PREDICTING OUTCOME IN ACUTE ORGANOPHOSPHORUS POISONING WITH INTERNATIONAL PROGRAM ON CHEMICAL SAFETY POISON SEVERITY SCORE (IPCS PSS) GRADING IN DHAKA MEDICAL COLLEGE HOSPITAL

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Summary

Organophosphorus pesticide poisoning kills around two million people each year, principally due to self poisoning in the Asia-Pacific region. This is a cross-sectional study which was conducted to assess whether patients at high risk of death in acute organophosphorus poisoning could be identified accurately using International Program on Chemical Safety Poison Severity Score (IPCS PSS) and recording clinical parameters soon after admission in Department of Medicine Dhaka Medical College Hospital (DMCH) for a period of six months after approval of the protocol. The study was carried out from March 2013 to August 2013 in the Department of Medicine, DMCH. Eighty patients with detailed information's were obtained according to predesigned protocol. Complete history was taken either from patient or accompanying attendants. Thorough clinical examination was done. Relevant investigations report was collected. All the information's were recorded and collected data were classified, edited, coded and entered into the computer for statistical analysis by using Statistical Package for Social Sciences (SPSS) version - 17. Among the 80 cases, IPCS PSS grade I presentation was more frequent which was 71.2%, followed by grade III 15.0% and grade II presentation (IPCS PSS) 13.8%. The IPCS PSS cut grade II

or III 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 I, 71.3% were cured and there was no death, in grade II, 13.8% were cured and there was no death. In Grade III, 12.5% were cured and 2.5% were found death. The present study indicated that the International Program on Chemical Safety Poison Severity Score (IPCS PSS) grading was good predictor of outcome in acute organophosphorus poisoning. Patients who presents with IPCS PSS grade II and III need to be treated accordingly and monitored closely.

Key words : Organophosphorus poisoning; IPCS PSS; Presticide; OPC.

Introduction

Poisoning with Organophosphorus (OP) compounds 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 [1]. This predominantly occurs in rural communities and is often an impulsive act comparable to self poisoning with medication in the west. OP poisoning is also of great interest to developed countries vulnerable to terrorist or military attack with nerve agents [2]. The principal pharmacological action of all OPs is the inhibition of acetylcholinesterase and most patients die from cardio-respiratory failure [3]. However, there is much variation in the timing of onset and clinical features depending of the particular OP involved.

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 Organophosphorus Compounds (OPC) poisoning or circumstantial evidence of OPC poisoning was undoubtful [4]. In Chittagong Medical College Hospital 156 confirmed cases of OPC was enrolled over 4 months period and also in Dinajpur Medical College

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Hospital 100 cases of OPC and 68 cases of carbamate were enrolled over 6 months period [5,6]. Whereas the incidence of OPC poisoning cases were 37.16% was obtained in Post mortem department of Forensic Medicine, Mymensingh Medical College, Mymensingh [7].

There is a greater need for understanding the clinical characteristics of OP, since majority of physicians depend purely on clinical signs and symptoms as a guide for diagnosis. OP pesticides in responsible for deaths of thousands of people in rural Asia every year, it is essential to establish an effective management strategy for such cases of poisoning [8].

OP poisoning has a high in patient mortality. This study was designed to assess whether it is possible to predict inpatient mortality in OP poisoning using a scoring system based on simple clinical parameters recorded at admission. This might enable clinicians to identify patients at high risk of dying soon after presentation, allowing more intensive monitoring and treatment. A simple system based on clinical features is likely to be most useful in low income countries where the majority of OP poisoning occurs [9-13].

The IPCS Poison Severity Score (PSS) was developed by the 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 caused by different forms of poisoning [14]. It has a several different categories which encompass a large number of clinical features and it is designed to be used flexibly to incorporate the most relevant clinical and laboratory features of the poisoning and data available [14]. This has been evaluated prospectively in one study which found it to be useful in identifying serious and complicated cases of poisoning [15]. Having this background information in mind this study was designed to explore if this score alone could predict mortality in OP pesticide poisoning using data collected prospectively on a patient's admission to DMCH.

Materials & methods
This was an observational study conducted in the Department of Medicine, Dhaka Medical College Hospital (DMCH) during March 2013 to August 2013. All patients presenting in the emergency and admitted in indoor in study hospital with history and clinical evidence of OP poisoning within the study period were the study sample.

Sampling method was purposive sampling and a total of 80 cases were recruited for this study. Patient admitted with features of acute cholinergic crisis due to history of ingestion of organophosphorus compound, age of patient will be 12 years or above of both sexes (Hospital policy for admission in adult Medicine Unit) willing to give informed consent by patient's guardian or Legally Authorized Representative (LAR) and pre-hospital treatment cases with atropine and/or pralidoxime were included and history of Acute insecticides ingestion but could not give history of organophosphorus compound and clinically absence of acute cholinergic crisis, patient with known serious co-morbid conditions like bronchial asthma, heart disease, renal disease, pregnancy, patients with history of more than one insecticides ingestion were excluded.

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. To observe the type of agents the investigator requests & motivated the patient attendants or the LAR's to bring the pesticide bottles or the lebel later on. Clinical severity was recorded according to IPCS poison severity score.

