Original Article



Serum glucose/ potassium ratio compared to theophylline level as a predictor of severity and outcome in acute theophylline toxicity

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ABSTRACT

Background: Acute theophylline toxicity represents a significant hazard, mainly in developing countries, due to its severe consequences, the absence of an antidote, and the existence of many factors that affect the prognosis of acutely theophylline-intoxicated patients. Aim: This study aimed to investigate the role of glucose/potassium ratio in the early prediction of the severity and outcome of acute theophylline toxicity in terms of morbidity and mortality, compared to serum theophylline concentration as the gold standard predictor. Methods: This cross-sectional study was conducted on adult patients with a diagnosis of acute theophylline toxicity admitted to the Poison Control Center, Ain Shams University hospitals, during the period from the beginning of January 2021 to the end of June 2022. For each patient, sociodemographic, clinical, and laboratory data, including theophylline levels and glucose/potassium ratio, were recorded. Results: Fiftyseven patients were enrolled in the study and classified according to the Poisoning Severity Score into minor, moderate, and severe toxicity groups. Both theophylline levels and glucose/potassium ratios were significantly higher in the severe and moderate groups compared to the minor group, and both predicted severe cases. However, theophylline level was more specific, while the glucose/potassium ratio was more sensitive for predicting severe cases. Conclusion: A high glucose/potassium ratio can be used for the early prediction of severe cases of acute theophylline toxicity.

Keywords: Glucose/potassium ratio, theophylline level, theophylline toxicity, poisoning severity score, hemodialysis Receive Date: May, 2024 Revise Date: August, 2024 Accept Date, August, 2024 Publish Date: August, 2024 **Corresponding author:* Sarah Atef Eweda *E-mail:* only.sms@hotmail.com Orchid ID:0000-0002-8135-6396

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I. INTRODUCTION

Theophylline remains the most prescribed pharmaceutical medication in many developing nations for the treatment of acute and chronic bronchial asthma due to its effectiveness, affordability, and accessibility. In addition, it is used as a diuretic, a cardiac stimulant, and a smooth muscle relaxant (Karamchand et al., 2021).

Acute theophylline is poisoning associated with gastrointestinal, neurological, musculoskeletal. and cardiovascular manifestations. It can result in life-threatening events (LTE) such as seizures and cardiac arrhythmias that are unresponsive to medication and ultimately cause cardiac arrest (Khalifa & Lashin, 2018).

The presence of numerous variables that affect the prognosis of individuals with acute theophylline toxicity and the lack of a particular antidote make acute theophylline toxicity a serious risk. As a result, physicians must identify the patients' risk factors for morbidity and mortality as soon as possible after presentation. This will allow more intensive monitoring and treatment, thereby reducing complications (**Elhawary et al., 2015**).

The Poisoning Severity Score (PSS) is a standardized tool developed in the 1990s by the European Association of Poisons Centers and Clinical Toxicologists, the International Program on Chemical Safety and the European Commission. It provides a scale for grading the severity of poisoning. The PSS classification is based on the observed clinical symptoms and signs by assigning a score from 0 to 4 as follows: None (0): No symptoms or signs related to poisoning; Minor (1): mild, transient, and spontaneously resolving symptoms; Moderate (2): pronounced or prolonged symptoms; Severe (3): severe or life-threatening symptoms and Fatal (4): severe cases resulting in death, although it is understood that death is not a grade of severity but an outcome (Persson et al., 1998; Schwarz et al., 2017).

Although serum theophylline level is considered the main determinant of theophylline poisoning severity, it may not correlate exactly with LTE and a patient may have serious poisoning even with a therapeutic or moderately elevated serum concentration (Geib, 2017). Furthermore, there are a few restrictions on its usage, such as the inconsistent relationship between its level and symptoms in chronic overdose compared overdose, to acute its

unavailability in many hospitals, and its unpredictable kinetics, which could influence how its values are interpreted (Hafez, 2018).

Thus, it becomes imperative to discover an additive or alternative parameter that is simple, quick, effective, and available in all hospitals to enable physicians to determine patients with high risk toxicity for more rapid and close monitoring (Sharif et al., 2023).

