

Predicting outcome in acute cardiotoxicity based on Glasgow coma scale (GCS) and modified APACHE II score (MAS)

Meray M. Shokry¹, Maha A. Hilal¹, Sharaf E. Shazly Abdalla² and Ahmed M. Said,¹

¹Department of Forensic Medicine & Clinical Toxicology, Faculty of Medicine, Sohag University, Sohag, Egypt.

²Department of Internal medicine, Faculty of Medicine, Sohag University, Sohag, Egypt.

Abstract

Introduction:

Acute cardiotoxicity patients can have adverse effects that may lead to intensive care unit (ICU) admission. Because of limited ICU beds, triage and stratification of cases into different groups according to survival is a must nowadays. Many scoring systems have been as a tool for triage and improve ICU quality management. **This study aims** to evaluate the role of GCS (Glasgow coma scale) and MAS (Modified Acute Physiology And Chronic Health Evaluation) as effective scoring system in predicting mortality in acute cardiotoxicity **Methods:** A prospective study was carried on 100 patients with acute cardiotoxicity by drugs and toxins known to cause cardiac injury admitted to Sohag Hospitals. **Results** 94% of patients had survived 4 of which discharged with complication . By ROC curve analysis to assess the predictor of outcome of acute cardiovascular toxicity, it was found that MAS score at cut off value > 11.5 had sensitivity 100% and specificity 74.5%, GCS at cut off < 9.5 had sensitivity 100% and specificity 72.3%.The accuracy rate of GCS was (92.4%) while that of MAS was (90.8%). **Conclusion:** GCS and MAS can be used as simple predictor tools of mortality in acute cardiotoxicity. **Recommendation:** GCS and MAS may be used as simple triage tools in acute cardiotoxicity patients in ICU to improve quality management and utilizing hospital resources.

Key words

Cardiotoxicity, MAS, GCS, APACHE II.

Introduction

Cardiovascular failure remains a leading cause of death in severe acute drug intoxication (Johnson et al, 2013). According to records from the Poison Control Center of Ain Shams University Hospitals, Egypt, the annual report in 2014 cardiovascular drugs intoxication accounts for 1.67% of the total reported poisoning cases (Hussien et al, 2018).

Severe cases of drug overdose usually require intensive care unit (ICU) admission. So, various scoring systems have been employed for proper identification and disposition of cases improving ICU quality management especially with shortage of ICU beds (Mood et al., 2011).

Glasgow coma scale (GCS) has been used now in several emergency departments as an indicator for the neurological status of patients with impaired consciousness regardless of the primary etiology. Poisoning with drugs influences the brain biochemically, causes brain damage hence affecting level of consciousness. The GCS has been performed evaluation

of patients admitted to ICU regarding outcome and recovery.

Four scoring systems had an acceptable to excellent outcome prediction in patients with mixed drug poisoning (MDP) inducing coma. They include 1st GCS within 24 hours of admission, 2nd APACHE II (Acute Physiology And Chronic Health Evaluation II) at admission, 3rd APACHE II after 24 hours and 4th MAS (Modified APACHE II Score) at 24 hours. GCS and MAS may have superiority over the other systems in being easy to perform and not requiring laboratory data. Modified APACHE II Score (MAS) can be calculated without using biochemical parameters employed in (APACHE II) Score (Mood et al., 2011).

Aim of the Study

This study aims to evaluate the role of GCS and MAS as effective scoring systems in predicting mortality in acute cardiotoxicity.

Patients and Methods

Study design: A prospective study was carried on 100 patients with acute cardiotoxicity by drugs and toxins known to cause cardiac injury admitted to Sohag University hospitals during the period from April 2018 to September 2019.

Patients: According to equation $[n = (Z1-\alpha + Z\beta) 2(S1 + S2)2/(\mu1-\mu2)2]$ by Hassanian-Moghaddam et al. (2014) to determine sample size with significant results by using this equation we need at least 59 patients to have significant results so we decided to collect 100 patients' sheets to have significant results.

Inclusion criteria: All patients admitted to Sohag University Hospitals with acute cardiotoxicity by drugs and toxins known to cause cardiac injury and we evaluate the injury by electrocardiogram (ECG) and serum CK-MB and cardiac troponin I. The type of medication or toxin was determined according to the history given by the patient him/herself or next of kin if unconscious on admission. Additionally, screening for common drugs of abuse and digoxin level in cases of drug abuse toxicity and digoxin toxicity respectively.

Ethical conditions: After approval of director of Sohag University hospitals, all studied patients or relatives signed informed consent before participation and they were allowed to refuse or accept this participation with complete confidentiality.

Exclusion criteria: The patients with underlying cardiac diseases (e.g. previous myocardial infarction) in addition to those who take chemotherapeutic drugs will be excluded.

