EVALUATION OF ACID-BASE AND ELECTROLYTES AS PREDICTORS OF OUTCOME IN CRITICALLY ILL POISONED CASES IN MENOUFIA UNIVERSITY HOSPITAL.

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Submit Date 2020-12-16
Revise Date 2021-01-27
Accept Date 2021-01-28

Abstract

BACKGROUND: Acid-base and electrolytes disturbance is an important cause of deaths in intensive care unit patients, so it is necessary to have a broader analysis of their effects in the prediction of the outcome among critically ill poisoned patients. **AIM:** To evaluate the role of acid-base and electrolytes as predictors of the outcome in critically ill poisoned cases. **METHODS:** This was a prospective study conducted on 181 cases of critically poisoned patients admitted to ICU in Menoufia Poison Control Center (MPCC) from the beginning of January 2020 till the end of June 2020. A clinical toxicological sheet was fulfilled for every case including patient's sociodemographic data, clinical data of patient's assessment, poison severity scoring (PSS), investigations done for the cases as biochemical laboratory investigations; including arterial blood gases, serum electrolytes, renal and liver functions, and specific toxicological screening tests for detection of poisons. Cases were divided according to their outcome into survivors and non-survivors. All data were collected and statistically analyzed. **RESULTS:** 181 cases of critically ill poisoned patients were included in the study. Males represented (51.4%), while females were (48.6%). Cases from rural areas outnumbered those from urban, ingestion was the commonest mode of poisoning (97.2%). Pesticides constituted the highest percent among cases, where aluminum phosphide was the most prevalent agent of poisoning. According to PSS (53%) of cases were moderate versus 45.3% were severe. Survivors were (57.5%), while non-survivors were (42.5%). Significantly lower PH, Hco3, PaO2, oxygen saturation, serum potassium levels, and much lower values of BD (more minus results) in the non-survivors, while serum creatinine was significantly higher in the non-survivors. From the ROC curves, patients were considered of a bad prognosis when Ph ≤ 7.24, Hco3 ≤ 14.55, BD ≤ -5.6, Pao2 ≤ 31.6, and K ≤ 3.62 (p-value <0.001). **CONCLUSION:** It is a cornerstone to assess the acid-base and electrolytes disturbances, especially base deficit and Hco3 level for helpful prediction of the outcome, and categorization of the cases who need ICU admission from the start even if they are asymptomatic.

KEYWORDS: acid-base, electrolytes, predictors, critically ill, poisoning, Menoufia

INTRODUCTION

Poisoning is a worldwide public health concern and commonly presents in the emergency unit as the most popular explanation for non-traumatic coma under 35 years of age is poisoning **(Khodeary& Elkholy 2017).** Despite the large percent of the acutely poisoned patients who need intensive care unit (ICU) admission, it is difficult to document the exact incidence of poisoning as the rate has increased with the increasing availability and accessibility of toxic substances and their widespread use in multiple applications such as medicine, manufacturing, and farming (**Coskun et al., 2013; Lee et al., 2016)**.

It has been estimated that over thirteen million natural and synthetic chemical substances present worldwide; about 3000 of these chemicals are accounting for 95 percent of accidental or suicidal poisoning (**Coskun et al., 2013)**.

Acid-base and electrolytes disturbance is an important cause of deaths in intensive care unit patients. A previous analysis conducted on 9,799 critically ICU patients showed that about 65% of critically ill patients had acute metabolic acidosis **(Borron, 2017)**. Mortality in those with metabolic acidosis was 45 percent versus 25 percent for those without metabolic acidosis; on the other side those with lactic acidosis, their mortality rate was 56%. These findings are difficult to be generalized directly to critically poisoned patients who have a much lower mortality incidence than ordinary ICU patients **(Borron, 2017).**

In acutely poisoned patients, acid-base balance alterations may result from exogenous ions administration, organic acid, metabolic production, mitochondrial function impairment, hypoventilation, renal injury, or inadequate oxygen supply to tissue, because of circulatory or respiratory insufficiency **(Al-Jaghbeer et al., 2015; Zanety and Alagmy 2016).**

Unconsciousness is a common symptom that may contribute to respiratory acidosis, with or without respiratory failure. A typical clinical sign of many poisoning agents, especially acute pesticide poisoning, is metabolic acidosis (**Lee et al., 2016)**.

However, it is not now clear whether electrolytes and acid-base disturbances are independent, contributing factors to ICU mortality among poisoned patients or not. Patients who have been exposed to poisons are targets for intensive treatment as their chance of recovery increases with the initiation of effective medication. It is important to have in-depth knowledge of clinical markers, which can predict the clinical outcome, to provide adequate therapy (**Lee et al., 2016)**. So, it is necessary to have a broader analysis of the prognostic effect of electrolytes and acid-base disorders in toxic ICU patients.

