

The Role of APACHE II, SOFA, Serum amylase and Lipase in Assessment of Severity and Outcome of Acute Organophosphorus Poisoning

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Abstract

Poisoning with Organophosphate (OP) compounds is responsible for great morbidities and mortalities all over the world especially in developing countries including Egypt. Scoring systems have been continuously developed to predict outcomes in patients with severe illness, to improve resource allocation and to assist in clinical decision-making particularly for ICU patients. The quest for biomarkers in relation to OP compound poisoning started quite a long time back but cheap and easily measurable biomarkers having prognostic value is the need of the hour. The objective of this study is to evaluate the role of acute physiology and chronic health evaluation II (APACHE II) score, the Sequential Organ Failure Assessment (SOFA) score, serum amylase and lipase in assessing severity and outcome of acute organophosphorus poisoning. A retrospective and prospective study was carried out on 200 patients of acute OP poisoning admitted to the Poison Control Center (PCC), Ain Shams University Hospitals. Information after obtaining the permission of the director of PCC and the regional ethics committee was collected from the sheets and computerized data base of the patients, an informed written consent has been obtained from each patient or from his/her caregiver for inclusion in the prospective part of the study. APACHE II and SOFA scores were calculated to each patient admitted and biochemical analysis of serum amylase and lipase were estimated in the prospective part of the study. The results were revised, coded and organized for statistical analysis. The study results revealed 180 (90%) patients discharged and 20 (10%) patients died. The study showed that there were 76% of patients had APACHE II score ≤ 9 , while 12.5% of patients had APACHE II score from 10 to 14, there were 8.5% of patients had APACHE II score from 15 to 24 and APACHE II score was > 24 in 3% of patients. SOFA score in 88.5% of patients was ≤ 6 , while in 4.5% of patients SOFA score was from 7 to 9 and in 7% of patients SOFA score was > 9 . Hyperamylasemia observed in 83.3% of died and 33.3% of died patients had increased lipase. There was significant difference between discharged and died patients as regards APACHE II score, SOFA Score, serum amylase and lipase. It could be concluded that SOFA score, APACHEII score, serum amylase and lipase had a role in assessment of severity of acute organophosphorus poisoning but only SOFA score, APACHEII score and serum amylase could be used as predictors of outcome. SOFA score is more useful in predicting mortality, and easier and simpler than the APACHEII and serum amylase. From the previous results, our study recommends that predictors of outcome (APACHE II score, SOFA score and serum amylase) should be assessed routinely and as early as possible to evaluate the severity, improve the course of management and deciding the pathway of care.

Keywords

Organophosphate, APACHE II score, SOFA score, ICU

Introduction

Organophosphorus (OP) poisoning is a major medical problem worldwide. The World Health Organization has estimated that more than 300 million case of acute pesticide poisoning occur worldwide each year, and that most of these cases are due to OP intoxication. These OP compounds are likely to have more toxicity in developing countries due to its easy availability and less awareness which results in high morbidity and mortality (Kumar et al., 2010; Kim et al., 2013).

Organophosphorus poisoning remains an important cause of morbidity and mortality, but no definite parameters have been identified as predictors of outcome. Prediction of morbidity at presentation might help in decision making in places of limited resources like rural settings in developing countries (Muley et al., 2014).

Scoring systems have been continuously developed to predict outcome in patients with severe illness, to improve resource allocation and to assist in clinical decision-making particularly for intensive care unit patients. Acute physiology and chronic health evaluation II (APACHE II) system serves as a useful index for evaluating the severity of poisoning due to multiple organ system involvement. Moreover, the Sequential Organ Failure Assessment (SOFA) score has been shown to have a good correlation between predicted and observed patient outcome (Williams and Gannon 2009; Mahrous et al., 2011; Kim et al., 2013).

The quest for biomarkers in relation to OP compound poisoning started quite a long time back. OP labeled albumin in plasma, blood β -glucuronidase and paraxonase status have been suggested by some researchers to be very reliable marker for both diagnosis and prognosis. But all these assays are dependent on specialized laboratories and costly. So cheap and easily measurable biomarkers having prognostic value is the need of the hour (Sen et al., 2014).

OP poisoning is associated with various biochemical abnormalities among which hyperamylasemia is well documented. Serum amylase could be considered as a better predictor of severity followed by lipase (Sumathi et al., 2014).