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

1. Socio-demographic data
2. ECG, serum CK-MB and cardiac troponin I
3. Vital signs
4. GCS
5. Physical findings
6. Outcome of the patients: The patients were classified according to the outcome into discharged and died patients.

- **GCS**

GCS from (3-15 points) was calculated from assessment of 3 components: motor (6 points), verbal (5 points) and eye (4 points) (Eizadi et al., 2011).

- **MAS**

MAS calculated from 5 physiological parameters {mean arterial pressure, temperature, respiratory rate, heart rate and each of which were marked from 0 to 4, with 0 being normal and 4 being the most abnormal then the 5th parameter GCS score (15-GCS) was, then, added}. The sum of these values was added to a mark adjusting for patient age and a mark adjusting for chronic health problems (severe organ insufficiency or immunocompromised patients). MAS can be calculated without parameters of biochemical tests [arterial oxygen tension (PaO₂), arterial pH, serum sodium, serum potassium, serum creatinine, haematocrit, white blood

cell count] that are usually used in APACHE II Score (Mood et al., 2011).

Statistical Analysis

The collected data were tabulated, coded, and verified prior to computerized data entry and were statistically analyzed using Statistical Package for the Social Science (SPSS) software package, version 16. Results were expressed in tables and charts.

Results

A total of 100 patients of acute cardiotoxicity were included in this study with mean age 16.3 years \pm 17.392 and ranged from 2 to 70 years. The majority of patients (57%) fall in the age group (\leq 15years) followed by age group (16-30years) represented by (28%). Male gender constituted (51%) of the studied patients and the majority of the cases from. According to residence, cases were mainly received from rural areas (82%) (table, 1).

As regard route and mode of intoxication, (table, 2) revealed that the majority of the studied intoxicated patients were exposed to drugs and toxins by oral route (81%), bites and stings (14%), inhalation (3%) and injection (2%) and mostly accidental (54%) followed by suicidal mode (37%).

As regards facial complexion in relation to toxic agents enrolled in this study (table, 3) showed that 40% of cases presenting with pallor were due to animal poisons, followed by cardiovascular drugs in 20% and phosphides in 20%. In 4 out of 9 cases presenting with cyanosis, animal poisoning was the cause. Other causes included hydrocarbons plus organophosphates (OPs) (in 2 cases) and drugs of abuse (2 cases). All cases of angioedema resulted from paraphenylenediamines (PPD). There was statistically significant difference between types of toxic agents as regards facial complexions by using Chi-square test ($p < 0.001$).

As regards pupil examination in relation to toxic agents enrolled in this study (table, 4) showed that constricted pupil was caused mainly by pesticides 50% followed by drugs of abuse 23.1%. Dilated reactive pupil was found in 50% of CNS drugs. There was statistically significant difference between groups classified according to type of toxins as regards pupil examination by using Chi-square test ($p < 0.001$).

Chi-Square statistical analysis for comparing different toxic agents as regards outcome is shown in (table, 5) and revealed that the most dangerous toxins observed to cause mortality was aluminum phosphide by (66.7%), then calcium channel blockers (CCBs) by (25%), beta adrenergic blockers (BBs) by (16.7%) and scorpion (15.4%). As regards recovery with complications succinylcholine and carbon monoxide (CO) toxicity were implicated by (100%), organophosphates (OPs) by (12.5%) and PPD by (25%). There was statistically significant difference between types of toxins and drugs as regards outcome ($p < 0.001$).

Table (6) shows that GCS at 24 hours of admission was high in majority of patients (57%) ,

moderate in (23%),and low in (20%) with mean 11.68± 3.4. Table (7) represents the distribution of MAS points in the first 24hours among total number of patients. It was found that MAS ranged from 2 points to 25 points, with mean value of 9.83± 4.89 points.

Tables (8) and (9) revealed that MAS and GCS could be used as predictors of outcome and mortality of acute cardiovascular toxicity .There is highly significant increase of MAS score and very highly significant decrease of GCS in relation to mortality and complicated

discharge compared to complete recovery. Table (10) and figure (1) represent ROC curve analysis to assess the predictors of outcome of acute cardiovascular toxicity. The area under the curve for MAS score was 0.908 and GCS score was 0.924. Also, it was found that MAS score at cut off value > 11.5 had corresponding sensitivity 100% and specificity 74.5%, GCS at cut off < 9.5 had sensitivity 100% and specificity 72.3%. The accuracy rate of GCS was (92.4%) which was slightly higher than MAS which was (90.8%).

