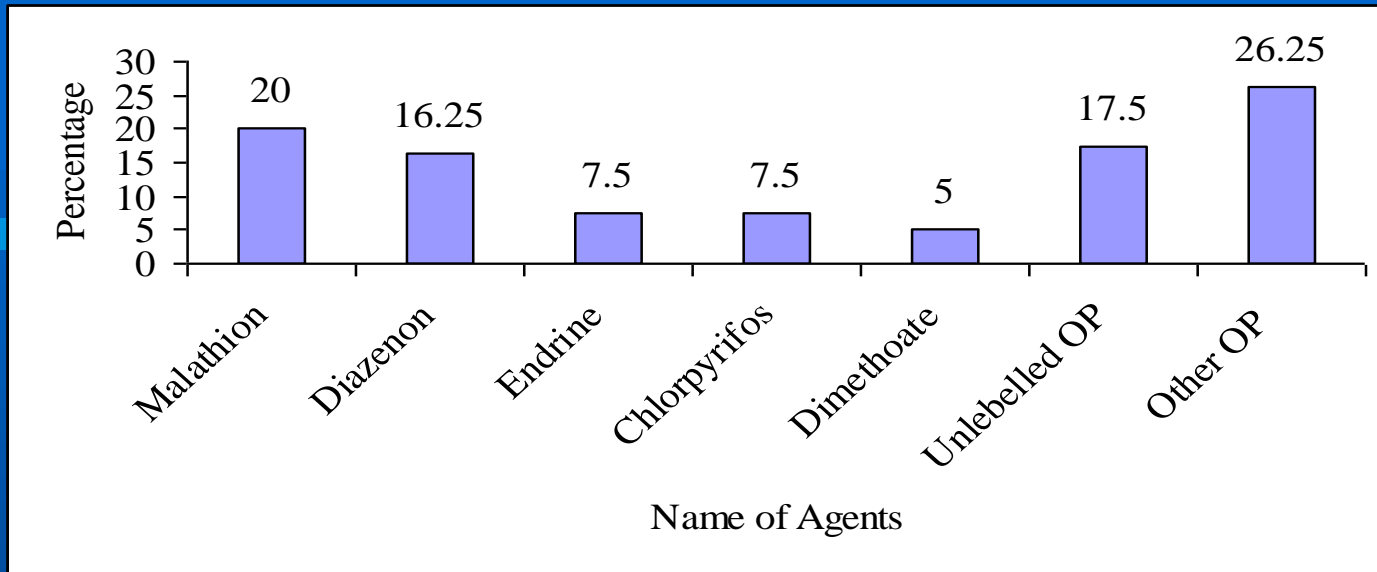
**Figure 1: Bar diagram showing the distribution of study patients regarding agents (n=80).**

GCS and IPCS PSS was observed to evaluate factors to predict outcome in this study. This two scales were observed under unlebelled OP poisoning as well.

Table IV: Comparison of best cut off values for GCS, blood pressure and pulse (n=14)