Serum glucose/potassium (G/K) ratio is a simple, fast and available parameter that has been used for prediction of severity in diseases such as subarachnoid hemorrhage, subdural hemorrhage and acute carbon monoxide poisoning that are marked by a catecholamine surge similar to that in acute theophylline toxicity (Hoffman, 2019; Smith et al., 2019; Demirtaş et al., 2021). It was reported that the serum G/K ratio is a more accurate indicator of excessive catecholamine release after intracranial hemorrhage than the serum glucose potassium concentration or serum concentration alone (Wu et al., 2021).

Previous studies have investigated the glucose-potassium ratio but to the authors' knowledge, no previous studies have incorporated theophylline levels and compared them to the glucose/potassium ratio. Thus, this study aimed to investigate the role of glucose/potassium ratio in early prediction of the severity and outcome of acute theophylline toxicity compared to serum theophylline concentration as a gold standard predictor.

II. PATIENTS AND METHODS

Study setting

The study was designed to be a cross sectional hospital based observational study. It was carried out in Poison Control Center, Ain Shams University Hospitals during the period from beginning of January 2021 till the end of June 2022 (PCC-ASUH).

Patients

-Inclusion criteria

The study included adult patients with a diagnosis of acute theophylline toxicity that was based on positive history of exposure, clinical manifestations and serum theophylline concentration.

-Exclusion criteria:

- Patients with diabetes mellitus or using any drug that can cause hypoglycemia or hyperglycemia.
- Patients with history of diseases or use of drugs that can cause hypokalemia or hyperkalemia (chronic kidney disease,

heart failure, and liver disease causing hyperkalemia, patients on therapies like diuretics, corticosteroids, laxatives).

- Previous pre-consultation treatment or presence of co-ingestion in order to avoid pharmacokinetic drug interactions and to exclude the effect of other drugs on G/K ratio.
- Patients with diseases that affect G/K ratio such as subarachnoid hemorrhage, carbon monoxide poisoning, pulmonary embolism and blunt abdominal trauma.
- 5) Acute theophylline toxicity with a delay time of more than 16 hours. The average theophylline elimination half-life in adults is reported to be 8 hours and up to 10-15 hours in sustained release preparations (Yaman et al., 2016; Blumhof, 2020). Specifying a 16-hour window helps ensure that we capture patients before extensive metabolism occurs.

-Sample size calculation:

Sample size was calculated to ensure adequate power to detect meaningful associations and significance. By using https://www.openepi.com/SampleSize/SSM ean.htm for sample size calculation and after reviewing previous study results (**Khalifa & Lashin, 2018**).Population size (for finite population correction factor or fpc) (N): 1000000 ; Hypothesized % frequency of outcome factor in the population (p): 3%+/-5;Confidence limits as % of 100 (absolute +/-%)(d): 5%.Assuming 80% power, 0.05 level of significance. Sample size will be at least 50 participants.

-Grouping

Patients were classified according to the Poisoning Severity Score (PSS) of the European Association of Poisons Centers and Clinical Toxicologists (EAPCCT) into minor, moderate or severe toxicity groups (**Persson et al., 1998**).

Methods

The data of patients were recorded in a special sheet designed for this study, including the following: demographic and intoxication data (manner of poisoning, delay time), clinical manifestations (consciousness level, vital data, gastrointestinal, cardiovascular, neurological, and respiratory manifestations) as well as data of the investigations that are conducted routinely for the evaluation of patients according to the protocols of management of PCC-ASUH.

The recorded data was used for grading patients according to the PSS. Random blood sugar (RBS) and serum potassium (K) were recorded for the calculation of G/K ratio as well as theophylline level at least 4 hours after ingestion. The majority of theophylline poisoning cases are due to the ingestion of sustained release forms which leads to a prolonged absorption phase. So, theophylline concentrations should be measured at 4-6-hour intervals measuring levels too early may not reflect peak serum concentrations which occurs later (Lucas & Donovan, 2013; Hafez, 2018).