Table (1): Number and percentage of the studied patients as regard age, gender and residence

Patient characteristics		Number	Percentage (%)
Age groups(years)	≤15years	57	57%
	16-30years	28	28%
	31-45years	7	7%
	45-70years	8	8%
Gender	Male	51	51%
	Female	49	49%
Residence	Urban	18	18%
	Rural	82	82%

Table (2): Route and mode of intoxication among studied patients:

		Number	Percentage (%)
Route of exposure	Oral	81	81
	Bite / Sting	14	14
	Inhalation	3	3
	Injection	2	2
Mode of poisoning	Accidental	54	54
	Suicidal	37	37
	Overdose	6	6
	Therapeutic	3	3
	Homicidal	0	0

Table (3): Chi-Square statistical analysis for comparing toxic agents as regards facial complexions in 100 studied patients:

Toxic agents	Complexions												Total	
	Normal		Cyanosis		Sweating		Pallor		Flushing		oedema			
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
CVS drugs	12	17.6	1	11.1	0	0	2	20.0	0	0	0	0	15	15
CNS drugs	21	30.9	0	0	0	0	1	10.0	3	100	0	0	25	25
Animal poisoning	5	7.4	4	44.4	1	16.7	4	40.0	0	0	0	0	14	14
Pesticides	14	20.6	0	0	1	16.7	0	0	0	0	0	0	15	15
Phosphides	3	4.4	0	0	0	0	2	20.0	0	0	0	0	5	5
Hydrocarbons	2	2.9	0	0	0	0	0	0	0	0	0	0	2	2
Hydrocarbons +OPs	0	0	2	22.2	0	0	0	0	0	0	0	0	2	2
Drugs of Abuse	5	7.4	2	22.2	4	66.7	1	10.0	0	0	0	0	12	12
CO	1	1.5	0	0	0	0	0	0	0	0	0	0	1	1
Theophylline	4	5.9	0	0	0	0	0	0	0	0	0	0	4	4
PPD	1	1.5	0	0	0	0	0	0	0	0	4	100	5	5
Total	68	100	9	100	6	100	10	100	3	100	4	100	100	100.0
Chi-square test	X2									1.57				
	P-value									0.000 ***				

N: number *P < 0.05 (significant) **P < 0.01 (highly significant)* **P < 0.001 (very highly significant)
 NS: Non- significant CVS=cardiovascular system acting CNS=central nervous system acting
 Ops=organophosphates CO=carbon monoxide PPD=paraphenylenediamines

Table (4): Chi-Square statistical analysis for comparing toxic agents as regards pupil examination in 100 studied patients:

Toxic agents	Complexions										Total	
	Normal		Constricted		Dilated		Unreactive		Nystagmus			
	Number & percentage in relation to changes in pupil											
	N	%	N	%	N	%	N	%	N	%	N	%
CVS drugs	14	21.2	0	0	1	16.7	0	0	0	0	15	15
CNS drugs	18	27.3	4	15.4	3	50	0	0	0	0	25	25
Animal poisoning	13	19.7	1	3.8	0	0	0	0	0	0	14	14
Pesticides	1	1.5	13	50.0	1	16.7	0	0	0	0	15	15
Phosphides	5	7.6	0	0	0	0	0	0	0	0	5	5
Hydrocarbons	2	3.0	0	0	0	0	0	0	0	0	2	2
Hydrocarbons +OPs	0	0	2	7.7	0	0	0	0	0	0	2	2
Drugs of Abuse	4	6.1	6	23.1	1	16.7	0	0	0	0	12	12
CO	0	0	0	0	0	0	1	100.0	0	0	1	1
Theophylline	4	6.1	0	0	0	0	0	0	0	0	4	4
PPD	5	7.6	0	0	0	0	0	0	0	0	5	5
Total	66	100	26	100	6	100	1	100	1	100	100	100
Chi-square	X²						1.67					
	P-value						0.000***					

N: number *P < 0.05 (significant) **P < 0.01 (highly significant) * **P < 0.001 (very highly significant)
 NS: Non- significant CVS=cardiovascular system acting CNS=central nervous system acting
 Ops=organophosphates CO=carbon monoxide PPD=paraphenylenediamines

Table (5): Chi-Square statistical analysis for comparing different toxic agents as regards outcome among all studied patients:

