



## Research Article

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# Evaluation of serum calcium levels in patients with COVID-19 in Shahid Sadoughi Hospital in Yazd

**Faezehsadat Heidari<sup>1</sup>, Jamshid Ayatollahi<sup>1,2</sup>, Seyed Mehran Mirallahi<sup>3</sup>, Mohammad Sharifyazdi<sup>1</sup>, Seyed Alireza Mousavi<sup>1</sup>, Zahre Akhondimeybodi<sup>1,4</sup>, Mahdie Hamidfar<sup>1</sup>, Seyed Hossein Shahcheraghi<sup>1</sup>**

<sup>1</sup> Infectious Diseases Research Center, Shahid Sadoughi Hospital, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

<sup>2</sup> Hematology and Oncology Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

<sup>3</sup> Medical Student, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

<sup>4</sup> Infectiologist, Fellowship of Prevention and Control of Nosocomial Infections, Shahid Sadoughi Hospital, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

## Abstract

COVID-19 produced by SARS-CoV-2 is still distributing and its dangerous cases are related to electrolyte disorders such as calcium levels disturbance. The aim of current study was to investigate serum calcium levels in patients with COVID-19 in Shahid Sadoughi Hospital of Yazd. In this cross-sectional study, COVID-19 patients admitted to Shahid Sadoughi Hospital in Yazd from March 2019 to March 2020 were studied. The following data were extracted from patients' records: age, sex, time elapsed from onset of symptoms to hospitalization, severity of COVID-19, serum calcium level at hospitalization, and disease outcome (recovery or death). The serum calcium level mean of patients was  $8.2 \pm 0.7$  mg/dl. Most patients had hypocalcemia. Patients who died had lower serum calcium levels than patients who recovered. Therefore, hypocalcemia is common in hospitalized COVID-19 patients and is associated with mortality.

**Keywords:** COVID-19, Serum Calcium Levels, Mortality.

## INTRODUCTION

COVID-19 can involve different parts of the body [1]. These include the gastrointestinal tract and kidneys [2]. These organs play an important role in maintaining the balance of various electrolytes including sodium, potassium, and calcium [3]. Because of this, dysfunction of any of these organs can lead to electrolyte disturbances [4].

In general, maintaining an electrolyte balance is essential for the optimal functioning of the human body, and any disturbance in this balance as a result of disease or infection can have devastating effects [5,6].

Due to the high prevalence of COVID-19 and related electrolyte disturbances, it is important to investigate the relationship between electrolyte levels with the severity and prognosis of COVID-19 in order to use therapeutic methods and improve patient outcomes [7-9].

Therefore, this study was designed to assess serum calcium levels in patients with COVID-19 in Shahid Sadoughi Hospital of Yazd.

## MATERIALS AND METHODS

In this cross-sectional study, all patients over 18 years with COVID-19 who were hospitalized in Shahid Sadoughi Hospital in Yazd from March 2019 to March 2020 were included in the study. This study was approved by the ethics committee of Shahid Sadoughi University of Medical Sciences of Yazd. Inclusion criteria included age over 18 years and COVID-19 disease approved by positive PCR test or evidence of lung involvement on CT scan. Exclusion criteria included patient dissatisfaction and incomplete record.

Patients' information including age, sex, time elapsed from onset of symptoms to hospitalization, disease severity, disease outcome (death/recovery) and serum calcium level were extracted from archived records.

### \*Corresponding author:

**Dr. Seyed Hossein Shahcheraghi**

Infectious Diseases Research Center, Shahid Sadoughi Hospital, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

Email: shahcheraghi@gmail.com

interosseous hedge is too strong to break; there is rather an inferior disinsertion.