Aim of the work

The aim of this work is to evaluate the role of APACHE II score, SOFA score, serum amylase and lipase in assessing severity and outcome of acutely organophosphate poisoned patients presented to the PCC of Ain Shams University Hospitals which may help in improving the course of management and deciding the pathway of care.

Patients and methods

This is a retrospective and prospective study of 200 acutely intoxicated patients admitted to PCC of Ain Shams University Hospitals (100 patients in the

retrospective part and 100 patients in the prospective part of the study). An approval from the ethical committee was taken. In the retrospective part of the study information was collected from the sheets of the patients and an informed written consent has been obtained from each patient or from his/her caregiver for inclusion in the prospective part of the study.

Patient Selection Criteria:

The selected patients were of both sexes with acute OP exposure. The diagnosis of OP poisoning was based on the following criteria as guided by Lee, (2001):

- History of exposure to OP compounds.
- Characteristic toxidrome of OP toxicity
- Improvement of Muscarinic symptoms and signs after atropine administration.
- Low serum pseudo-cholinesterase activity.

Exclusion Criteria:

- Patients with history of severe cardiac, pulmonary, renal impairment or nephritic syndrome.
- Patients with any of the following which reduce pseudocholinesterase activity (Parenchymal liver disease, acute infection, metastatic carcinoma, malnutrition, iron deficiency anemia, dermatomyositis, early pregnancy and Patients taking toxicants (cocaine, carbon disulfide, benzalkonium salts, organic mercury compounds, ciguatoxins, and solanines) or drugs (birth control pills and metoclopramide).

The following data was collected from the sheet of each patient:

1. Sociodemographic data including age and sex of the patients.
2. APACHE II and SOFA scores were calculated to each patient admitted

The APACHE II score was calculated in accordance with the standard methodology, clinical and biological data obtained during the first 24 hours of ICU stay as well as the age and chronic health status of the patients. If a variable was measured more than once during that time, the worse value was used. In APACHE II, there are 12 physiological variables. The effects of age and chronic health status are incorporated directly into the model, weighted according to their relative impact, to give a single score. The APACHE II score ranges from 0 to 71 points (Vincent and Moreno, 2010). The SOFA score was calculated in accordance with the standard methodology, during stay of each patient In SOFA score, six organ systems are weighted to give the final score

and ranges from 0 to 24 (Williams and Gannon, 2009).

- Biochemical analysis of serum amylase and lipase were estimated.

Serum amylase levels between 0 and 95 u/l and serum lipase levels between 0 and 60u/l (Ahmed et al., 2009). Serum lipase level was measured to exclude acute pancreatitis due to OP poisoning and to know whether increased serum amylase was of pancreatic or salivary origin. Serum α -amylase has been measured on admission. Serum α -amylase was measured by a kinetic method using Spectrum GALG2-CNP kit. Serum lipase has been measured on admission and was measured by a colorimetric test, kinetic method using Spectrum DGMRE kit.

- Outcome of the patients:
The patients were classified according to the outcome into discharged and died patients
- Complications:
All patients were observed during the study to the complications developed during admission in the hospital.

Statistical Analysis

The obtained results were revised, coded and organized for statistical analysis using SPSS (Statistical Package for Social Science) version 20 software. Mean, standard deviation (\pm SD) was done for numerical data. Frequency and percentage were obtained for non-numerical data. Comparison between outcome groups was tested by using Chi-square test for qualitative data, and by using Independent t-test for quantitative data. Correlation analysis (using Pearson's method) was used to assess the strength of association between two quantitative variables. Linear regression analysis was used to identify significant predictors of outcomes. P-value less than 0.05 was considered statistically significant. Receiver operating characteristic curve (ROC) was used to assess predictors of outcome with its cut off points, sensitivity, specificity, positive Predictive Value and negative Predictive Value. According to Peat and Barton (2005), ROC curve determines sensitivity, specificity, and also can determine the significance of a test in predicting certain disease using the Area under the Curve (AUC) and its significance.

Results

A retrospective and prospective study was carried out on 200 patients of acute OP poisoning admitted to the Poison Control Center (PCC), Ain Shams University Hospitals. In the current study, the mean age was 23.4 and ranged from 1 month to 63 years. There were 44.5% of patients in the age group between 18 to < 40 years and 37% of patients were in the age group < 18 years old, 53% of patients were females and 47% were

males (table, 1). The outcome of the patients as shown in (table, 2) was as the following: 180 patients were discharged representing about (90%) and 20 patients were died representing about (10%).