Toxic agents		Mortality		Discharged with complications		Complete recovery		Total	
		N	%	N	%	N	%	N	%
CVS Drugs	BBs	1	16.7%	0	0%	5	83.3%	6	100%
	CCBs	1	25%	0	0%	3	75%	4	100%
	Digoxin	0	0%	0	0%	5	100%	5	100%
CNS drugs	Antipsychotics	0	0%	0	0%	10	100%	10	100%
	Tricyclic antidepressants	0	0%	0	0%	3	100%	3	100%
	Anticonvulsants	0	0%	0	0%	5	100%	5	100%
	Benzodiazepines	0	0%	0	0%	2	100%	2	100%
	Anticholinergics	0	0%	0	0%	3	100%	3	100%
	Lithium	0	0%	0	0%	1	100%	1	100%
	Lidocaine spray	0	0%	0	0%	1	100%	1	100%
Animal bites	Scorpion	2	15.4%	0	0%	11	84.6%	13	100%
	Snake	0	0%	0	0%	1	100%	1	100%
Pesticide	Ops	0	0%	1	12.5%	7	87.5%	8	100%
	Carbamate	0	0%	0	0%	7	100%	7	100%
Phosphide	Zinc phosphide	0	0%	0	0%	2	100%	2	100%
	Aluminum phosphide	2	66.7%	0	0%	1	33.3%	3	100%
Hydrocarbons		0	0%	0	0%	2	100%	2	100%
Hydrocarbons + OPs		0	0%	0	0%	2	100%	2	100%
Drugs of abuse	Opioids	0	0%	0	0%	4	100%	4	100%
	Tramadol	0	0%	0	0%	3	100%	3	100%
	Amphetamines	0	0%	0	0%	2	100%	2	100%
	Cannabis	0	0%	0	0%	3	100%	3	100%
CO		0	0%	1	100%	0	0%	1	100%
Theophylline		0	0%	0	0%	4	100%	4	100%

Table (5): Continued

Toxic agents	Mortality		Discharged with complications		Complete recovery		Total	
	N	%	N	%	N	%	N	%
PPD	0	0%	1	25%	4	75%	5	100%
Total	6	6%	4	4%	90	90%	100	100%
Chi Square	$X^2=86.17$ P-value=0.002**							

N: number *P < 0.05 (significant) **P < 0.01 (highly significant) ***P < 0.001 (very highly significant)
 NS: Non- significant CVS=cardiovascular system acting CNS=central nervous system acting
 Ops=organophosphates CO=carbon monoxide PPD=paraphenylenediamines

Table (6): GCS and GCS score with mean, median, mode and range of GCS among all studied patients:

Severity of toxicity	GCS	GCS score=(15-GCS)	Number of patients	%
Mild	≥ 13	0-2	57	57%
Moderate	12-9	3-6	23	23%
Severe	≤8	7-12	20	20%
Total			100	100%
Mean ± SD= 11.68±3.4 Median= 13 Mode=15 Range: 3-15 points				

GCS: Glasgow Coma scale SD: Standard deviation

Table (7): MAS mean, mode, median, range and percentage distribution of points at 24 hours of the admission of studied patients:

MAS points groups	Number	Percentage (%)	
Mild	2-10	60	60%
Moderate	11-15	26	26%
Severe	16-25	14	14%
Total	100	100%	
Mean ± SD= 9.83± 4.89 Median= 9 Mode=8 Range: 2-25 points			

MAS: Modified APACHE II Score SD: Standard deviation

Table (8): Independent t-test statistical analysis of MAS score and GCS among studied patients:

Variable		Complicated recovery&mortality	Uncomplicated recovery	Independent t-test	
		N=10	N=90	T	p-value
MAS	Mean± SD	14.8±6.42	9.28±4.4	3.58	0.001**
GCS	Mean± SD	8.1±3.87	12.1±3.1	-3.729	0.000***

*P < 0.05 (significant) **P < 0.01 (highly significant) ***P < 0.001 (very highly significant)
 NS: Non- significant SD: Standard deviation MAS: Modified APACHE II Score GCS: Glasgow Coma scale

Table (9): Linear regression analysis of MAS score and GCS to detect predictors of mortality:

Predictors	Unstandardized Coefficients		Standardized Coefficients	Independent t-test	
	B	Standard Error	Beta	T	p-value
MAS	-0.019	0.005	-0.398	-4.297	0.000***
GCS	0.029	0.006	0.412	4.470	0.000***

*P < 0.05 (significant) **P < 0.01 (highly significant) ***P < 0.001 (very highly significant)
 NS: Non- significant MAS: Modified APACHE II Score GCS: Glasgow Coma scale

Table (10): Sensitivity, specificity and accuracy rate of MAS score and GCS as predictors of mortality:

Variable	Cut- off point	AUC	p-value	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Accuracy rate
MAS score	>11.5	0.908	0.001**	100%	74.5%	20.0%	100%	90.8%
GCS	< 9.5	0.924	0.001**	100%	72.3%	18.75%	100%	92.4%

*P < 0.05 (significant) **P < 0.01 (highly significant) ***P < 0.001 (very highly significant)
 NS: Non-significant MAS: Modified APACHE II Score GCS: Glasgow Coma scale
 AUC (Area under the curve) PPV: Positive predictive value NPV: Negative predictive value