Patients were classified into three groups according to the severity of the disease:

1) Mild: Fever or myalgia or other respiratory symptoms plus less than 50% lung involvement on CT scan

2) Moderate: fever or myalgia or other respiratory symptoms plus more than 50% lung involvement on CT scan

3) Severe: The disease was considered severe with any of the following characteristics:

a. More than 30 breaths per minute

b. Blood oxygen saturation less than 93% at rest

c. Requires mechanical ventilation

d. Shock

e. Organ failure

Serum calcium levels were also classified into three categories: low (less than 8.5 mg/dl), normal (8.5-10.5 mg/dl) and high (more than 10.5 mg/dl).

Finally, the collected data were analyzed by SPSS V.22 software.  $P < 0.05$  was considered statistically significant.

## RESULTS

The age mean of patients was  $55.5 \pm 17.5$  years. Most patients (36.1%) were between 41-60 years old. In most patients (53.2%), the time between the onset of symptoms and hospitalization was between 4-6 days. The serum calcium level mean of patients was  $8.2 \pm 0.7$  mg/dl (Table 1).

**Table 1:** Demographic and clinical characteristics of patients

Variables		N (%)
Age (year)	18-40	84 (23.7)
	41-60	128 (36.1)
	61-80	108 (30.4)
	80 <	35 (9.9)
Gender	Female	155 (43.7)
	Male	200 (56.3)
Time elapsed from onset of symptoms to hospitalization (days)	<4	81 (22.8)
	4-6	189 (53.2)
	>6	85 (23.9)
Severity of the disease	Mild	184 (51.8)
	Moderate	137 (38.6)
	Severe	34 (9.6)
Outcome of the disease	Recovery	312 (87.9)
	Death	43 (12.1)
Serum calcium level	Low	243 (68.4)
	Normal	108 (30.5)
	High	4 (1.1)

COVID-19 patients whose end result was death had lower serum calcium levels than patients who recovered ( $p = 0.000$ ) (Table 2).

**Table 2:** Relationship between serum calcium levels and studied variables

Variables		Serum calcium level (mg/dl) (mean $\pm$ standard deviation)	p-value
Age (year)	18-40	0.6 $\pm$ 8.3	0.449
	41-60	0.6 $\pm$ 8.2	
	61-80	0.7 $\pm$ 8.3	
	80 <	0.6 $\pm$ 8.2	
Gender	Female	0.6 $\pm$ 8.3	0.517
	Male	0.7 $\pm$ 8.2	
Time elapsed from onset of symptoms to hospitalization (days)	<4	0.7 $\pm$ 8.2	0.744
	4-6	0.7 $\pm$ 8.3	
	>6	0.6 $\pm$ 8.2	
Severity of the disease	Mild	0.6 $\pm$ 8.3	0.165
	Moderate	0.6 $\pm$ 8.2	
	Severe	0.8 $\pm$ 8.1	
Outcome of the disease	Recovery	0.6 $\pm$ 8.3	0.000
	Death	0.7 $\pm$ 7.8	

## DISCUSSION

The present study showed that most the hospitalized patients had hypocalcemia and lower calcium levels were associated with mortality. Many previous studies have shown that hypocalcemia is a significant feature of COVID-19<sup>[10,11]</sup>.

In a retrospective study in Milan, Italy, hypocalcemia was very common among COVID-19 patients and was used as a predictor of hospitalization. This study also showed that hypocalcemia is associated with male gender and older ages<sup>[12]</sup>. However, in the present study, there was no difference in serum calcium levels based on age groups and gender.

In a study on 18437 hospitalized patients, serum calcium level was a vital marker of the mortality at the time of admission. The highest mortality in this study was seen in hypocalcemic patients<sup>[13]</sup>.

Another study showed that hypocalcemia was associated with increased ICU admission and mortality in COVID-19 patients<sup>[14]</sup>.

Another study found that hypocalcemia was more common in COVID-19 patients than in the healthy population but was not associated with disease severity<sup>[15]</sup>.

## CONCLUSION

The results showed that lower calcium levels were not associated with disease severity but could be the predictor of disease poor outcome and mortality.

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## Conflicts of interest

None declared.

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