As regard complications developed, table (3, 4) showed that 24% of the patients in the present study developed complications. These complications categorized as 16.5% of patients developed respiratory failure, 12% were comatose, and 4% of patients developed pneumonia. As regard APACHE II score and SOFA score, table (5, 6) showed that the mean APACHE II score of patients was 6.37. The APACHE II score ranged between 0 and 38. There were 76% of patients had APACHE II score \leq 9, while 12.5% of patients had APACHE II score from 10 to 14, there were 8.5% of patients had APACHE II score from 15 to 24 and APACHE II score was > 24 in 3% of patients. The mean SOFA score of patients was 2.34. The SOFA score ranged between 0 and 15. SOFA score in 88.5% of patients was \leq 6, while in 4.5% of patients SOFA score was from 7 to 9 and in 7% of patients SOFA score was > 9. There was significant difference between discharged and died patients as regards APACHE II and SOFA Scores where patients who died had high APACHE II and SOFA Scores than discharged patients. As regard serum amylase and lipase, table (7) showed that there was significant difference between discharged and died patients as regards serum amylase and lipase, where hyperamylasemia observed in 83.3% of died. 33.3% of died patients had increased lipase. As shown in table (8) there was significant positive correlation between APACHE II score, SOFA score and serum amylase with the hospital stay duration, total atropine and toxogonin doses received. There was significant positive correlation between lipase and hospital stay duration and total toxogonin dose, but no correlation with total atropine dose. Table (9) showed that significant increase of APACHE II, SOFA scores and also increased level of amylase and lipase in patients who developed complications than those who didn't develop the complications. APACHE II, SOFA scores and serum amylase could be used as predictors of outcome of acute organophosphorus poisoning, while lipase couldn't be used in outcome prediction, table (10). ROC curve analysis to assess the predictor of outcome of OP poisoning (Table 11) showed that the area under the curve for APACHE II score was 0.986, SOFA score was 0.995 and compared to serum amylase was 0.852. Also, it was found that APACHE II score at cut off value > 10 had corresponding sensitivity 100% and specificity 90.56%, SOFA score at cut off > 5 had sensitivity 100% and specificity 90.56% and serum amylase at cut off > 95 had sensitivity 83.3% and specificity 87.5%. The accuracy rate of SOFA score (99.5%) was higher than that of APACHE II score (98.6%) and serum amylase (85.2%).

Tale (1): Number and percentage of the studied patients as regard age and sex

		Number	Percentage %
Age in years	< 18	74	37%
	[18, 40[89	44.5%
	[40, 60]	33	16.5%
	> 60	4	2%
	Mean \pm SD	23.40 \pm 9.97	
	Range	0.08 – 63	
Sex	Male	94	47%
	Female	106	53%

SD: Standard deviation

Table (2): Number and percentage of the outcome of the studied patients.

Outcome	Frequency	Percentage
Discharged	180	90%
Died	20	10%
Total	200	100%

Table (3): Number and percentage of the patients that developed complications during the study.

Complications	N	%
Non complicated	152	76%
Complicated	48	24%

Table (4): Number and percentage of different complications developed during the study.

Type of complication	N	%
Respiratory failure	33	16.5%
Coma	24	12%
Pneumonia	8	4%
Arrhythmias	5	2.5%
Shock	5	2.5%
Intermediate syndrome	5	2.5%
Pancreatitis	5	2.5%
Pulmonary edema	4	2%
Convulsion	2	1%
Relapse	2	1%
Renal failure	2	1%

Table (5): APACHE II and SOFA scores of the studied patient.

(Total No= 200)		Number	Percentage %
APACHE II score	≤ 9	152	76%
	10-14	25	12.5%
	15-24	17	8.5%
	> 24	6	3%
	Mean \pm SD	6.37 \pm 2.26	
	Range	0 – 38	
SOFA score	≤ 6	177	88.5%
	7-9	9	4.5%
	>9	14	7%
	Mean \pm SD	2.34 \pm 0.36	
	Range	0 – 15	

Table (6): Independent t- test statistical analysis of APACHE II and SOFA scores in relation to outcome.