All patients received treatment according to the protocol therapy of PCC-ASUH, which included multiple doses of activated charcoal, IV fluids, antiemetics, proton pump inhibitors, hemodialysis for severe cases and other supportive treatment.

The outcomes of the patients involved in this study were recorded regarding the following: complete recovery or death; need for ICU admission; need for mechanical ventilation or hemodialysis; as well as hospital stay duration.

Statistical analysis

Data were fed to the computer and analyzed using IBM SPSS Corp. Released 2013.IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp. Qualitative data were described using

number and percent. Quantitative data were described using mean, standard deviation for non-normally distributed data after testing normality using Kolmogrov-Smirnov test.. For qualitative data: Monte Carlo test for comparison of 2 or more groups while for quantitative non-parametric, Mann-Whitney U test was used to compare 2 independent groups. Kruskal Wallis test was used to compare more than 2 independent groups with Mann Whitney U test to detect pair-wise comparison. The diagnostic performance of a test to discriminate diseased cases from nondiseased cases is evaluated using Receiver Operating Characteristic (ROC) curve analysis. Sensitivity and Specificity were detected from the curve and accuracy was calculated through cross tabulation.

Ethical Considerations: Official authorization was received from the director of PCC-ASUH as well as approval from the Local Research Ethics Committee at the Faculty Of Medicine, ASU (Approval Number: FMASU MS 79/2022). Informed consent was also obtained from the patients themselves or their legal representatives.

III. RESULTS

The present study was conducted on patients admitted to PCC-ASUH during the period from the beginning of January 2021 till the end of June 2022 with an established diagnosis of acute theophylline toxicity based on a positive history of exposure, clinical manifestations and serum theophylline concentration after excluding 17 cases following the predetermined exclusion criteria as 5 cases were diabetic, 3 cases presented with delay time more than 16 hours, 3 cases were excluded due to incomplete laboratory data as theophylline level was not measured due to unavailability in the laboratory at that time while 6 cases were excluded due to presence of coingestion.

Fifty-five patients in the study survived, while two patients died (mortality rate =3.5%).The patients were classified according to PSS into three groups (minor, moderate and severe toxicity) as shown in figure 1.

Table 1 shows no significant difference was found between the studied groups regarding sociodemographic data or delay time, while suicide was the most common manner of poisoning. The need for hemodialysis was significantly higher in the severe group compared to the minor and moderate groups, as the majority of the severe group (87%) underwent hemodialysis while only 3.3% of moderate cases had hemodialysis. Most patients were ICU admitted, with only two mechanically ventilated patients, as shown in Table (1).

Table 2 shows that the serum G/K ratio and theophylline level were significantly higher in the severe and moderate groups compared to the minor group. Table 3 shows the relation between G/K ratio as well as theophylline level and measures of outcome. Although both theophylline level and G/K ratio were higher among ICU patients compared to non-ICU patients, neither of them showed a significant statistical difference. However, only theophylline level was significantly higher among patients who needed hemodialysis. Neither the G/K ratio nor theophylline levels were significantly different between ventilated and nonventilated patients, nor between patients who survived and those who died.

Figures 2 and 3 show ROC curve analysis of the G/K ratio and theophylline level in predicting severe cases from minor to moderate cases of acute theophylline toxicity. It showed that the cut-off value of \geq 68.2 for the G/K ratio had a sensitivity of 86.4% and a specificity of 42.9 %, while a cut-off value of \geq 74.4mcg/ml for theophylline level had a sensitivity of 81.8% and a specificity of 91.4% for predicting severe cases. Thus, both theophylline level and serum G/K ratio were able to predict the severe toxicity cases.

However, G/K ratio was found to be more sensitive than theophylline level and thus can be useful as an early marker for severity in acute theophylline toxicity. On the contrary, serum theophylline level was found to be more specific. Figure 4 shows ROC curve analysis of theophylline level in predicting the need for hemodialysis. It showed that the cut-off value of \geq 74.4 for theophylline level had a sensitivity of 95.2% and a specificity of 97.2%.