This study aimed to evaluate the role of acid-base and electrolytes as predictors of the outcome in critically ill poisoned cases.

MATERIALS & METHODS

This was a prospective study conducted on 181 cases of critically poisoned patients who sought medical advice and were admitted to ICU under the supervision of Menoufia Poison Control Center (MPCC) from the beginning of January 2020 till the end of June 2020. A valid informed consent was taken from each case involved in the study or their guardians also the ethical committee approval was taken from Menoufia University - Faculty of Medicine.

A clinical toxicological sheet was designed for poisoned patients admitted to ICU, including patient's data from admission till discharge as regard: The sociodemographic data of the patients: as age, sex, and residence, data for patients assessment represented as present history (poison data regarding its type, route, mode, etc.), data of clinical assessment; regarding the general and systematic assessment of all body systems then cases were classified according to poison severity score (PSS) into none, mild, moderate, and severe **(Persson et al., 1998)**.

Investigations for the cases were done as needed as biochemical laboratory investigations; including arterial blood gases, serum electrolytes, renal functions, liver functions, and specific toxicological screening tests for detection of the type of poisons as choline esterase level for organophosphorus and carbamate poisoning, silver nitrate test for detection of aluminum or zinc phosphide poisoning, drug screening tests, and radiological investigations when needed. Cases were admitted to the intensive care unit as needed for continuous cardiac monitoring or mechanical ventilation and were treated according to (MPCC) protocols as regards the diagnosis. Cases were divided according to their outcome into survivors and non-survivors. All data were kept anonymous to ensure confidentiality of data.

Statistical analysis:

Data were transmitted to the computer and analyzed using version 20.0 of the IBM SPSS software package. The Kolmogorov-Smirnov test was used to confirm the normality of the distribution. Data were provided as mean ± standard deviations (SD) for normal distribution parameters, or medians with range values for skewed distribution parameters. The Student's t-test was used for normal distribution variables, while the Mann-Whitney U test was used for skewed distribution variables. Categorical variables had been analyzed using the chi-square test.

Receiver operating characteristic (ROC) curves were constructed to determine the diagnostic performance of the variables; by plotting sensitivity versus (1-specificity) with respective areas under the curves denoting the predictive power of each parameter as (AUC) more than 50% yields acceptable performance and area about 100% is the best performance for the test. The optimized cutoff values were representing the highest Youden index (sensitivity + specificity − 1). Sensitivity tests are the capability to correctly identify the targeted case in a "true positives" sample. The greater the sensitivity, the lower the "false negatives" numbers of unidentified cases will be. Specificity is the ability of the test to accurately exclude persons who are free of the parameter detected they are true negatives. The greater its specificity, the less it will detect the false positive. (PPV) Positive Predictive Value: the possibility of the presence of the detected parameter among those with positive results while (NPV) Negative Predictive value: The possibility of the absence of the detected parameter among those with negative results. Accuracy rate (AR) was calculated for each cut-off value = (True Positive + True Negatives) / Total tested x 100**.** P-value of less than 0.05 was considered statistically significant.

RESULTS

This was a cross-sectional, prospective study over six months, from the 1st of January 2020 to the end of June 2020. Total 181 cases of critically ill poisoned patients with a mean age of (28.8±13.087) years were included in this study. Males represented 51.4%, while females represented 48.6%. Cases from rural areas outnumbered those from urban as they constituted 59.7%, while 40.3% were from urban areas **fig (1).**

As regards the criteria of poisoning, ingestion was the commonest route of poisoning (97.2%), while inhalation was only in 2.8%. Aluminum phosphide was the most prevalent agent of poisoning among critically ill poisoned patients in 58%, followed by drug overdose (19.4%), Zn phosphide (17.7%), carbon monoxide (CO) (1.7%), unknown substance (1.7%), dormex (1.1%) and lastly organophosphorus insecticide (0.6%) as shown in **fig (2)**. So, the pesticides by their different forms constituted the highest percent among ICU poisoned cases (76%). By categorization of cases according to poison severity score (PSS), 53% of cases were moderate versus 45.3% were severe, and only 1.7% of cases were mild. Most of the cases were due to suicidal attempts (89.6%), while accidental cases constituted 10.4%. Also, 41.5% of cases were referred from other medical units. Survivors were 104 cases (57.5%), while non-survivors were 77 cases (42.5%) **(Table 1).**

There was a highly statistically difference between survivors and non-survivors' groups regarding the age (t = 29.645 and p < 0.001), while the sex was not statistically significant between them. Significant differences were observed between survived and non-survived groups according to the PSS score, as 100% of the non-survivor group were severe, while 92.3% of the survivor group were moderate in severity. As regards the type of poisoning, a significant difference was present between the survivor and non-survivor groups, where the aluminum phosphide poisoning constituted the highest percentage among the non-survivor group by 89.9%. The referred cases were significantly more in the non-survivor than survivor group (P<0.001). Length of hospital stay was also significantly less in the non-survivor group than survivor one **(Table 2).**

Statistical analysis of routine laboratory investigations at admission was shown in **table (3).** It revealed significantly lower pH, Hco3, PaO2, oxygen saturation, serum potassium levels, and much lower values of BD (more minus results) in the non-survivors, while serum creatinine was significantly higher in the non-survivors.