Data collected was analyzed in computer by using the Statistical Package for Social Sciences (SPSS) program version 17 (Inc. Chicago program). Data analysis was done by using descriptive and inferential statistical methods: frequency, percentage, means, Standard Deviation (SD). A two-tailed P-value less than 0.05 was considered to be statistically significant. Presentation of the results are done by tables and graphs as applicable. Prior to the commencement of this study, the research protocol was approved by the Dhaka Medical College ethical committee.
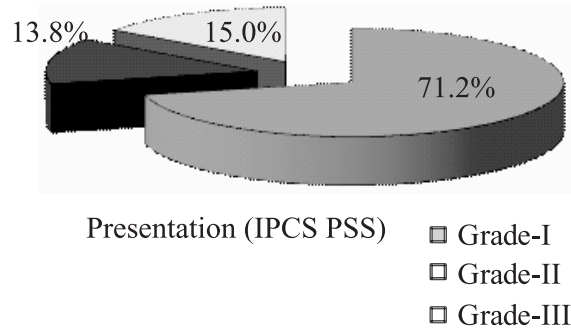
Results

Table I : Duration of hospital stay in different IPCS PSS grade (n=80)

IPCS PSS	Duration of hospital stay (days)		
	Mean ±SD	Min	-Max
Grade I	1.51 ±1.02	(1	-3)
Grade II	5.58 ±0.90	(4	-7)
Grade III	5.64 ±1.12	(4	-7)

P value=0.001; F value=133.6; df=2.77
P value reached from ANOVA test

The mean duration of hospital stay was statistically significant (p<0.05) in different grade of IPCS PSS.

Fig I : Pie chart showing distribution of the study patients according to presentation (IPCS PSS) (n=80)

Table II : 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 II or III	0.584 (0.414- 0.754)	0.429 (0.17 - 0.886)	0.742 (0.513-0.971)

The IPCS PSS cut Grade II or III 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 II or III was the predictor death for unlebelled OP with a sensitivity of 0.429 with 95% CI 0.17 to 0.886 and with a specificity 0.742 with 95% CI: 0.513 to 0.971.

Table III : ROC plot of the IPCS PSS variable ability to predict death (n=80)

	AUC (95% CI)	Sensitivity (95% CI)	Specificity (95% CI)
IPCS PSS cut Grade II or III	0.936 (0.865- 1.007)	1.00 (1.0 – 1.0)	0.872 (0.697-1.047)

The IPCS PSS cut Grade II or III was a predictor of outcome as the IPCS PSS itself and level of consciousness made AUC of 0.936 (95% CI 0.865 to 1.007).

The IPCS PSS cut Grade II or III was the predictor overall with a sensitivity of 1.0 with 95% confidence interval (CI): 1.0 to 1.0 and with a specificity 0.872 with 95% CI: 0.697 to 1.047.

Table IV : 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 I	57	71.3	0	0
Grade II	11	13.8	0	0
Grade III	10	12.5	2	2.5

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

Discussion
This observational cross-sectional study was carried out with an aim to determine whether it is possible to predict outcome in acute organophosphorus poisoning with International Program on Chemical Safety Poison Severity Score (IPCS PSS) grading in DMCH.

It was observed in this study that outcome was insignificant (mortality of 2.5%) which may be due to awareness of patient's attendants regarding early hospitalization and effects of best treatment protocol by antidotes . Nouira et al. and Banerjee et al. showed 10.0% and 5.78% patients expired respectively, which may be due to respiratory failure being the primary cause of death [16,17]. Hasan and Hoque showed 18.0% patient expired [18]. In Bangladesh Faiz and Hasan found case fatality 16.7%, Sharif et al. reported mortality has been found to be 14-15% due to pesticide poisoning [19,20]. The mortality had reversed far from previous study as the treatment protocol of intensive atropine had been introduced through 'National guideline' since 2007. Previously, there was also scarcity to use of pralidoxime with atropine as well.

Among the study patients, only two patients were died. They received unlebelled OP. It was not known which component was present within unlebelled OP. These two patients were admitted in this hospital after four hours of ingestion. Vital parameters of one of them were pulse-36 b/min, B.P-80/60 mm of Hg, GCS-3 and IPCS-PSS Grade-III. Atropinisation was done by infusion of 75 ampoules of atropine and loading dose of pralidoxime was given. Vitals of another patient were pulse- 40b/min, B.P-90/60 mm of Hg, GCS-3

and IPCS-PSS Grade III. Similarly atropinisation was done by infusion of 56 ampoules of atropine and loading dose of pralidoxime was given. Both the patients needed intensive care support but at that time it was not available.

It was observed that IPCS PSS Grade I presentation was more frequent (71.2%), followed by Grade III (15.0%) and Grade II presentation (13.8%) (Fig 3). IPCS PSS cut Grade II or III were a predictor of outcome as the IPCS PSS itself for unlebelled OP and level of consciousness made AUC of 0.584. The IPCS PSS cut Grade II or III was the predictor death for unlebelled OP with sensitivity of 0.429 and specificity 0.742. Davies et al mentioned their study that the IPCS PSS on admission was useful in predicting outcome in patients identified as having taken OPs on admission, with Grade III having a sensitivity of 0.66 and specificity of 0.88 for predicting death and score of Grade II or more having sensitivity and specificity of 0.78 and 0.79 respectively, which is comparable with the current study [21].

Among the ingradients, the mortality was found in only unlebelled OP poisoning. There was no mortality found among dimethoate or fenthion group. But previous studies showed that mortality could be most accurately predicted on admission in patients with dimethoate poisoning and was difficult to predict in fenthion poisoning, with half of all fatal fenthion cases presenting with a Grade I IPCS PSS score.

Conclusion
It was observed that in IPCS PSS Grade I, 71.3% cured and there was no death, Grade II 13.8% cured and there was no death. Grade III 12.5% cured and 2.5% was found death. In Sam et al study majority (52.1%) of the cases, had IPCS PSS of Grade III, indicating severe and life threatening toxicity [22]. In that study extremely severe toxicity leading to mortality was observed in 10 (14.08%) patients, among whom five died within the hospital while others died after discharge in a moribund state. The present study also consistent with this previous observation.

Disclosure
All the authors declared no competing interest.

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