Unlebelled OP	AUC (95% CI)	Sensitivity (95% CI)	Specificity (95% CI)
GCS cut off <13	0.407 (0.235- 0.580)	0.571 (0.463 - 0.679)	0.242 (0.148-0.336)
Systolic BP Cut off <100	0.318 (0.181-0.455)	0.50 (0.390 - 0.610)	0.318 (0.216-0.420)
Pulse cut off <60	0.407 (0.234- 0.580)	0.50 (0.390 - 0.610)	0.258 (0.162-0.354)
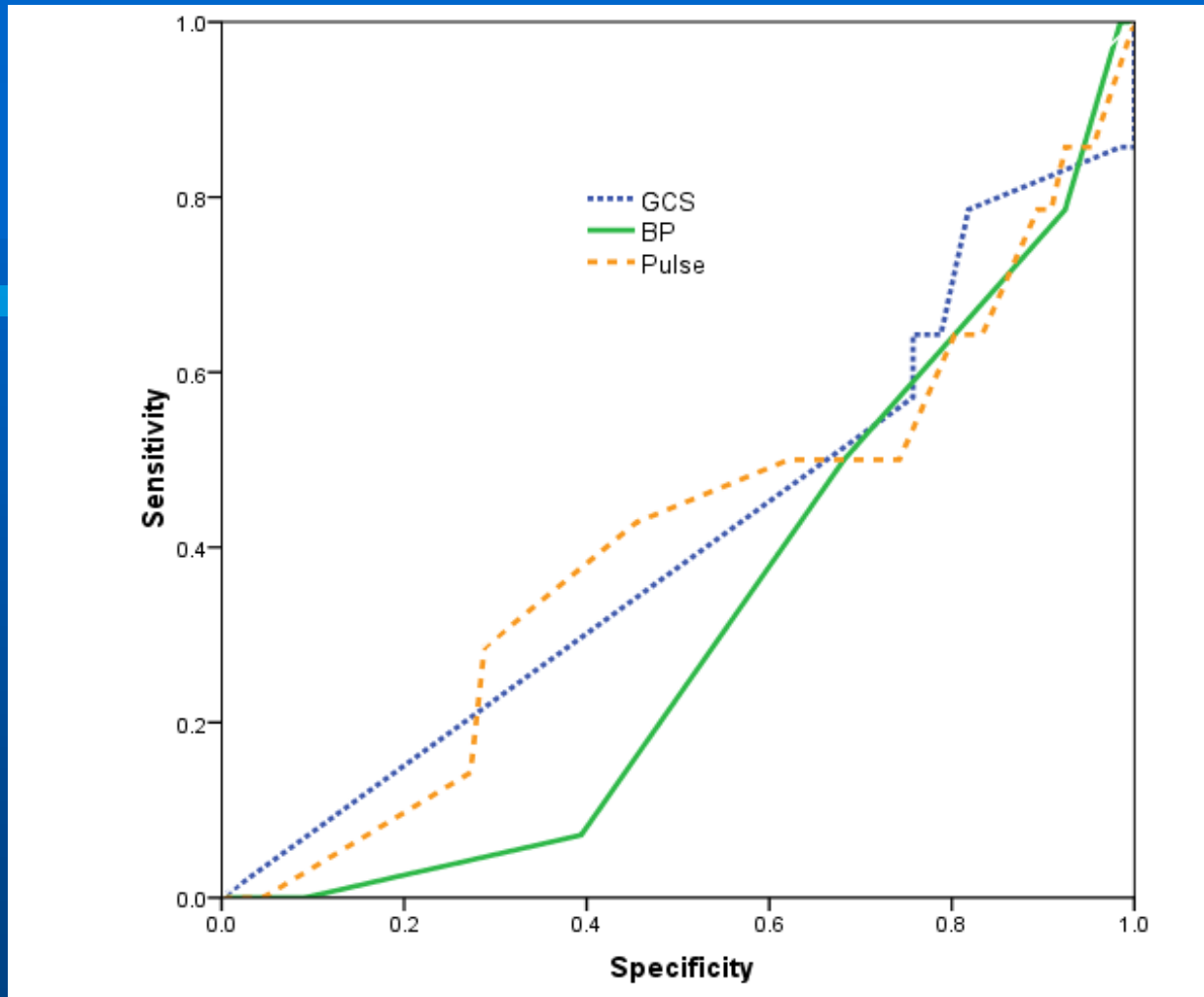
Figure 2: Receiver operating characteristic (ROC) plot for unlebelled Op comparing the predictive value of GCS, blood pressure and pulse.
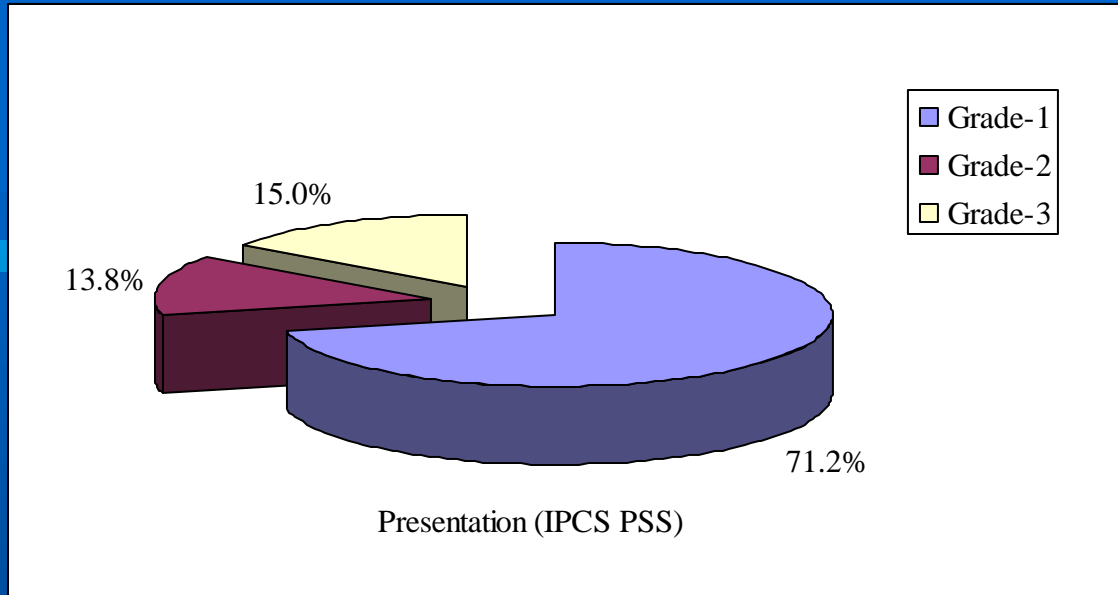
Figure 3: Pie chart showing distribution of the study patients according to presentation (IPCS PSS) (n=80)