From the ROC curves analysis, patients were considered of a bad prognosis when Ph ≤ 7.24, Hco3 ≤14.55, BD ≤ -5.6, PaO2 ≤ 31.6, and K ≤3.62 (P-value <0.001). The most sensitive parameter was Hco3 (99%) with an accuracy rate of 89.5%, followed by PH and BD (92.3%), while the most specific parameter was BD (96.1%) with an accuracy rate of 93.9% **(Table 4 & Fig 3,4,5).**

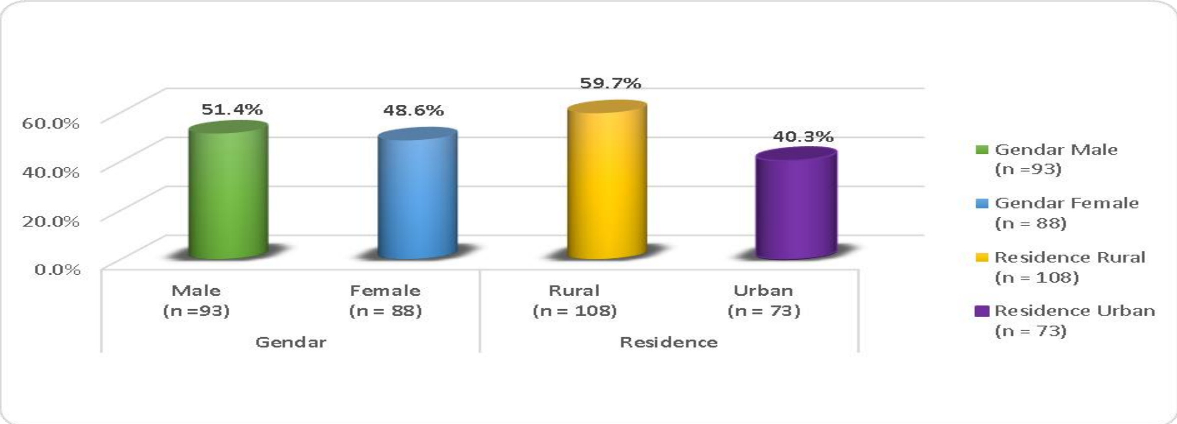

Figure (1): Distribution of critically ill poisoned cases as regards gender and residence.

Table (1): Distribution of criteria of poisoning in critically ill poisoned cases.

Character		**N=181**	**%**
Mode of poisoning	Ingestion	176	97.2
	Inhalation	5	2.8
Type of poison	Pesticides (Aluminum phosphide, Zn phosphide and Organophosphorus)	138	76
	Drug overdose	35	19.4
	Carbon monoxide (CO)	3	1.7
	Unknown	3	1.7
	Dormex	2	1.1
PSS	Mild	3	1.7
	Moderate	96	53.0
	Severe	82	45.3
Manner of Poisoning	Accidental	19	10.4
	Suicidal	162	89.6
Referred from another medical unit	Yes	75	41.5
	No	106	58.5
Outcome	Survivor	104	57.5
	Non survivors	77	42.5