Figure (1): Pie chart showing patients classification into three groups according to PSS

Sociodemographic and intoxication		Test of			
data	Minor	Moderate	Severe	significance	
	N=4	N=30	N=23		
Age (years) (Mean±SD)	22.75±15.84	26.12±12.06	26.33±15.33	KW=0.830	
				P=0.660	
Sex: [Number/ (%)]					
Male	1/ (25%)	6/ (20%)	2/ (8.7%)	MC=1.53	
Female	3/ (75%)	24/ (80%)	21/ (91.3%)	P=0.466	
Residence: [Number/ (%)]				MC=3.69	
Rural	1/ (25%)	1/ (3.3%)	4/ (17.4%)	P=0.158	
Urban	3/ (75%)	29/ (96.7%)	19/ (83.6%)		
Delay time (hour): (Mean± SD)	6.75± 3.20	5.38± 2.24	4.39± 2.86	KW=4.19 P=0.123	
Manner of toxicity: [Number/ (%)]				MC=14.96	
Homicidal	1 (25%)	0 (0%)	0(0%)	P=0.005*	
Suicidal	0 (0%) 3 (75%)	0 (0%) 30 (100%)	1 (4.3%) 22 (95.7%)		
Need for mechanical ventilation:					
[Number/ (%)]				MC=3.06	
No	4 (100%)	30 (100%)	21 (91.3%)	P=0.216	
Yes	0 (0%)	0 (0%)	2 (8.7%)		
Hemodialysis: [Number (%)]					
No	4 (100%)	29 (96.7%)	3 (13%)	MC=41.63	
Yes	0 (0%)	1 (3.3%)	20 (87%)	P<0.001*	
Site of admission: [Number/ (%)]					
Non- Intensive care unit					
Intensive care unit	0 (0 %)	4 (13.3%)	1 (4.3%)	MC=1.73	
	4 (100%)	26 (86.7%)	22 (95.7%)	P=0.422	
Hospital stay Duration (days):	2.25 ± 1.25	1.80 ± 0.89	3.04 ± 2.84	KW=6.23 P=0.04*	
$(Mean \pm SD)$				r –0.04 ⁻	

Table (1): Sociodemographic and intoxication data of the studied groups

%:percentage, SD:standerd deviation • KW:Kruskal Wallis test; * P<0.05=statistically Significant P>0.05=Insignificant, MC:Monte Carlo test; N: number of patients; The study period from the beginning of January 2021 to the end of June 2022

Table (2): Comparison between the studied groups of acute theophylline toxicity admitted to PCC-ASUH during study period as regards glucose/ potassium ratio and theophylline level by Kruskal Wallis test.

Laboratory parameter	Minor N=4	Moderate N=30	Severe N=23	Test significance	of
G / K ratio (Mean ± SD)	47.73±16.85	79.86± 30.04	97.59± 30.13	KW=4.55 P=0.008*	
Theophylline level(mcg/ml) (Mean ± SD)	40.35±7.21	54.32±15.22	88.41±14.76	KW=34.91 P<0.001*	

SD: Standard deviation KW: Kruskal Wallis test * P<0.05=statistically Significant N: number of patients; G/K: glucose / potassium; the study period from the beginning of January 2021 to the end of June 2022

Table (3):	Relation	of	serum	glucose/	potassium	ratio	and	theophylline	level	with	measures	of
outcome.												

Laboratory markers	Non-ICU patients N=5	ICU patients N=52	Test of significance	P value
Serum G/K ratio (Mean± SD)	76.06± 35.48	85.59±31.79	z=0.621	p=0.535
Theophylline level (Mean± SD)	48.48±18.03	68.88±22.87	z=1.75	p=0.08
Laboratory markers	No hemodialysis N=36	Hemodialysis N=21	Test of significance	P value
Serum G/K ratio (Mean± SD)	77.76± 30.54	96.77±31.27	z=1.88	p=0.06
Theophylline level (Mean± SD)	52.90± 14.37	91.42± 12.21	z=6.12	p<0.001 *
Laboratory markers	Non-ventilated N=55	Ventilated N=2	Test of significance	P value
Serum G/K ratio (Mean± SD)	85.21± 32.33	72.35±15.06	z=0.651	p=0.515
Theophylline level (Mean ± SD)	66.22±22.96	91.0± 15.56	z=1.52	p=0.129
Laboratory markers	Survived N=55	Died N=2	Test of significance	P value
Serum G/K ratio (Mean± SD)	85.21± 32.33	72.35±15.06	z=0.651	p=0.515
Theophylline level (Mean± SD)	66.22±22.96	91.0± 15.56	z=1.52	p=0.129