	Total number =200	Discharged N= 180	Died N= 20	Independent t-test	
				t	P-value
APACHE II score	≤ 9	152(84.5%)	0(0%)	-15.452	<0.001
	10-14	22(12.2%)	3(15%)		
	15-24	6(3.3%)	11(55%)		
	> 24	0(0%)	6(30%)		
	Mean ± SD	4.58± 1.52	22.45± 7.61		
	Range	0 – 24	11 – 38		
SOFA score	≤ 6	176(97.8)	1(5%)	-21.391	<0.001
	7-9	3(1.6%)	6(30%)		
	>9	1(0.6%)	13(65%)		
	Mean ± SD	1.41±0.57	10.75±2.46		
	Range	0 – 10	6 – 15		

Table (7): Independent t- test statistical analysis of serum amylase and lipase in relation to outcome.

Laboratory parameters		Discharged N=88	Died N= 12	Independent t-test	
				t	p-value
Amylase (0 -95 u/l)	≤95 u/l	74(84.1%)	2(16.7%)	-6.252	<0.001
	>95u/l	14(15.9%)	10(83.3%)		
	Mean± SD	78.02 ± 26.39	440.66 ±193.03		
	Range	3 – 617	40 - 1357		
Lipase (0- 60 u/l)	≤60u/l	87(98.9%)	8(66.7%)	-5.281	<0.001
	>60u/l	1(1.1%)	4(33.3%)		
	Mean± SD	29.92 ±12.006	69.66±27.47		
	Range	0 – 93	21 -185		

Table (8): Pearson correlation among hospital admission duration, total atropine dose and total toxogonin dose in relation to APACHE II score, SOFA score, serum amylase and lipase in the present study.

Variable	H.A duration		Total atropine dose (mg)		Total toxogonin dose (gm)	
	r	p-value	r	p-value	r	p-value
APACHE II	0.566	<0.001	0.443	<0.001	0.467	<0.001
SOFA	0.702	<0.001	0.452	<0.001	0.454	<0.001
Amylase	0.238	0.017	0.472	<0.001	0.276	0.047
Lipase	0.332	0.001	0.094	0.355	0.441	0.001

r: correlation coefficient

H.A duration: Hospital admission duration

Table (9): Independent t-test statistical analysis of APACHE II score, SOFA score, serum amylase and lipase among complicated and non complicated patients in the present study.

Variable		Non complicated N = 152	Complicated N = 48	Independent t-test	
				t	p-value
APACHE II	Mean± SD	3.349 ± 1.284	15.938 ±5.122	-15.558	<0.001
SOFA	Mean± SD	0.961 ±0.184	6.729 ±2.186	-15.237	<0.001
Amylase	Mean± SD	57.903 ± 22.704	285.179±120.197	-5.162	<0.001
Lipase	Mean± SD	27.264 ±12.768	53.786±21.114	-4.768	<0.001

t= independent t test , SD: standard deviation

Table (10): Linear regression analysis of APACHEII score, SOFA score, serum amylase and lipase to detect predictors of outcome.

Model	Unstandardized Coefficients		Standardized Coefficients	T	P- value
	B	Std. Error	Beta		
APACHE II	-0.019	0.004	-0.461	-4.448	<0.001
SOFA	0.101	0.007	1.192	13.829	<0.001
Amylase	0.000	0.000	0.175	3.344	0.001
Lipase	0.001	0.001	0.072	1.518	0.132

P is considered statistically significant if ≤ 0.05 .

Table (11): Sensitivity, specificity and accuracy rate of predictors of outcome in the current study.

Variable	Cut off point	AUC	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Accuracy rate
APACHE II score	>10	0.986	100	90.56	54.1	100	98.6%
SOFA score	>5	0.995	100	90.56	71.4	100	99.5%
Amylase	>95	0.852	83.33	87.50	47.6	97.5	85.2%

AUC: Area under Curve (Receiver Operating Curve), *PPV*: Positive Predictive Value, *NPV*: Negative Predictive Value

Discussion

Organophosphates are one of the most common causes of poisoning, especially in developing countries, with high morbidity and mortality. This study aimed at to evaluate the role of APACHE II score, SOFA score, serum amylase and lipase in assessing the severity and outcome of acute organophosphorus poisoning presented to the PCC of Ain Shams University Hospitals which may help in improving the course of management and deciding the pathway of care. In this study 180 patients (90%) improved and were discharged and 20 patients (10%) died during treatment in the PCC. This was in agreement with results reported by *Bilal et al. (2014)* where the recovery in their results was observed in 90% of cases and death was observed in 10% cases. This ratio was close to this obtained by *Godhwani et al. (2004)* where it was 12%. *Yamashita et al. (1997)* reported a higher rate of 25%, while *Dharmani and Jaga, (2005)* reported fatality in hospital-based surveys of OP poisoning as high as 46%.