Table V: ROC plot of the IPCS PSS variable ability to predict death for unlebelled OP (n=14)

Unlebelled OP	AUC (95% CI)	Sensitivity (95% CI)	Specificity (95% CI)
IPCS PSS cut Grade 2 or 3	0.584(0.414-0.754)	0.429(0.17 - 0.886)	0.742(0.513 -0.971)

The IPCS PSS cut Grade 2 or 3 was a predictor of outcome for unlebelled OP as the IPCS PSS itself and level of consciousness made area under curve (AUC) of 0.584 (95% confidence interval (CI): 0.414 to 0.754).

The IPCS PSS cut Grade 2 or 3 was the predictor death for unlebelled OP with a sensitivity of 0.429 with 95% confidence interval (CI): 0.17 to 0.886 and with a specificity 0.742 with 95% CI: 0.513 to 0.971.
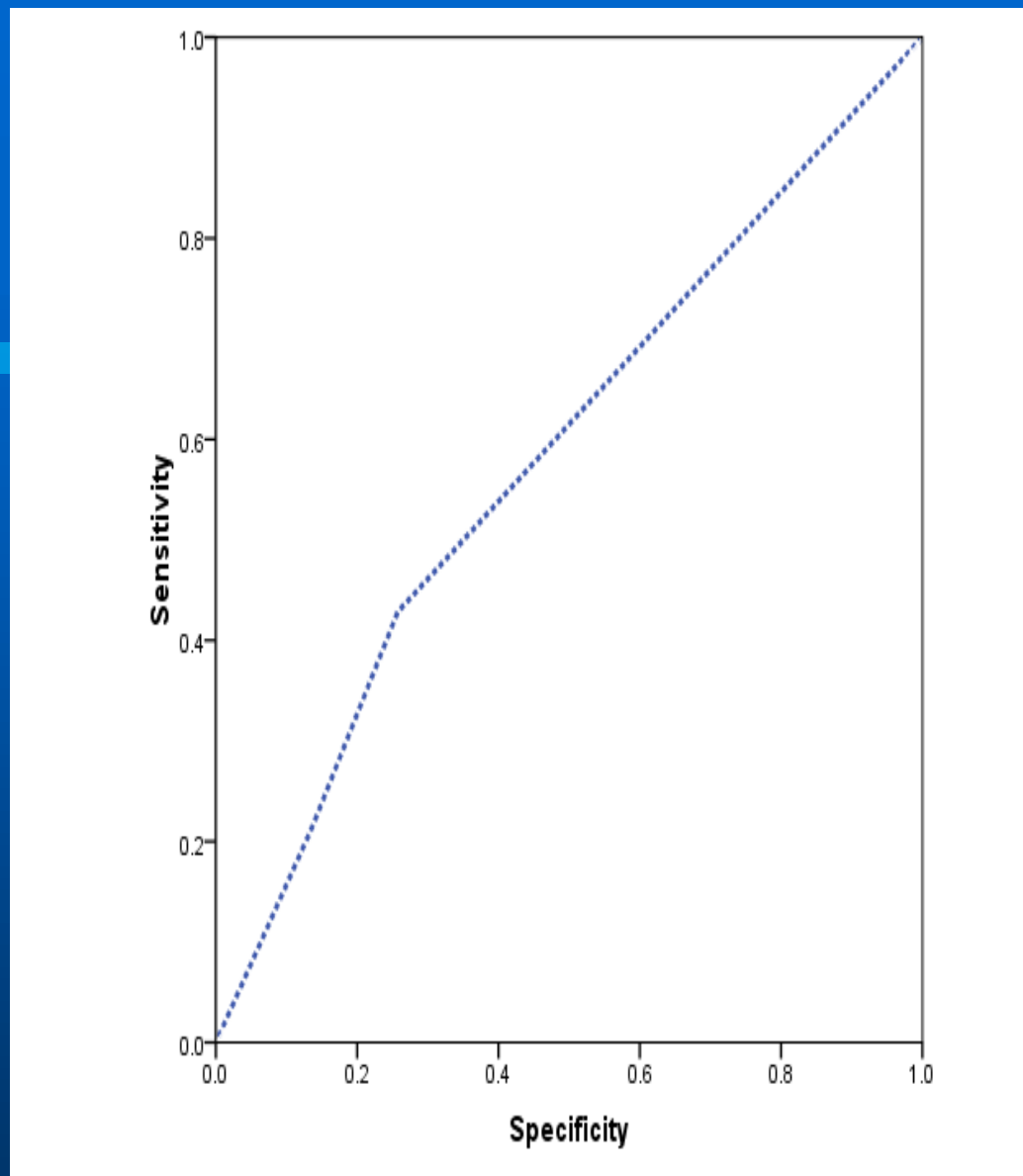
Figure 4: ROC plot of the IPCS PSS variable ability to predict death for unlebelled OP.