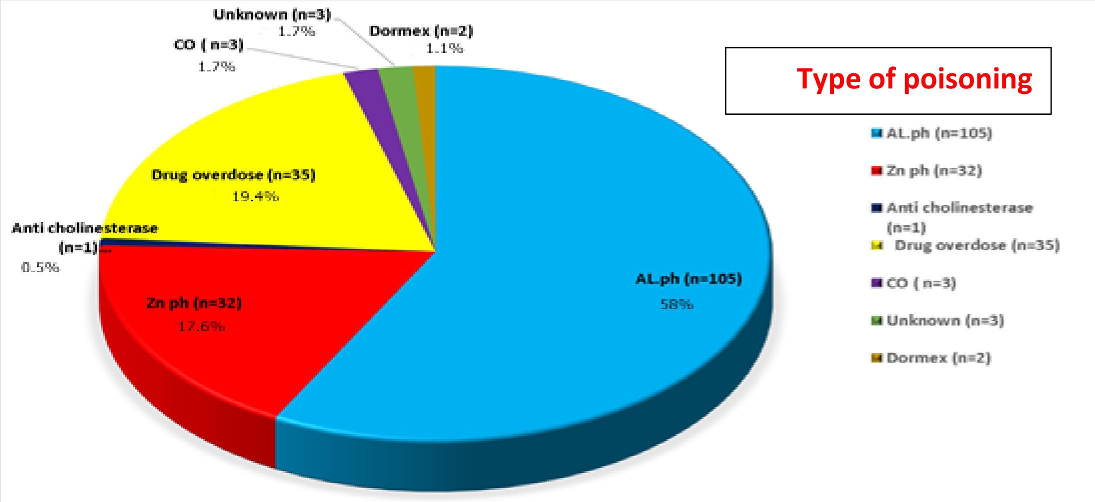

Figure (2): Distribution of critically ill poisoned cases according to types of poisoning substances.

Table (2): Statistical analysis of different variables in the critically ill poisoned cases according to the outcome.

	Total (n=181)	Outcome		Test	*P* value
		Survivors (n=104)	**Non-Survivors (n=77)**		
Age (Years)	28.8±13.087	28.05±10.155	29.89 ±16.245	t=29.645	0.000**
Sex					
Male	93 (51.4%)	48(46%)	45(58.4%)	X^2=2.67	0.069
Female	88(48.6%)	56 (53.8 %)	32 (41.6%)		
PSS					
Mild	3(1.7%)	3(2.9%)	0(0%)	X^2=161.79	0.000**
Moderate	96(53%)	96(92.3%)	0(0%)		
Severe	82(45.3%)	5 (4.8%)	77(100%)		
Type of Poisoning					
AL.ph (Aluminum phosphide)	105(58%)	36 (34.6%)	69(89.6%)	X^2=65.409	0.000**
Drug overdose	35(19.4%)	33(31.8%)	2(2.6%)		
Zn ph (Zn phosphide)	32(17.7%)	29 (27.9%)	3(3.9%)		
CO. Carbon monoxide	3(1.7%)	3(2.9%)	0 (0%)		
Unknown	3 (1.7%)	0 (0%)	3(3.9%)		
Dormex	2(1.1%)	2 (1.9%)	0 (0%)		
Anti-cholinesterase	1(0.6%)	1 (1%)	0 (0%)		
Refer from another medical unit					
Yes	75 (41.5)	35 (34 %)	40(52%)	X^2=181.50	0.000**
No	106 (58.5)	69 (66 %)	37(48%)		
Length of hospital stay (Hours)	72 (2- 168)	72(10-168)	15(2- 72)	U=103**	0.000**

(SDs): standard deviation, **: Statistically significant at $p \leq 0.01$; x2: Chi square test**;** **t**: Student t-test; **U**: Mann Whitney test.

Table (3): Statistical analysis of laboratory investigations of studied cases at admission in relation to their outcome.

	Total (n=181)	Outcome		Test	*P* value
		Survivors (n= 104)	Non-Survivors (n= 77)		
PH	7.3 (6.50 -7.40)	7.33 (7.10 – 7.40)	7.06 (6.50-7.33)	U=337.5**	0.000**
Paco2(mm Hg)	39 (21 -74)	39 (22- 60)	36 (21-74)	U=3953	0.884
Hco3	17 (6.30 -28)	20 (9.70 -28)	10 (6.30- 19.30)	U=331.5	0.000**
Pao2 (mm Hg)	32 (11.3 – 74.9)	33.5 (13 – 74.9)	29.2 (11.30-69)	U=2493.5	0.000**
BD (base deficient)	-4 (-23 – 3)	-3 (-12 -3)	-14 (-23 -1.5)	U=295	0.000**
Oxygen saturation (%)	43 (9.70 – 95.2)	60 (15.5 -95.20)	29 (9.70- 76)	U=1392	0.000**
Serum sodium level (mmol/L)	136.8 (115 – 145)	136.2(115-145)	137 (132.6 -142)	U=2870	0.001**
Serum potassium level (mmol/L)	3.8 (3.10 – 5)	3.90 (3.10 -5)	3.7 (3.1 - 4.70)	U=2710	0.000**
Serum magnesium level (mg/dL)	2.1 (.85 – 2.90)	2.1 (.85 -2.6)	2.2(0.85-2.90)	U=3456	0.114
Alanine transaminase (U/L)	17 (6-560)	17.75 (9-150)	13 (6 -560)	U=2822	0.001**
Aspartate transaminase (U/L)	17 (8-314)	27 (10-100)	14 (8 -314)	U=1515	0.000**
Serum creatinine (mg/dL)	0.8 (0.20-2.1)	0.7 (0.20- 1.90)	0.9 (0.52 – 2.10)	U=1760	0.000**
Blood urea (mg/dL)	18.9 (16.26–36.15)	30.45 (18.19–36.15)	26.3 (16.26- 36.15)	U=2803.5	0.001**

PaO2; partial pressure of oxygen, **PaCO2**; partial pressure of carbon dioxide, **U**: Mann Whitney test.