In the present study the mean age for the patients was 23.4 years and most of patients were belonging to teenager and middle age group (18 – 40 years) represent 44.5% of the patients in the study. This finding was in accordance with *Ahmed et al. (2014)* and *Banday et al. (2015)* in which the incidence was highest in patients aged less than 40 years. There were only 2% of all patients included in the study above age of 60 years and this was in agreement with *Chintale et al. (2016)*. This could be explained by the vulnerability to various

emotional conflicts that can happen during this phase (teenager and middle age groups) of life in which the people are most ambitious and productive (*Banday et al., 2015*).

In the present study females were affected more than males. 53% of patients were females and 47% were males with a female to male ratio 1.1: 1. This was in agreement with *Chaturvedi et al. (2014)* and *Gündüz et al. (2015)* study in which also females were affected more than males. *Banerjee et al. (2012)* postulated in their study that male to female ratio was 1:1.38. On contrary to many other studies males were more affected than females (*Muley et al., 2014; Sumathi et al., 2014; Ghaniger et al., 2016*). Causes of female predominance in the current study may be attributed to emotional liability of female to life stress and strains in our society than male also due to easy availability of OP compounds in the home as a household product (*Z'gambo et al., 2016*).

In the current study 24% of patients developed complications. The most frequent type of complication was respiratory failure in 16.5% followed by coma in 12%. *Bilal et al. (2014)* agreed with these results, Also *Chintale et al. (2016)* reported that respiratory failure was the most common complication.

In the current study the mean APACHE II score of the studied patients was 6.37, APACHE II score in discharged, died, noncomplicated and complicated patients was 4.58 ± 1.52 , 22.45 ± 7.61 , 3.35 ± 1.28 and 15.94 ± 5.12 respectively

($P < 0.001$). The mean SOFA score of the studied patients was 2.34, SOFA score in discharged, died, noncomplicated and complicated patients was 1.41 ± 0.57 , 10.75 ± 2.46 , 0.961 ± 0.18 and 6.729 ± 2.19 respectively ($P < 0.001$). There was statistically significant association between high APACHE II score and high SOFA score and severity of OP poisoning. This was in agreement with *Singh et al. (2011)* and *Kim et al. (2013)* studies in which APACHE II score and SOFA score were high in nonsurvivors than survivors. Also, *Jabalameh et al. (2006)* reported that APACHE II Score was highest in died patients and correlated with OP poisoning complications. These results also go with those of *Kang et al. (2009)* who reported that The APACHE II score was high in patients who died from acute organophosphate poisoning and those who had complications especially respiratory failure. Also, this was similar to results of *Vosylius et al. (2005)* who reported that the non-survivors had higher SOFA score than the survivors and the emergence of more severe organ dysfunction was strongly associated with mortality. *Sam et al. (2009)* said that APACHE II score is a simplified physiological score assessing the severity of OP poisoning.

In the current study serum amylase in discharged, died, noncomplicated and complicated patients was 78.02 ± 26.39 , 440.66 ± 193.03 , 57.9 ± 22.7 and 285.18 ± 120.2 respectively ($P < 0.001$). Lipase in discharged, died, noncomplicated and complicated patients was 29.92 ± 12.0 , 69.66 ± 27.47 , 27.26 ± 12.77 and 53.79 ± 21.11 respectively ($P < 0.001$). OP poisoning is associated with many biochemical abnormalities. Among which hyperamylasemia often noted in cases of OP poisoning, may be due to the fact that acute pancreatitis is caused by excessive cholinergic stimulation of pancreas by OP compounds (*Sumathi et al., 2014*). Hyperamylasemia was reported in this study more in died and complicated than discharged and noncomplicated patients. Thus this increase in serum amylase level was coinciding with severity, the same result was reported by *Alawadi (2000)*. These results go with *Sumathi et al. (2014)* who reported significant association with severity of OP poisoning with respect to amylase and lipase. Serum amylase and lipase can be used as a marker for recognition of severity in OP poisoning (*Adhil and Sudharsan, 2015*). Serum amylase levels may be considered as a marker of Organophosphorous intoxication, since it enables the early recognition of severity and to identify those at risk of developing the complications of Organophosphorous poisoning (*Salame and Wani, 2017*). Among one hundred patients in the present study, hyperamylasemia was found in twenty four patients (24%) while hyperlipasemia was seen in 5