SD: Standard deviation •P<0.05=statistically Significant P>0.05=Insignificant G/K: glucose/ potassium ratio Z: Mann Whitney U test; N: number of patients, ICU: intensive care unit; G/K: glucose / potassium The study period from the beginning of January 2021 to the end of June 2022



Figure (2): Receiver Operating Characteristic (ROC) curve of glucose /potassium ratio in predicting severe cases with sensitivity 86.4 % and specificity 42.9%



Figure (3): Receiver Operating Characteristic (ROC) curve of theophylline level in predicting severe cases with sensitivity 81.8 % and specificity 91.4%



Figure (4): Receiver Operating Characteristic (ROC) curve of theophylline level in predicting need for hemodialysis with sensitivity 95.2% and specificity of 97.2%.

Discussion

Acute theophylline toxicity can be manifested by different systems affection, ranging from mild symptoms to severe and even fatal outcomes. Predicting the severity and outcomes of patients with acute toxicity is imperative for providing suitable and aggressive supportive management to improve clinical outcomes (Aggelopoulou et al., 2018).

The current study was designed to investigate the role of G /K ratio in early prediction of severity and outcome of acute theophylline toxicity in terms of morbidity and mortality compared to serum theophylline concentration as a gold standard predictor.

The present study showed that no significant difference was found between the studied groups as regards sociodemographic data. Although the present study showed that the mean delay time was longer in minor and moderate cases than in severe cases, yet, it showed no significant difference among the studied groups. Intentional poisoning was the main manner of poisoning among the studied cases. Abuelfadl et al. (2017) and Hafez (2018) also reported that all patients with acute theophylline toxicity were due to suicidal attempts and no accidental exposure was recorded in their study

The need for hemodialysis was significantly higher in the severe group (87%). Mechanical ventilation was needed only for two patients that had unfavorable outcome and died. Also, the mean hospital stay duration was significantly different between groups in the present study, as the severe group had longer hospital stay duration in comparison to that of both the moderate and minor groups. According to Hocaoğlu et al. (2014), cases with severe acute theophylline toxicity who are admitted to the ICU need a longer hospital stay duration as they need close observation and medical care for the proper treatment of complications.

In this study, the majority of patients were admitted to the ICU. Acutely intoxicated patients frequently do not have a well-known clinical course or predictable sequelae. The uncertain nature of a toxicological emergency affects the decisions made by healthcare personnel about patient admission to the ICU. For a poisoned patient, the decision of ICU admission depends not only on the severity of the patient but also on xenobiotic characteristics, patient characteristics, the need for monitoring and assessing the capabilities of an observation unit or inpatient unit (Kirk, 2011).

All patients of minor group (four patients) were admitted to the ICU. Despite this unexpected finding, it may be explained that PSS does not estimate risks or hazards on the basis of parameters such as amounts ingested or serum concentrations (Persson et al., 1998; Schwarz et al., 2017). When the history of a patient regarding the quantity consumed is large, unknown, or not accurate, physicians might choose to admit the patient to the ICU as a precautionary measure to ensure immediate intervention if the patient's condition deteriorates, especially that the initial clinical presentation of theophylline toxicity can be asymptomatic or mild and the course is unpredictable (McLaughlin et al., 2009; Kirk, 2011).