Table (4): ROC curve analysis of sensitivity and specificity for some significant predictive variables of mortality in critically ill poisoned cases.

AUC: Area under the curve; *: Statistically significant at $p \leq 0.05$; **CI:** Confidence interval; **PPV:** Positive

	AUC	P Value	95% C.I	Cut off	Sensitivity	Specificity	PPV	NPV	Accuracy
PH	.9580	0.001*	0.93- 0.98	≤7.24	92.3	90.9	93.3	89.7	91.7
Hco3	.9590	0.001*	0.98 -0.93	≤14.55	99	84.4	92.82	98.48	89.5
Pao2 (mm Hg)	.6890	0.001*	0.76-0.61	≤31.6	63.5	32.5	72.53	57.78	65.19
BD (base deficient)	.9630	0.001*	0.99-0.92	≤-5.65	92.3	96.1	97	90.2	93.9
Oxygen saturation (%)	.8260	0.001*	0.88-0.76	≤49.2	68.3	89.6	89.87	67.65	77.35
Serum sodium level (mmol/L)	0.358	0.001*	0.43 -0.27	≤134	72.1	89.6	52.08	21.62	45.86
Serum potassium level (mmol/L)	.6620	0.001*	0.74 -0.58	≤3.625	82.7	51.9	68.25	67.27	67.96

predictive value; **NPV**: Negative predictive value

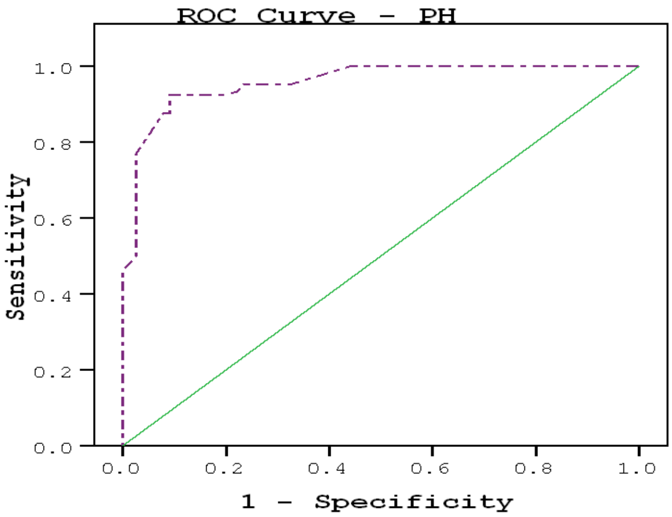

Figure (3): Receiver operating characteristic (ROC) curves of Ph for prediction of the mortality in critically poisoned patients.

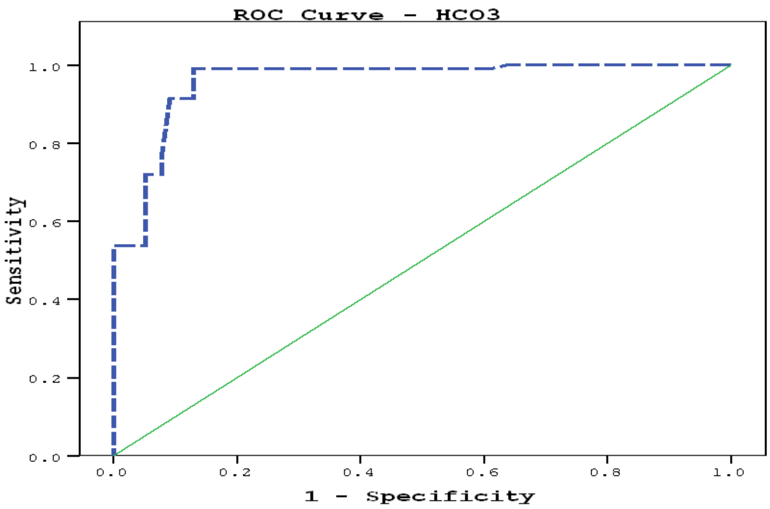

Figure (4): Receiver operating characteristic (ROC) curves of Hco3 for prediction of the mortality in critically poisoned patients.

