Evaluation of Blood Gas Results of Patients Presenting to the Emergency Department with Diabetic Ketoacidosis

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Introduction

Diabetic Ketoacidosis is an acute, life-threatening complication of Diabetes Mellitus (1). It is usually seen in patients with Type 1 Diabetes, but it can also occur in patients with newly diagnosed Type 2 Diabetes. Its clinical manifestations are associated with hyperglycemia, dehydration, and acidosis. Initial diagnostic procedures include blood glucose measurement, complete urinalysis, ECG, blood gas determination, and a normal saline (NS) IV infusion. High serum ketone levels lead to increased anion gap metabolic acidosis (2). Sometimes a high anion gap may be the only clue to the presence of an underlying metabolic acidosis, therefore serum electrolytes should be carefully examined. Osmotic diuresis leads to excessive loss of sodium chloride in the urine. In addition, the presence of hyperglycemia tends to artificially lower serum sodium levels. It is accepted that every 100 milligrams of glucose reduces the sodium value by 1.6 mEq (3). In diabetic ketoacidosis, blood gas is necessary to evaluate acid-base status. Studies have reported that blood gas is 97.8% sensitive and 100% specific for the diagnosis of diabetic ketoacidosis (3). The aim of this study is to evaluate blood gas analysis in patients admitted to the emergency department with diabetic ketoacidosis, using standard serum electrolyte normal ranges as criteria.

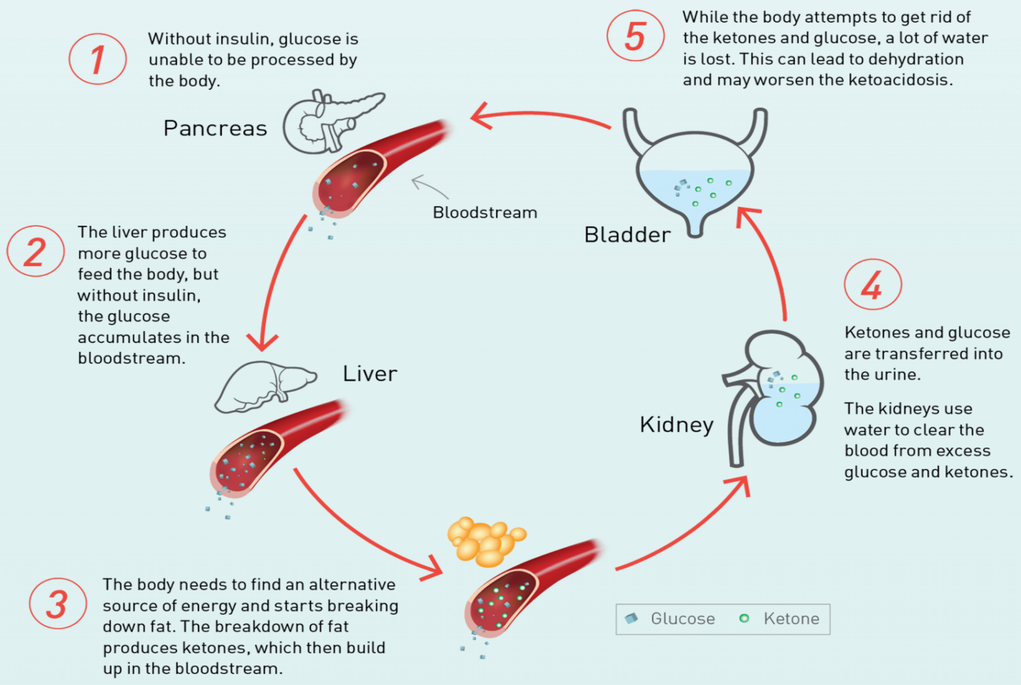

Figure 1: Diabetic Ketoacidosis (DKA) – Why should it matter to me? Available from: https://www.nipro-group.com/en/inspire/diabetic-ketoacidosis-dka-why-should-it-matter-me

Materials & Methods

This study was planned retrospectively on 62 patients who applied to the emergency department. According to the Raosof Sample Size Calculator program, with reference to previous studies, the minimum number of samples was found to be 45 at a 95% confidence level. Patient selection was made randomly on the hospital database. Patients over 18 years of age who were diagnosed with diabetic ketoacidosis after applying to the emergency department between January 1, 2022, and July 1, 2022, were included in the study. Patients who could not be diagnosed with diabetic ketoacidosis and who had renal failure and respiratory failure were excluded from the study. According to the criteria of the American Diabetes Association; Diabetic Ketoacidosis was defined as serum glucose ≥ 250 mg/dL, serum anion gap > 10 mEq/L, bicarbonate ≤ 18 mEq/L, pH ≤ 7.30, and ketones in urinalysis. The normal ranges of serum electrolyte values were accepted as standard, and the results were compared with these values. Clinical severity groups and blood gas results, demographic data, patient's complaints and results (discharge, follow-up, service, intensive care, exitus) were compared.

The statistical analysis of the study was generally presented as descriptive and descriptive statistics (mean, standard deviation, median, percentage) were used. After recording the collected data, qualitative data were reported as percentage frequencies (%), quantitative data as mean ± standard deviations, and SPSS was used for data analysis.

Results

Frequency Table					
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		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	,00	25	40,3	40,3	40,3
	1,00	37	59,7	59,7	100,0
	Total	62	100,0	100,0	
dkaşiddeti					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	,00	28	45,2	45,2	45,2
	1,00	24	38,7	38,7	83,9
	2,00	10	16,1	16,1	100,0
	Total	62	100,0	100,0	

Table 1 (Frequency Table)

The mean age of the patients is 34,923. Of these patients, 25 (40.32%) were female and 37 (59.68%) were male (Table 1). Of the patients, 28 (45.2%) mild, 24 (38.7%) moderate, 10 (16.1%) severe diabetic ketoacidosis patients (Table 1). There were significant differences in pH and bicarbonate values among all clinical severity groups ($p<0.001$) (Table 2). Although there were differences in the adjusted significance levels, statistically significant differences were revealed between our clinical severity groups in values such as pCO2, anion, chlorine, creatinine, white blood cells and urine ketone ($p<0.001$) (Table 2).

Kruskal-Wallis Test	komorbidite	yaş	glukoz	pH	pCO2	lactat	HCO3	BE	anyon	idrarketon	crp	NA	K	CL	üre	kreatin	wbc
Kruskal-Wallis H	0,234	0,744	0,353	29,422	23,269	1,069	48,584	0,351	35,735	19,308	0,220	0,302	1,491	14,955	2,157	15,079	8,769
p	0,889	0,689	0,838	0,000	0,000	0,586	0,000	0,839	0,000	0,000	0,896	0,860	0,475	0,001	0,340	0,001	0,012

Table 2 (Kruskal-Wallis Test)

Conclusion

In our study, when we compared the clinical severity groups of diabetic ketoacidosis with the comorbidity, age, and some blood gas results such as glucose, lactate, base excess, CRP, sodium, potassium, and urea, we could not find a statistically significant difference between the clinical severity groups ($p>0.05$) (Table 2). Thus, more detailed studies with larger sample ranges are needed on this subject.

References

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