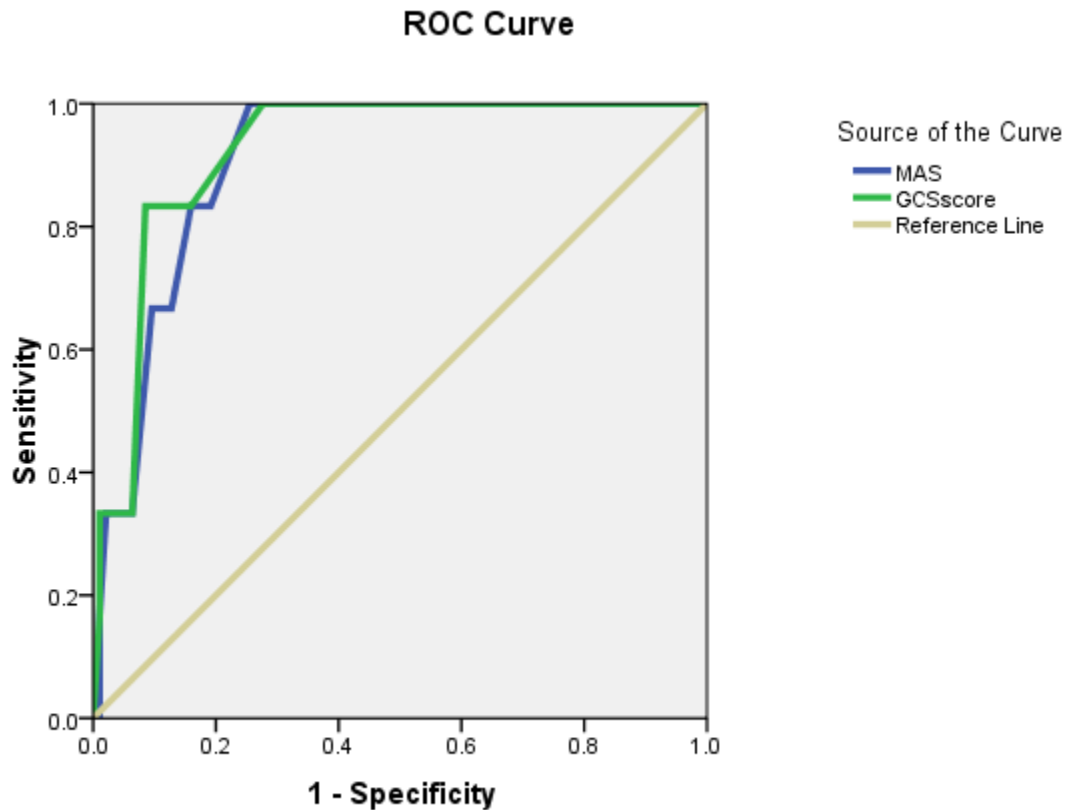


Figure (1): Receiver Operator Characteristic (ROC) Curve of MAS and GCS score

Discussion

Due to shortage of ICU beds rapid assessment by easy and simple scoring systems is a must nowadays. Cases of intoxication with cardiac involvement are liable to high mortality rate and need close monitoring and assessment (Mood *et al.*, 2011). This study aimed to evaluate the role of GCS and MAS as effective scoring systems in predicting mortality in acute cardiotoxicity. The present study was undertaken on 100 acutely poisoned patients by drugs and toxins with cardio-toxic effects who were admitted to Sohag University hospitals.

In the present study, the mean age was 16.3 ± 17.4 years and the majority of patients (57%) fall in the age group (≤ 15 years) years followed by age group (16-30 years) representing (28%). In contrast, Hussien *et al.*, (2018) who studied cardiovascular drugs in poison control center of Ain Shams University Hospitals, found that the majority of studied patients were in the age group of (18- 24) years presenting (50%) of

cases followed by the age group (25-40) years (37.5%). Also, Karakilic *et al.* (2016) in Turkey studied relationship between BNP and cardiovascular toxicity found that the mean age was 33.36 ± 12.23 years, similar to an Iranian study of QT dispersion by Hassanian-Moghaddam *et al.* (2014) which was 31 ± 12 years (range from 7 to 65 years). This difference explained by Hassan and Siam (2014) as most of the poisonings by medications and pesticides were due to accidental ingestions by infants and young children.

In the current study 51% of the studied patients were males and 49% were females, which is nearly similar to the study by Hassanian-Moghaddam *et al.* (2014) in Iran who found that males represent 56.2% and females (43.8%). The majority of the studied patients from rural areas (82%) which coincides with both a study of poisoning in Aswan Governate

by *Mohamed et al. (2019)* and with Punjab toxicological study of *Singh et al. (2003)*.

In this study the route of poisoning was mainly by oral route (81%), followed by bites and stings (14%), while a minor percentage by inhalation (3%) and injection (2%). This partly agreed with the study of *El Masry and Tawfik (2013)* in Ain Shams poison control center as oral route was in (94.9%) of cases.