The present study also observed longer hospital stay duration in the minor group compared to the moderate group. Since management decisions should not be based only on clinical assessment but also on serum concentration of theophylline, patients may have serial theophylline levels that don't decline into the therapeutic range due to variability in the drug's metabolism, prolonging their hospital stay (Hymel, 2016). The current study revealed that serum theophylline level was significantly higher in moderate and severe cases compared to minor cases. It goes hand in hand with Amin et al. (2013), who found a highly significant relation between theophylline serum level and severity grades of the studied cases according to PSS. Similarly, Khalifa & Lashin (2018) revealed a significant correlation between peak serum theophylline concentration and major toxic effects.

In the present study, serum theophylline level was significantly higher among patients who needed hemodialysis compared to those who didn't, while G/K ratio showed no significant difference as regards hemodialysis need.

This was in accordance with Abdelwahab & Hussien (2020), who formed a new score for prediction of the probability of the need of an acutely theophylline intoxicated patient for hemodialysis from clinical and laboratory results, one important parameter was theophylline level >56.7 μ g/ml.

Hemodialysis could be performed prophylactically if serum theophylline level was 80-100 μ g/ml after an acute ingestion, if patients presented with LTE such as seizure, hypotension or cardiac arrhythmias or in patients unable to tolerate activated charcoal (*Borkan*, 2002).

In the current study, serum theophylline level is not significantly related to ICU admission or mortality. The indication for ICU admission may be related to other medical conditions rather than the direct effect of theophylline, as both theophylline level and G/K ratio were not significantly different between ICU and non-ICU patients. On the contrary, Khalifa and Lashin (2018) found that theophylline level showed statistically significant association with ICU theophylline admission in intoxicated patients.

the In current study, serum theophylline level was higher in ventilated patients when compared to non-ventilated patients, but there was no significant difference. Therefore, rather than being directly related to theophylline toxicity, the need for mechanical ventilation in cases of acute theophylline toxicity may be related to other medical problems, such as aspiration pneumonia in the event of vomiting in a comatose patient. This is closely related to Leroy et al. (1997), who stated that the main underlying risk factor for aspiration pneumonia was drug overdose (39%) and mechanical ventilation was required for 73 patients out of 116 patients in their study.

The present study revealed that the mean serum G/K ratio was significantly higher in the severe group compared to the moderate and minor groups. A high G/K ratio was described in several pathological conditions; a high serum G/K ratio in patients with aneurysmal subarachnoid hemorrhage would be useful in predicting poor prognosis, as investigated by Matano et al. (2019). Similarly, according to studies conducted by Okazaki & Kuroda (2018) and Hasegawa et al. (2022); patients with subarachnoid hemorrhage with poor clinical status had significantly higher levels of catecholamines and thus a higher G/K ratio. Also, Boyuk (2022) used the G/K ratio for diagnostic differentiation between massive pulmonary embolism and non-massive pulmonary embolism. In his study, the G/K ratio showed a strong diagnostic value, as the cut off value of 26.5 had a sensitivity of 72% and a specificity of 70%. In addition, Katipoğlu & Demirtaş (2022) used the G/K ratio in evaluating patients with blunt abdominal trauma, and they concluded that this ratio played an important role in predicting severity.

Furthermore, an elevated G/K ratio was reported as an early predictor for delayed neuropsychiatric syndrome in carbon monoxide poisoning (Demirtas et al., 2021) intermediate syndrome in and acute organophosphorus intoxication (Sharif & Fayed, 2022). Additionally, high G/K ratio was associated with unfavorable outcome in methylxanthine intoxication (Sharif et al., 2023).

Hoffman (2019) and Smith et al. (2019) concluded that the serum G/K ratio is an easy, quick and accessible parameter that has been used for the prediction of severity in diseases marked by catecholamine surge. The cause of the elevated G/K ratio in those conditions was explained by Katipoğlu & Demirtaş (2022) as the sympathetic system is activated, resulting in the release of massive amounts of such catecholamines as adrenaline. noradrenaline, and dopamine, along with and corticosteroids. glucagon Catecholamines are of great importance after any stress condition because they increase glucagon secretion and thus increase blood glucose concentrations. In addition. hypokalemia occurs due to a trans-cellular shift linked to increased catecholamine activity.