patients (5%). This was in agreement with *Chaturvedi et al. (2014)* where hyperamylasemia was more frequently seen in organophosphate poisoning. *Sahin et al. (2002)* concluded that acute pancreatitis was not a rare complication of organophosphorus poisoning. Acute pancreatitis is frequent in OP poisoning and increased serum amylase is less specific and sensitive. Hence, serum lipase measurement may be useful in patients with increased amylase levels for early diagnosis of pancreatitis (*Lee et al., 1998; Sumathi et al., 2014*). As patients with hyperamylasemia had normal serum lipase, thus hyperamylasemia was contributed to be of salivary origin and not of pancreatic origin, this finding agreed with (*Clark, 2002*). A previous report by *Lee et al. (1998)* explained that hyperamylasemia in OP poisoned patients may be due to excessive muscarinic stimulation, severe acidosis, or shock with subsequent hypersecretion of salivary glands.

In the current study there was positive correlation between APACHE II score, SOFA score, serum amylase and duration of hospital admission, total dose of atropine and toxogonin needed. While there was positive correlation between lipase and hospital stay duration and total toxogonin dose received by the patients, but no correlation with total atropine dose. This was in agreement with *Coskan et al. (2015)*, *Hiremath et al. (2016)* and *Dong et al. (2017)* where it was observed that patients with high APACHE II score and SOFA score needed longer duration of hospital stay and higher atropine and pralidoxime doses. Also, *Salame and Wani, (2017)* reported that increased serum amylase in severe cases needed high doses of antidotes. *Sumathi et al. (2014)* found that serum lipase didn't show significant correlation with plasma cholinesterase.

By using linear regression analysis with the indices studied in the current work showed that APACHE II score, SOFA score and amylase were highly significantly increased with death hence could be used as predictors of outcome. While lipase couldn't be used as outcome predictor. This was similar to results of *Kim et al. (2013)*, *Sam et al. (2009)* and *Sumathi et al. (2014)*. SOFA score is significantly associated with mortality and has strong discriminative power for predicting mortality (*Kim et al., 2013*). *Sam et al. (2009)* said that APACHE II score is a simplified physiological score predicting and assessing the severity and mortality of OP poisoning and *Kang et al. (2009)* found that APACHE II score was significant predictor of mortality. Serum amylase could be considered as a better predictor of severity and outcome in acute OP poisoning (*Sumathi et al., 2014*). In contrast, *Adhil and Sudharsan, (2015)* reported that lipase can be used as a marker for

recognition and predicting outcome in OP poisoning.

In the current study, ROC curve analysis to assess the predictor of outcome of OP poisoning showed that the area under the curve for APACHE II score was 0.986, SOFA score was 0.995 and compared to serum amylase was 0.852. Also, it was found that APACHE II score at cut off value > 10 had corresponding sensitivity 100% and specificity 90.56%, SOFA score at cut off > 5 had sensitivity 100% and specificity 90.56% and serum amylase at cut off > 95 had sensitivity 83.3% and specificity 87.5%. Also, in this study the accuracy rate of SOFA score (99.5%) was higher than that of APACHE II score (98.6%) and serum amylase (85.2%). These results go with those of *Sumathi et al. (2014)* where the area under the curve for SOFA score was 0.896 and for APACHE II score was 0.716, The accuracy rate of SOFA score 83.2% was higher than that of APACHE II score 67.9%. *Kim et al. (2013)* showed that serum amylase was 0.714. And the accuracy rate of serum amylase was 71.4%.

SOFA score had the highest accuracy and predictive ability followed by APACHE II score while serum amylase was the least one. This was in agreement with *Baradari et al. (2016)* and *Shabir and Maqbool, (2017)* "SOFA score is able to predict outcome significantly". *Kim et al. (2013)* concluded that SOFA score is more useful in predicting mortality, and easier and simpler than APACHE II score.

Conclusion

SOFA score, APACHE II score, serum amylase and lipase had a role in assessment of severity of acute organophosphorus poisoning but only SOFA score, APACHE II score and serum amylase could be used as predictors of outcome. SOFA score is more useful in predicting mortality, and easier and simpler than the APACHE II and serum amylase.

Such objective information is routinely collected in the emergency department and can help emergency physicians to quickly detect the severity of OP poisoned patients and predict the poor outcomes of those who need intensive care admission.