In the current study the mode of poisoning was mostly accidental (54%) followed by suicidal (37%), while overdose and therapeutic errors represented (6%) and (3%) respectively. This is different from the study by *El Masry and Tawfik (2013)* as they reported that poisoning occurred suicidally (49%), accidentally (42.7%), drug overdose (7.5%), therapeutic error (0.4%) and homicidal in 0.4% of cases. However results in the current study agree with *Ismail et al. (2015)* who found accidental poisoning in Sohag constitutes (66.67%), suicidal (33.33%) and homicidal (0%). This was explained as the suicide rate in Upper Egypt is lower than Great Cairo due to religious effects and strong relationship between family members which was also supported by *Aboul-Hagag et al. (2013)*.

As regard changes in facial complexion in the current study they were normal in 68% of patients; pallor, cyanosis and facial flushing presented in 10%, 9% and 3% of patients respectively. Animal bites were responsible for (40%) of pallor then CVS drugs (20%) and phosphides (20%), (44.4%) of cyanosis cases were due to animal poisoning then (22.2%) due hydrocarbons plus OPs and drugs of abuse. All cases of angioedema were due to PPD. This came with *Mahaba (2000)* who described that pallor due cardiac injury or cyanosis due respiratory affection were major manifestations of animal bites. Also, *Shalaby et al. (2010)* mentioned that 72% of PPD studied poisoned patient came with angio-facial and laryngeal oedema.

In the present study pupil examination were normal in 66% of patients, 26% presented with constricted pupil, 6% with dilated pupil, constricted pupil caused mainly by pesticides

50% followed by drugs of abuse 23.1% among the cases. Dilated reactive pupil was found in 50% of CNS drugs. This came with *Ismail et al. (2015)* in Sohag who found that pupil examination was normal in 60% of poisoned patients, 28.89% with miosis and 10% with mydriasis and also, miosis was almost caused by pesticides poisoning, while, mydriasis was more observed in CNS drugs and drugs of abuse. Pinpoint pupils is considered one of the clinical manifestations of cholinergic toxidrome signs due pesticides and opioid toxidrome. On the other hand, mydriasis is one of the clinical manifestations of sympathomimetics and anticholinergics toxidromes (*Baskin, 2014*).

As regard outcome in the current study 94% survived from them 4 patients suffered complications on discharge and 6% of patients died. The most dangerous toxin causing mortality was aluminum phosphate by (66.7%), CCBs by 25%, BBs by 16.7% and scorpion by 15.4%. As regards recovery with complications cases poisoned by succinylcholine and CO toxicity developed irreversible neurologic injury, OPs by (12.5%) as the patient discharged with tracheostomy due to irreversible laryngeal stricture and PPD by (25%) as the patient developed chronic renal failure. This agrees with *Shadnia et al. (2005)* as they highlighted that aluminum phosphide is a dangerous poison with majority of deaths occur within the first 12-24 hours, usually due to cardiovascular arrest. While, *Hassanian-Moghaddam et al. (2014)* found that (66.6 %) survived and (33.3 %) died and noted that the most common overdosed drugs to have QT dispersion were methadone, followed by TCA and aluminum phosphide.

As regard clinical scores in the current study GCS was low (≤ 8) within 24 hours of admission of patients in (20%), moderate (12-9) in (23%), while was high (≥ 13) in majority of patients (57%). Also, (60%) of patients had MAS ≤ 10 points, (26%) had score (11-15) points and (14%) had score ≥ 16 points, the mean of MAS was 9.83 ± 4.89 points and the range from 2 points to 25 points. This partially came with poisoning severity score used by *El*

Masry and Tawfik (2013) in 2011 annual report of Ain Shams poison control center who classified poisoned patients to low severity (75.1%), moderate (20.7%) and high severity (4.2%). Also, partially in agree with *Heshmat et al., (2012)* in Tanta study of ECG changes in acute poisoning who also classified GCS low (≤ 8) in (12.7%) of 282 studied patients, moderate (12-9) in (42.6%), while was high (≥ 13) in (44.7%) of patients. GCS less than eight had been more associated with mortality in children presenting with poisoning also, GCS of 8 or less were more liable to be intubated (*Eizadi Mood et al., 2011*).

In the current study by using linear regression analysis with the indices studied in the current work it showed that MAS score and GCS score were highly significantly increased with death hence could be used as predictors of outcome. This agrees with *Mood et al. (2011)* in Iran who revealed that GCS and MAS by using logistic regression were identified as independent risk factors for predicting outcome in suspected poisoning.

In the present study ROC curve analysis to assess the predictor of outcome of acute cardiovascular toxicity, the area under the curve for MAS score was 0.908 and GCS score was 0.924. Also, it was found that MAS score at cut off value >11.5 had corresponding sensitivity 100% and specificity 74.5%, GCS at cut off < 9.5 had sensitivity 100% and specificity 72.3%. The accuracy rate of GCS (92.4%) was slightly higher than that of MAS (92.4%) both with excellent discrimination characteristic as according to *Mood et al. (2011)* AUCs between 0.7 and 0.8 were classified as “acceptable” and between 0.8 and 0.9 as “excellent” discrimination.

