

# Lactation Ketoacidosis in a COVID- 19 patient: A Case Report

Areej N. Almweisheer and Aeshah S. AlAtawi

Department of Emergency Medicine, King Fahad Medical City, Saudi Arabia

## Abstract

Lactation ketoacidosis is an uncommon cause of HAGMA affecting breastfeeding women due to increased metabolic demands, reduction in carbohydrate intake, and acute illness. We report a case of a 22-year-old lady, 4 weeks postpartum, with a confirmed diagnosis of COVID-19. Starvation and lactation may induce ketoacidosis, and COVID-19 may aggravate the condition. Emergency services should consider the risk of starvation lactation ketoacidosis associated with COVID-19 in postpartum women.

## Case presentation

A 22-year-old lady, 4-month post-partum, presented to the emergency department (ED) with 5 days' history of fever, nausea, vomiting, and abdominal pain. She had been diagnosed with COVID-19 five days before her presentation. Due to her worsened condition, she had been unable to tolerate any food intake in the preceding five days. Systemic review unremarkable. She did not have a history of diabetes, alcohol drink, or drug abuse.

**On Arrival to ED**, her vital signs BP122/95 mmHg, HR154 beats/min, T 37.8 C, and a RR 22 breaths/min, and RBS 2.8 mmol/L.

**The clinical examination** revealed an anxious-ill appearing woman and dry oral mucous membranes with the rest of the physical examination being normal. Bedsides, abdominal ultrasound Unremarkable

**VBG** revealed severe metabolic acidosis with PH: 7.06, (PCO<sub>2</sub>): 18.2 kPa, (HCO<sub>3</sub>): 8.7 mmol/L, lactate: 1.4 mmol/l. A urine dipstick analysis revealed ketonuria (+3).

Initial labs as shown in table 1

chest X-ray Normal, and a 12-lead ECG showed sinus tachycardia.

**Based on the initial evaluation**, she received in the ED 2 liters of normal saline, 50 ml of 50% dextrose, 10 mg of metoclopramide, and 1 gr of paracetamol. Differential diagnoses of HAGMA were taken into consideration including environmental causes, toxicology causes, uremia, DKA, alcoholic ketosis, and lactic acidosis.

However, given the patient's normal levels of lactic acid and cortisol, and toxicology screening, these etiologies were ruled out. Furthermore, serum osmolality was normal. Our differential diagnosis was further narrowed due to the presence of elevated ketones. Given the patient's malnourished and postpartum state, the most likely cause of HAGMA was lactation ketoacidosis. She was admitted to our medical ward for further care. Throughout the admission, she had multiple incidents of low random blood sugar and hypokalemia; however, work up for adrenal insufficiency was performed which came back negative. The patient was started on 5% dextrose intravenous fluids, sodium bicarbonate, and electrolyte replacement. The patient was encouraged for gradual feeding from the second day of admission. Antibiotics, steroids, antiviral medication, and enoxaparin were started as part of the COVID-19 management plan. After five days of admission, the patient had fully recovered and she was discharged in good condition.

Table 1: Laboratory values upon admission and during admission course

Laboratory Value	Day 1	Day 2	Day 3	Day 4	Day 5	Reference range
PH	7.06	7.37	7.46	7.46	7.47	7.35 – 7.45
pCO <sub>2</sub> (mmHg)	< 5.0	22.6	21.8	24.5	20.5	41-51
Serum Anion gap (mmol/L)	27.8	11.2	14.0	12.6	16.4	8-12
lactate (mmol/L)		0.80	0.94			0.5 -2.2
Urine-Ketone (mg/dL)	positive					negative
Serum osmolality (mOsm/kg)				281		
Serum potassium (mmol/L)	4.84	2.79	2.95	3.05	3.58	3.4-4.4
Serum creatinine (umol/L)	81	36	44	46	43	49-90
Glucose, plasma	3.2	10.3				
Cortisol, serum (nmol/L)			54 (pm)			am:101 - 536,
Ethanol (Serum)			negative			negative
Lipase	12					

## Discussion

Ketoacidosis is a severe metabolic disorder characterized by the accumulation of ketone bodies and acidosis, is mostly seen in people with diabetes, and is rarely induced by other pathological conditions [4]. However, lactation ketoacidosis is a rare cause of HAGMA affecting breastfeeding mothers. Ketoacidosis has been reported to be induced by a low carbohydrate diet [5]. Negative energy balance, due to any stressor such as in breastfeeding, exacerbates ketogenesis and may produce lactation ketoacidosis [6].

In our case, a non-diabetic lactating woman presented with ketoacidosis. The patient had been diagnosed with COVID-19 5-days before her presentation to the ED. The presenting and non-specific symptoms of this lady are similar to the common symptoms of lactation ketoacidosis that could be a result of metabolic acidosis and hypoglycemia. Due to her worsened condition, she had been unable to tolerate any food intake in the preceding five days. However, a previous study reported that COVID-19 might increase fat breakdown and induce ketosis which leads to ketoacidosis. Therefore, lactating women with ketoacidosis and infected with COVID-19 should have a high carbohydrate diet to reduce the risk of ketoacidosis.

The mechanism of COVID-19-induced lactation ketoacidosis needs further research. However, a recent study showed that patients with COVID-19 commonly presented with reduced oral intake, and the suboptimal or poor feeding may result in high caloric deficits [7]. COVID-19 might further aggravate lactation ketoacidosis and can perhaps even be the trigger of this condition.

Our management approach in evaluating presenting symptoms and underlying factors, biomedical investigation, and treatment was consistent with the approach described in the systematic review of lactation ketoacidosis reported by Alawi et al., 2020. The main treatment of our case includes dextrose infusion and hydration, electrolytes replacement, a balanced diet, and treatment of the COVID-19.

## Conclusions

This is a unique case of a postpartum lady with confirmed COVID-19 having lactation ketoacidosis. COVID-19 might be associated with lactation ketoacidosis and knowing this association would enhance considering this diagnosis in the appropriate population whenever having a COVID-19 suspected or confirmed case with ketosis and HAGMA.

## References

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