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الملخص العربي

دور اباتش الثاني وسوفا و الاميليز المصلى والليياز في تقييم شدة ونتائج التسمم الحاد بالمركبات الفسفورية العضوية

منى القطب موسى ١ و سهير على محمد و مها عبد الحميد هلال و مروه أحمد حسب النبي ٢ و نايل عبد الحميد زكي ٣

يعتبر التسمم بالمركبات الفوسفورية العضوية هو المسؤول عن نسبة كبيرة من حالات المراضة والوفيات في جميع انحاء العالم وخاصة في البلدان النامية بما في ذلك مصر. ولقد تطورت أنظمة التسجيل بالتنبؤ بالنتائج لمرضى الحالات الحرجة وذلك لتحسين تخصيص الموارد و للمساعدة في صنع القرار الإكلينيكي خصوصاً لمرضى وحدة العناية المركزة. وبالرغم من ان السعى لمعرفة العلاقة بين المؤشرات الحيوية والتسمم بالمركبات الفسفورية العضوية قد بدأ منذ وقت طويل و لكن الحاجة الان تتطلب المؤشرات الحيوية المنخفضة التكاليف والسهولة القياس والتي لها قيمة تنبؤية. ولذلك تهدف هذه الدراسة الى تقييم دور أنظمة التسجيل اباتش الثاني وسوفا و الاميليز المصلى والليياز في توقع شدة ونتائج التسمم الحاد بالمركبات الفسفورية العضوية . تم عمل هذه الدراسة باثر رجعي ومستقبلي على ٢٠٠ مريض من حالات التسمم الحاد بالمركبات الفسفورية العضوية بمركز علاج التسمم بمستشفيات جامعة عين شمس. وتم تقسيم المرضى الى مجموعتين (حالات تم خروجها و وفيات). وقد تم جمع البيانات من ملفات المرضى وقاعدة الملفات الإلكترونية بالمركز والتي تشمل: تطبيق أنظمة التسجيل اباتش الثاني وسوفا على كل حالات الدراسة و التحليل البيوكيميائي للاميليز المصلى والليياز للحالات في الجزء المستقبلي من الدراسة و قد أظهرت نتائج البحث ان ١٨٠ (٩٠٪) من المرضى تم خروجهم و ٢٠ (١٠٪) من المرضى قد توفوا. وأظهرت الدراسة ان نظام التسجيل اباتش الثاني أقل من أو يساوي ٩ في ٧٦٪ من المرضى، ومن ١٠ إلى ١٤ في ١٢,٥٪ من المرضى ، ومن ١٥ إلى ٢٤ في ٨,٥٪ من المرضى وأكثر من ٢٤ في ٣٪ من المرضى. كما كان نظام التسجيل سوفا في ٨٨,٥٪ من المرضى أقل من أو يساوي ٦، بينما في ٤,٥٪ من المرضى كان من ٧ إلى ٩ وفي ٧٪ من المرضى كان أكثر من ٩. وقد لوحظ فرط اميليز الدم في ٨٣,٣٪ من الوفيات كما لوحظ ايضا ارتفاع نسبة الليياز في ٣٣,٣٪ من الوفيات وقد بينت هذه الدراسة وجود فرق ذو دلالة إحصائية بين الحالات التي تم خروجها والوفيات من حيث أنظمة التسجيل اباتش الثاني وسوفا وقياس الاميليز المصلى والليياز. وبناء على ذلك نستنتج ان أنظمة التسجيل اباتش الثاني و سوفا و الاميليز المصلى والليياز لهم دور في تقييم شدة خطورة التسمم الحاد بالمركبات الفسفورية العضوية ولكن أنظمة التسجيل اباتش الثاني وسوفا و الاميليز المصلى فقط يمكن اعتبارهم منبئات هامة للنتيجة. كما يعتبر نظام التسجيل سوفا افضل واسهل و ابسط في التنبؤ بالوفاة في حالات التسمم الحاد بالمركبات الفسفورية العضوية من نظام التسجيل اباتش الثاني و الاميليز المصلى. وتوصى الدراسة بتقييم منبئات النتيجة (أنظمة التسجيل اباتش الثاني وسوفا و الاميليز المصلى) بصورة دورية ومبكرة لتحديد شدة خطورة التسمم وتحسين فترة العلاج وتقرير طريق الرعاية.

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