Our results were in accordance with those of *Eizadi Mood et al. (2011)* in Iran who showed that mixed drug poisoning patients with GCS ≤ 10 are more liable to develop complications comparing to patients with GCS score more than 10. GCS at cut off point 10 showed accuracy 93%, sensitivity 91% and specificity 92%. Also, *Mood et al. (2011)* in Iran study of suspected poisoning showed that GCS within 24 hours of admission show

accuracy rate 90% with cut-off point 5 show sensitivity 83% and specificity 94%. In addition, MAS at cut off point 10 showed sensitivity 100% and specificity 61% and both GCS and MAS within 24 hours of admission had excellent discrimination.

Conclusion

MAS was significantly increased with mortalities, while, GCS was significantly decreased with mortalities with high accuracy rate hence could be used as predictors of outcome and they promising early simple scaling scores of prediction of mortality in acute cardiovascular toxicity with improving pathway of care, protocols of management and best use of hospital resources.

Limitations of the Study

The present study was conducted in Sohag hospitals and because there is no poison control center in Sohag, we hardly collected 100 patients with acute cardiovascular toxicity that can give us significant results. We did not make an adjustment in our results for the intensity of treatment, which may affect the rate of mortality. Despite these drawbacks, these data still provide important information and the current study is one of few studies in assessment of GCS and MAS together as predictor of mortality in acute cardiovascular toxicity.

Recommendation

The present study recommends the use of MAS and GCS as useful markers for prediction of mortality in patients with acute cardiotoxicity by cardiac drugs and non-cardiac drugs and toxins. Clearly, patients with elevated MAS (> 11 points) and decreased GCS (< 10) require monitoring and consideration of critical care unit admission and studies are necessary to evaluate whether initiation of certain treatments lipid emulsion therapy or high insulin glucose for BBs or CCBs should be empirically initiated for patients with elevated MAS or decreased GCS.

Acknowledgment

After Allah the author of this thesis dedicated the work to the soul of her father and thanks her supervisors for their kindness and

great help and they thank the medical and nursing staff of Sohag University Hospitals for their help.

References

- Aboul-Hagag K E, Ahmed FA, and Mansour AE (2013): Forensic analysis of suicide mortality in Sohag governorate (Upper Egypt) in the period 2005–2009. *Egyptian Journal of Forensic Sciences*. 2013 Jun 1;3(2):53-60
- Baskin LB (2014): Intoxication and toxidromes. *Lab Literacy for Canadian Doctors: A Guide to Ordering the Right Tests for Better Patient Care*, 173.
- Eizadi Mood N, Sabzghabae AM, Yadegarfar G H, et al., (2011): Glasgow coma scale and its components on admission: are they valuable prognostic tools in acute mixed drug poisoning? *Critical Care Research and Practice*, 10.1155: ID 952956, 5 pages.
- El Masry M and Tawfik H (2013): 2011 Annual report of the poison control centre of Ain Shams University Hospital, Cairo, Egypt. *Ain Shams Journal of Forensic Medicine and Clinical Toxicology*, 20.1: 10-17.
- Hassan BA and Siam M G (2014): Patterns of acute poisoning in childhood in Zagazig, Egypt: an epidemiological study. *International scholarly research notices*, 2014: 245279-245279.
- Hassanian-Moghaddam H, Amiri H, Zamani N, et al., (2014): QT dispersion and prognostication of the outcome in acute cardiotoxicities: A comparison with SAPS II and APACHE II scoring systems. *Cardiovascular Toxicology*, 14.2: 129-133.
- Heshmat MM, Maklad AI, Elsheikh RG, et al., (2012): Study of electrocardiographic changes associated with acute poisoning in Tanta poison center. *Ain Shams Journal of Forensic Medicine and Clinical Toxicology*, 19.2: 37-52.
- Hussien R, Ashry SK, Agwa SH, et al., (2018): Plasma MiRNA-208b as a biomarker for detection of cardiotoxicity induced by acute cardiovascular drugs poisoning. *Ain Shams Journal of Forensic Medicine and Clinical Toxicology*, 31: 15-22.
- Ismail PAM, Hilal MA, Mohamed SA, et al., (2015): Study on acute adult poisoning cases in Sohag University Hospitals in the period from October 2013 to September 2014. Thesis of master's degree, Srv3.eulc.edu.eg.
- Johnson NJ, Gaiieski DF, Allen SR, et al., (2013): A review of emergency cardiopulmonary bypass for severe poisoning by cardiotoxic drugs. *Journal of Medical Toxicology*, 9.1: 54-60.
- Karakilic E, Solakoglu GA and Karakilic ID (2016): Relationship between BNP and cardiovascular toxicity. *Acta Medica Mediterranea*, 32.6: 1791-1796.
- Mahaba HM (2000): Snake bite: epidemiology, prevention, clinical presentation and management. *Annals of Saudi medicine*, 20.1: 66-68.
- Mohamed OH, George S M and Yassa HA (2019): Evaluation of poisoning patterns in Aswan Governorate in the period from 1st of June 2017 to 31st of December 2017 (Prospective Study). *Zagazig Journal of Forensic Medicine*, 17.2: 84-95.
- Mood NE, Sabzghabae AM and Khalili-Dehkordi Z (2011): Applicability of different scoring systems in outcome prediction of patients with mixed drug poisoning-induced coma. *Indian Journal of Anaesthesia*, 55.6: 599-604.
- Shadnia S, Rahimi M, Pajoumand A, et al., (2005): Successful treatment of acute aluminum phosphide poisoning: possible benefit of coconut oil. *Human & Experimental Toxicology*, 24.4: 215-218.
- Shalaby SA, Elmasry MK, Abd-Elrahman AE, et al., (2010): Clinical profile of acute paraphenylenediamine intoxication in Egypt. *Toxicology and Industrial Health*, 26.2: 81-87.
- Singh K, Oberoi SS, and Bhullar DS (2003): Poisoning trends in the Malwa region of Punjab. *Journal of Punjab Academy of*