In the current study, both serum theophylline level and serum G/K ratio were able to predict the severity of cases However, G/K ratio was found to be more sensitive than theophylline level and thus can be useful as an early marker for severity in acute theophylline toxicity. On the contrary, serum theophylline level was found to be more specific.

This is comparable to the findings of Sharif et al. (2023), who discovered that the G/K ratio was the most reliable indicator of patients with severe LTE. The researchers highlighted the value of using the G/K ratio for its sensitivity because there is often a delay between the occurrence of lifethreatening events (LTEs) and the peak blood theophylline levels. They explained that the serum theophylline level is not expected to surge immediately after exposure. The researchers came to the conclusion that the G/K ratio is a significant and practical measure that could predict or stratify patients according to severity and thus, guide decision-making and prioritize the treatment lines in methyl xanthine intoxicated patients

Conclusion: A high G/K ratio can be used as a simple tool for early prediction of severe cases of acute theophylline toxicity.

Recommendation: It is recommended to use the G/K ratio as a predictor of severity in acute theophylline intoxicated patients either as an added parameter to theophylline level or an alternative if theophylline level is not available. Repeated measurement of G/K ratio to follow up on the response to treatment is also recommended.

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نسبة الجلوكوز الي البوتاسيوم في الدم مقارنة بمستوى الثيوفيلين كمتنبئ لشدة سمية الثيوفيلين الحادة

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الخلفيه: تشكل سمية الثيوفيلين الحادة خطراً كبيراً نظراً لعواقبها الوخيمة، التي تظهر بشكل رئيسي في البلدان النامية. يعود ذلك إلى عدم وجود ترياق محدد وإلى تعدد العوامل المؤثرة على نتائج المرضى المصابين بالتسمم الحاد بالثيوفيلين.

الهدف: تهدف هذه الدراسة إلى تقييم دور نسبة الجلوكوز الي البوتاسيوم في التنبؤ المبكر بشدة ونتائج سمية الثيوفيلين الحادة من حيث المرض والوفيات مقارنة بتركيز الثيوفيلين في الدم كمعيار ذهبي.

الطريقه: اجريت هذه الدراسة المقطعية على المرضى البالغين الذين تم تشخيصهم بتسمم الثيوفيلين الحاد و تم حجز هم بمركز السموم الاكلينكي، بمستشفيات جامعة عين شمس خلال الفترة من بداية يناير 2021 حتى نهاية يونيو 2022. تم تسجيل بيانات التقييم السريري ومستويات الثيوفيلين ونسبة الجلوكوز الى البوتاسيوم وكذلك نتائج التسمم.

النتائج: تم تسجيل سبعة وخمسين مريضًا في الدراسة وتصنيفهم وفقًا لدرجة خطورة التسمم إلى مجموعات طفيفة ومتوسطة وشديدة التسمم. كانت مستوىات الثيوفيلين ونسبة الجلوكوز الي البوتاسيوم أعلى بشكل ملحوظ في المجموعات الشديدة والمتوسطة التسمم مقارنة بالمجموعة الطفيفة وكلا المؤشرين تنبأ بالحالات الشديدة. ومع ذلك؛ كان مستوى الثيوفيلين أكثر دقة في التحديد بينما كانت نسبة الجلوكوز الي البوتاسيوم أكثر حساسية.

الاستنتاج: يمكن استخدام نسبة الجلوكوز الي البوتاسيوم العالية كأداة للتنبؤ المبكر بالحالات الشديدة من تسمم الثيوفيلين الحاد. التوصيات : يوصى باستخدام نسبة الجلوكوز إلى البوتاسيوم كمؤشر على شدة التسمم الحاد بالثيوفيلين، إما كمعامل إضافي لمستوى الثيوفيلين أو كبديل إذا لم يكن مستوى الثيوفيلين متاحًا. كما يوصى بإجراء قياسات متكررة لنسبة الجلوكوز إلى البوتاسيوم لمتابعة الاستجابة للعلاج.