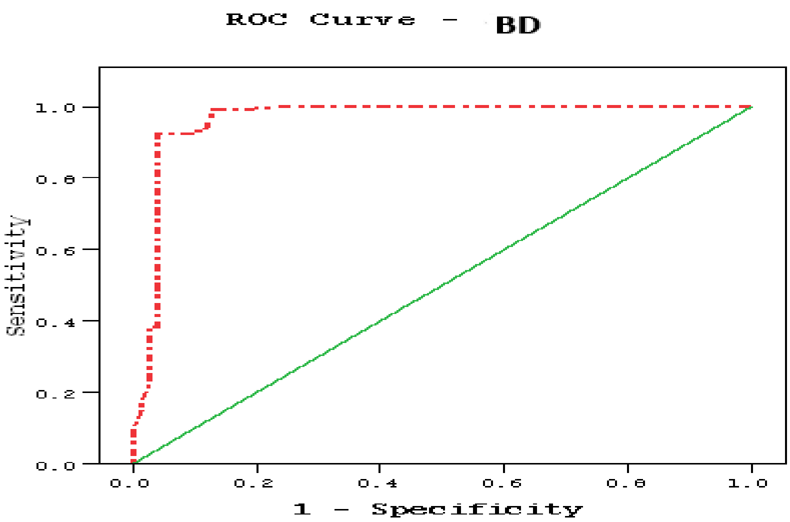

Figure (5): Receiver operating characteristic (ROC) curves of BD for prediction of the mortality in critically poisoned patients.

DISCUSSION

Acid-base disorders that are commonly observed in ICU patients are a key medical concern that is closely related to morbidity and mortality in the ICU. In this concern, one of the mandatory issues in acid-base and electrolyte abnormalities is to predict the outcome in the critically ill poisoned patient **(Borron, 2017; Buhary et al., 2017).**

This prospective study was conducted on 181 critically poisoned patients who sought medical advice and admitted to ICU over six months, where the studied cases showed that males and females were nearly equal in the taken sample; this was more or less similar to the results documented by **Buhary et al. (2017)** in their study.

Rural cases outnumbered those from urban as they constituted 59.7%; this is because of the largely agricultural area in the place of study, and this was in line with **Haroun et al. (2016**) from Egypt, as 83.7% of intoxicated cases were from rural areas. Contrary to **Sulaj et al. (2015)** in their study " Early clinical outcome of acute poisoning cases treated in intensive care unit ", they declared that 55.9% of the cases were urban residents in Tirana in Albania, but their results of the referred cases from other medical centers (37.7%) were closely near to the percent of our study (41.5%).

As regards the criteria of poisoning, ingestion was the commonest route of poisoning (97.2%), and this was matched with **Singh et al. (2011)** who had a percent of 97.8 for the oral route toxicity.

Most of the cases in the present study were due to suicidal attempt (89.6%), this was agreed with **Maheswari et al. (2016)** in their study on poisoning cases in the Emergency Care Unit, as 79.2% of the cases entangled in their study were due to self-inflicted suicidal mode of poisoning.

Pesticides constituted the highest percent among cases; where aluminum phosphide was the most prevalent agent of poisoning among critically ill poisoned patient in 58% followed by drug overdose in 19.4%, then Zn phosphide in 17.7% on the contrary of the data elaborated by **Hamdi et al. (2016)** in their study in Tehran that had medications overdose as the most common cause of poisoning. This might be due to the agricultural nature in Menoufia governorate and so the huge widespread and availability of pesticide in the society.

Regarding poison severity score, 98.3% of the cases were moderate to severe versus 1.7% of mild cases; this was close to the results by **Sulaj et al. (2015)** as they declared that 100% of the ICU poisoned cases were of moderate and severe grade according to poison severity score in their study. On the other hand, the mild grades poisoned cases were three cases who alleged poisoning with one complete tablet of aluminum phosphide which is more than three folds the lethal dose, so admitted to ICU within the 1st-hour post-ingestion for anticipating and dealing with the emergent manifestations and all of them improved and survived because of early and proper management. This can through the light on PSS that had a limited clinical utility and likely cannot be broadly applied to many toxic exposures due to their unique clinical circumstances. An updated new score is better to be developed with global cooperation of medical toxicologists, to be used effectively as a predicting clinical or testing tool **(Schwarz et al., 2017).**

Non-survivors represented 42.5% as a mortality rate in this study, this could be due to the risky nature of the taken sample of patients (ICU critically ill ones), also, the fatal aluminum phosphide poisoning which represented the main bulk among the poisoned cases, this was in line with **Kandeel and El-Farouny, (2017)** in their study who reported that pesticides (insecticides and rodenticides) were the most common agents resulting in death. Moreover, this high mortality rate coincides with that of **Ashtaputre et al. (2017)** as they announced in their research a mortality rate of 32.1%, and also with **Sulaj et al. (2015)** who stated a mortality rate of 54% where the main bulk of the sample was ICU patient poisoned with aluminum phosphide toxin.