Table VI: Distribution of the study patients by outcome of different grades (n=80)

Outcome of different grades (IPCS PSS)	Cure (n=78)		Death (n=2)	
	n	%	n	%
Grade 1	57	71.3	0	0
Grade 2	11	13.8	0	0
Grade 3	10	12.5	2	2.5

Table XII showing outcome of different grades, it was observed that in grade 1 (IPCS PSS) 57(71.3%) cured and there was no death, Grade 2 (IPCS PSS) 11(13.8%) cured and there was no death. Grade 3 (IPCS PSS) 10(12.5%) cured and 2(2.5%) was found death.

Table VII Distribution of the study patients by outcome (n=80)

Outcome	Number of patients	Percentage
Survival	78	97.5
Death	2	2.5

Table XIV showing outcome of patients, it was observed that 78(97.5%) patients survived and 2(2.5%) was died.

SUMMARY

- This observational study was carried out to identify the factors predicting outcome of OP poisoning and following observation were seen.

- Majority (42.5%) age of the patients with organophosphorus compound were in 3rd decade and male to female ratio was 1.4:1

- . Nearly two third (63.8%) of the patients came from poor family and more than a half (53.7%) of the patients came from urban area.

- Familial disharmony and disappointment in love were more frequent which were 40.0% and 36.3% respectively.

- More than a half (53.7%) of the patients had prior admission before admission to DMCH and 2.5% were expired.

- Malathion was found 20.0%, diazenon 16.25%, endrine 7.5%, chlorpyrifos 7.5%, dimethoate 5.0%, unlebelled OP 17.5% and other OP was 26.25%.

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- Grade 1 presentation (IPCS PSS) was more frequent, which was 71.2%, followed by grade 3 (IPCS PSS) 15.0% and grade 2 presentation (IPCS PSS) 13.8%.

- The IPCS PSS cut Grade 2 or 3 was a predictor of outcome as the IPCS PSS itself and area under curve (AUC) of 0.936 with sensitivity of 1.0 and specificity 0.872.

- In grade 1 (IPCS PSS) 71.3% cured and there was no death, in Grade 2 (IPCS PSS) 13.8% cured and there was no death.

- Grade 3 (IPCS PSS) 12.5% cured and 2.5% was found death.

CONCLUSIONS

- This study was undertaken to determine the factors associated with outcome of patients with organophosphorus compound poisoning.
- The IPCS PSS and GCS were found good predictor for mortality.
- Patients who present with a GCS ≤ 13 and IPCS PSS grade 2 and 3 need to be treated accordingly and monitored very closely.
- It is crucial that the identity of the OP be taken into account because unlabelled OP poisoning may have serious ingredients within it and found to have lethal in this study.
- Patients poisoned with unlabelled OP need close monitoring even if they are asymptomatic at presentation.

RECOMMENDATIONS

- Clinical parameters set up by GCS and IPCS-PSS can identify the OP poisoning severity.

- The clinical indices including IPCS-PSS, GCS can predict mortality rate and highly recommended in routine practice to decide the intensity of therapy and can be effectively employed at the time of presentation of patients with organophosphorus poisoning.