التنبؤ بنتيجة التسمم القلبي الحاد على أساس مقياس الغيبوية الجلاسكو كوما سكال والمقياس المعدل من اباتشي توميراي مدحت^١، مها عبد الحميد هلال^١، شرف الدين شاذلي عبد اللاه^٢، احمد محمد سعيد^١**الملخص العربي**

المقدمة: يمكن أن يكون للمرضى المصابين بالتسمم القلبي الحاد أعراض جانبية تؤدي إلى ضرورة الدخول إلى وحدات العناية المركزة. ونظرًا لحدودية أسرة العناية المركزة فإن فرز وتقسيم الحالات إلى مجموعات مختلفة وفقًا للبقاء على قيد الحياة هو أمر لا بد منه في الوقت الحاضر وقد تم الاستعانة بإجراء العديد من الأنظمة لتقييم شدة الحالة كأداة لفرز الحالات وتحسين إدارة جودة وحدات العناية المركزة.

الهدف من الدراسة: تهدف هذه الدراسة إلى تقييم دور الجلاسكو كوما سكال والنسخة المعدلة من اباتشي تو كنظام تسجيل فعال في التنبؤ بالوفيات في حالات التسمم القلبي الحاد.

طريقة البحث: أجريت دراسة مستقبلية على ١٠٠ مريض يعانون من التسمم القلبي الحاد بالعقاقير والسموم المعروفة بتسببها في اعتلال عضلة القلب بمستشفيات سوهاج، تم الحصول على موافقة خطية مستنيرة من كل مريض أو من مقدم الرعاية له / لها لإدراجها في الدراسة، والبيانات الديموغرافية والاكلينيكية بما في ذلك معلومات عن العلامات الحيوية ومقياس الجلاسكو كوما سكال وتسجيلها في ورقة خاصة مصممة لكل مريض.

نتائج البحث :

كان ٩٤٪ من المرضى من الناجين ٤ منهم خرجوا من المضاعفات . من خلال التحليل الإحصائي لتقييم مؤشر نتائج سمية القلب والأوعية الدموية الحادة ، وجد أن المقياس المعدل من اباتشي عند قيمة حدية أكبر من ١١.٥ ذو حساسية ١٠٠٪ وخصوصية ٧٤.٥٪، ويتميز الجلاسكو كوما سكال عند قيمة حدية أقل من ٩.٥ كان ذو حساسية ١٠٠٪ وخصوصية ٧٢.٣٪. وكان معدل دقة الجلاسكو كوما سكال (٩٢.٤٪) مقارنة ب (٩٠.٨٪) للمقياس المعدل من اباتشي .

الخلاصة: يمكن الاستعانة بالجلاسكو كوما سكال والمقياس المعدل من اباتشي كأدوات بسيطة في التنبؤ بالوفيات في التسمم القلبي الحاد.

التوصيات: يوصى بالاستعانة بالجلاسكو كوما سكال والمقياس المعدل من اباتشي تو كأدوات فرز بسيطة لمرضى التسمم القلبي الحاد في وحدة العناية المركزة لتحسين إدارة الجودة والاستفادة من موارد المستشفى.

١- قسم الطب الشرعي والسموم الإكلينيكية، كلية الطب البشرى، جامعة سوهاج، مصر.

٢- قسم الباطنة العامة- امراض القلب، كلية الطب البشرى، جامعة سوهاج، مصر.