Acid-base disorders are commonly observed in ICU patients and are considered as a key medical concern that is closely related to morbidity and mortality in the ICU. In this concern, one of the mandatory issues in acid-base and electrolyte abnormalities is to predict the outcome in the critically ill poisoned patient **(Borron, 2017; Buhary et al., 2017).**

Significant differences were observed between survived and non-survived groups according to the PSS score as 100% of the non-survivor group were severe, while 92.3% of the survivor group were moderate grade poisoning and this is matched with **Hegazy et al. (2019)** study concerning ICU admitted patients, as 91.9% of non-survivors were from the severe group. Also, these findings had gone with **Mate et al. (2017).**

As regard type of poisoning, a significant difference was present between the survivor and non-survivor groups, where the aluminum phosphide poisonings formed the highest percentage among the non-survivor group (89.9%) and this was seen in a study by **Ashtaputre et al. (2017)** who stated that aluminum phosphide poisonings represented the highest percentage among the non-survivor group by 60%. Besides, **Singh et al. (2011)** in their research declared that all dead cases were aluminum phosphide poisoning.

Also, several studies had shown a high mortality rate from aluminum phosphide poisoning reached 45% in a study of **Jaiswal et al. (2009),** and **Hegazy et al. (2019)** who declared that 97.6% of non-survivors were intoxicated with aluminum phosphide, where 67.2% of them had died. This high mortality rate due to aluminum phosphide poisoning could be a result of easy access to the toxin (no prohibition on dealing with it in the street or obtaining it from its resource), and its cheapness with rapid action and high fatality (Tablet form in Egypt is available in a concentration of 3 grams aluminum phosphide containing 1.7 gm active ingredients which is more than three folds of the lethal dose [0.5 gm]) (**Hegazy et al., 2019)**, so we appeal the officials and authority to legalize the purchase and dealing process of aluminum phosphide pesticide.

The referred cases were significantly more in non-survivors than survivors, and this was elaborated in **Hegazy et al. (2019)** study**.** This can be due to improper diagnosis, non-availability of toxicological investigations plus misleading information from the patient or their relatives, and so improper treatment and more activation of the pathophysiological process of the toxin, moreover wasting time during transferring the patient from a remote area to a toxicology center.

Length of hospital stay was significantly less in the non-survivor group; as in most of the severe cases, especially aluminum phosphide poisoning, the conditions started by vomiting, hypotension, tachycardia, tachypnea, cyanosis, then altered states of consciousness occurred during the first few hours. Finally, within 24 to 48 hours of poisoning, the condition progresses rapidly to multi-organ failure and death despite continuous supportive treatment, other researchers from multiple regions had recorded similar results as **Lee et al. (2016)** and **Shrestha et al. (2018).**

Significantly lower levels of pH, HCO3, PaO2, oxygen saturation, serum potassium (K^+), sodium (Na^+), and BD (more minus results), meanwhile a significantly higher level of serum creatinine was detected in the non-survivors than in survivors, this matched with the results shown by **Hamdi et al. (2016)** and **Sinekalatha et al. (2019)**; as they found that the occurrence of electrolytes and acid-base abnormalities are higher in non-survivors than survivors and more connected with bad prognosis, so these parameters could be used as predictors for the poisoning cases prognosis. **Lee et al. (2019)** also had stated that the base deficit value can make physicians predicting mortality when assessing cases on admission, and can point to the need for ICU from the start.

Lee et al. (2016) and **Hu et al. (2017)** results coincided with this study's findings and declared that electrolyte, acid-base disturbances, especially Na^+ level abnormalities, and acidosis were highly related to hospital mortality and this would be more likely if these cases had anion gap disturbances. These disturbances should be followed up closely, early diagnosed, and correctly treated during the hospital stay and iatrogenic risks should be avoided. As the bulk of this study poisoned cases were aluminum phosphide cases, so these results regarding acid-base disturbances were matched with that of **Gurjar et al. (2011).**

From the ROC curves, cut-off values were predicted, as the case could be considered of bad prognosis when PH ≤ 7.24, Hco3 ≤ 14.55, BD ≤- 5.6, PaO2 ≤ 31.6, Na^+ ≤134.00, and K^+ ≤3.62 and these parameters are more or less matched with that of **Lee et al. (2019)** who declared that lower BD (> -7.8 mEq/L) had the lowest survival rate. Base deficit (BD) is known as the amount of bases required to return the blood pH to homeostatic levels. The normal levels of BD are from -2 to + 2 mEq/L, and the lower value of the base deficit is related to lactate accumulation, so this is associated with metabolic acidosis, hypoperfusion, and oxygen debt.

Hypokalemia may be due to repeated vomiting in poisoning patients or caused by the poison itself by affecting potassium pumps, on the other hand, the hyponatremia may also be due to vomiting or indicating renal affection in poisoning patients and so bad prognosis, these findings were in agreement with that of **Lee., (2010)** and **Hamdi et al. (2016**). Serum creatinine in the non-survivors' cases was higher than in survivors, as hypoxia and shock in toxic patients may attribute to renal dysfunction **(Sharma et al., 2018).**

Poison related acidosis can be due to different pathophysiological causes and various mechanisms such as; acid overload (which may occur through the accumulation of acids endogenously through organ damage and direct cell injury or exogenously through acidic poison itself), bases loss which may be due to proximal renal tubular acidosis, respiratory acidosis due to respiratory failure that may be central by depression of the respiratory center and/or peripheral by neuromuscular impairment, drowning of respiratory passages in their secretions, aspiration or all of them (hypoxia and lactic acid formation) **(Abdollahi et al., 2004; Kitterer et al., 2015).**

So, metabolic acidosis takes place when there is an increase in the production of non-volatile acids or a loss of bicarbonate from the body that overcomes the acid-base system homeostasis or when renal functions are compromised. Accumulation of intermediate metabolites such as lactic acid due to disorders of the intermediate synthesis mechanisms can increase the acid production several folds **(Kraut and Madias, 2010)**

The base deficit can be used as an alternative that indicates the presence of metabolic acidosis because of its strong linear correlation with serum HCO3 **(Surbatovic et al., 2009).**

The most sensitive parameter in our study was serum Hco3 (99%) with an accuracy rate of 89.5% followed by PH and base deficit (92.3%) while the most specific parameter was base deficit (96.1%) with an accuracy rate of 93.9%. These findings are looking like those declared by Lee et al. in 2019, as they stated that the base deficit sensitivity was 86.4%, and the specificity was 68.1%. So, it is valuable to rely on these measures and try to identify factors that predicting mortality and morbidity in poisoned patients. Since poisoning is an important health concern for young, effective people, where mortality could be prevented by adequate and timely interference.

CONCLUSION

From this study, we can conclude that acid-base and electrolyte disturbances commonly take place in critically ill poisoned patients. It is a cornerstone to initially assess these disturbances, especially base deficit and Hco3 for the proper prediction of cases outcome, and so proper decision-taking for an early treatment plan.

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الملخص العربي

تقييم القاعده الحامضية و الإلكتروليتات كمتنبئات للنتائج في مرضي التسمم الحرج بمستشفي جامعه المنوفيه

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مقدمه: اضطراب القاعدة الحمضية وإلكتروليتات الدم يعد سبب هام لحدوث الوفاة بين مرضى وحدة العناية المركزة في العموم ، لذلك كان من الضروري إجراء دراسه شاملة لمعرفه أثر القاعدة الحمضية وإلكتروليتات الدم في التنبؤ بما سوف تؤول اليه حالات مرضى التسمم الشديد. **الهدف**: تقييم دور القاعدة الحمضية والإلكتروليتات كمؤشرات للتنبؤ بالنتائج في حالات التسمم الحرج.

الطريقة: اجريت هذه الدراسة الاستطلاعية على 181 حالة من حالات التسمم الحرج والتي تم إدخالها وحدة العناية المركزة في مركز علاج السموم بالمنوفية من بداية يناير 2020 حتى نهاية يونيو 2020.و قد تم استيفاء استماره طبيه لكل حالة بما في ذلك البيانات الاجتماعية والديموغرافية ، والبيانات السريرية لتقييم المريض ، وتقييم شدة السميه ، والفحوصات التي أجريت للحالات بما في ذلك غازات الدم الشرياني ، وإلكتروليتات الدم ، ووظائف الكلى والكبد ، واختبارات فحص السموم للكشف عن نوع السم، كما تم تقسيم الحالات حسب الناتج النهائي لها إلى ناجين ومتوفيين. **النتائج**: ضمت الدراسه حوالي 181 حالة من حالات التسمم الحرج حيث مثل الذكور (51.4٪) والإناث (48.6٪). كما فاق عدد الحالات من المناطق الريفية عددهم من المناطق الحضرية. هذاوقد شكلت المبيدات أعلى نسبة بين الحالات ؛ حيث شكل فوسفيد الألومنيوم العامل الأكثر انتشارًا للتسمم. وبلغت نسبه الناجين (57.5٪) ، بينما حالات الوفاة (42.5٪). و تبين ان انخفاض درجة حموضة الدم ، ونسبه البيكربونات ، ونسبه تشبع الدم بالأكسجين و العجز القاعدي وكذلك مستوى البوتاسيوم في الدم مرتبط بشكل ملحوظ بحالات الوفاه. بينما كانت نسبه الكرياتينين في الدم أعلى في حالات الوفاة .