



## Lower Urinary Tract Symptoms in Hospitalized Patients with COVID-19

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### Abstract

**Background:** The purpose of the current study was to investigate Lower Urinary Tract Symptoms (LUTS) in patients infected by SARS-CoV-2.

**Methods:** In this cross-sectional study, 203 patients diagnosed with COVID-19 based on the positive results of Reverse Transcription Polymerase Chain Reaction (RT-PCR) tests of oropharyngeal and nasopharyngeal swabs were enrolled. None of the patients were on diuretic drugs, anticholinergic agents, and alpha blockers. Patients with a history of LUTS, urethral stenosis, neurogenic bladder, urinary tract infection, and Benign Prostatic Hyperplasia (BPH) were excluded from the study. Questions about basic characteristics and de novo LUTS were asked from each patient and the answers were recorded.

**Results:** De novo lower urinary tract symptoms were identified in 30 (14.7%) patients, 23 males and 7 females indicating a significant difference in terms of sex ( $p=0.005$ ). The most frequent urinary tract symptom was frequency which was reported in 21 patients.

**Conclusion:** There is no clear explanation on the relationship between LUTS and SARS-CoV-2. However, the potential ability of the virus for causing viral cystitis may be a reasonable hypothesis. Therefore, still further studies are required to determine the role of COVID-19 virus in urinary tract symptoms.

**Keywords:** COVID-19, SARS-CoV-2, Urinary tract

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## Introduction

COVID-19 disease is the clinical term of the new severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) infection (1) which was initially identified in December 2019 in Wuhan, China.

Although the typical symptoms of COVID-19 are dry cough, fever, myalgia, and breathing difficulties (2), there is considerable literature about the involvement of other organs and systems including nervous, cardiovascular, gastrointestinal, endocrine, and cutaneous system (3-6). Nevertheless, one of the less discussed manifestations is urinary tract symptoms in the absence of any other causes. Firstly, Mumm *et al* reported urinary frequency as a symptom of SARS-CoV-2 (7); Liu *et al* showed that glycosuria and proteinuria have a role in severe COVID-19 manifestations (8). To date, there is little data in the literature on the urinary tract symptoms in COVID-19 patients. In the present study, lower urinary tract symptoms were investigated in patients infected by SARS-CoV-2.

## Materials and Methods

This cross-sectional study was approved by the Ethics Committee of IUMS (IR.IUMS.REC.1399.670) and an informed consent was obtained from each patient prior to participation. In this study, 203 patients diagnosed with COVID-19 based on the positive results of Reverse Transcription Polymerase Chain Reaction (RT-PCR) tests of oropharyngeal and nasopharyngeal swabs were enrolled. The diagnosis process and RT-PCR test were performed based on the World Health Organization guidelines. The patients with a negative RT-PCR were excluded from the study. All patients were admitted to Firoozgar General Hospital affiliated to Iran University of Medical Sciences (IUMS) from June 2020 to January 2021. None of the patients were on diuretic drugs, anticholinergic agents, and alpha blockers and were not affected by diabetes, bladder, and renal disorders. There was no history of pelvic organ surgery, pelvic radiotherapy, surgical treatment for Benign Prostatic Hyperplasia (BPH), cystoscopy, bladder or urethral surgery. Patients with a history of Lower Urinary Tract Symptoms (LUTS), urethral stenosis, neurogenic bladder, and BPH were excluded from the study. BPH cases were excluded based on history,

International Prostate Symptom Score (IPSS), and abdominal ultrasound findings. All cases with urinary tract infection based on urine analysis and culture were also excluded from study.

LUTS was investigated in the studied patients after their hospitalization for COVID-19 infection. Questions regarding basic characteristics, respiratory symptoms, and de novo LUTS were asked from each patient and the answers were recorded. The definitions of the International Continence Society for describing LUTS were used (9). Next, frequency, urgency, dysuria, urge incontinence, incomplete emptying, and hesitancy as lower urinary tract symptoms were assessed.

The collected data were analyzed by chi-square test, Fisher exact test and T-test using SPSS software v19 (IBM, USA). A P-value <0.05 was considered statistically significant.

## Results

A total of 203 patients, 107 (52.7%) males and 96 (47.3%) females with an average age of  $61.7 \pm 15.8$  years were enrolled in the present study. table 1 shows the demographics and clinical characteristics of the studied patients. De novo LUTS were identified in 30 (14.7%) patients. table 2 shows the frequency of LUTS was significantly higher in males than females (23 males and 7 females:  $p=0.004$ ). The most frequent urinary symptom was frequency which was reported in 21 patients. table 3 shows the prevalence of different LUTS in SARS-CoV-2 positive hospitalized patients.

## Discussion

Since the first case report of COVID-19 at the end of 2019 in China, SARS-CoV-2 has rapidly spread all over the world. According to the available studies, the most common manifestations of COVID-19 are pulmonary signs and symptoms, whereas other organs can also get involved by this virus (3-5). Few studies have assessed the different organ manifestations of SARS-CoV-2, and only a few small case series (7,10-12) have reported urinary tract symptoms in COVID-19 patients. The present study showed that de novo lower urinary tract symptoms may appear in SARS-CoV-2 infected patients with a negative urine culture and normal urinalysis. The most common

**Table 1.** Demographics and clinical characteristics of patients

Demographic characteristics	
Sex (Male/female)	107/96
Age (Years)	61.7±15.8
Body mass index (kg/m <sup>2</sup> )	25.6±6.1
Clinical sign and symptoms	
Fever	163
Cough	108
Shortness of breath	87
Myalgia and headache	193
Gastrointestinal symptoms	23
Others	69
Laboratory characteristics	
Hemoglobin (g/dL)	12.6±1.9
White blood cell count	4925±3060
Plasma creatinine (mg/dl)	1.4±1.0

**Table 2.** The frequency of LUTS in males and females

		Lower Urinary Tract Symptoms (LUTS)		
		LUTS +	LUTS -	Total
Sex	Male	23	84	107
	Female	7	89	96
	Total	30	173	203
Pearson chi-square (p-value:0.004)				

**Table 3.** Frequency of different Lower Urinary Tract Symptoms (LUTS) in SARS-CoV-2 positive hospitalized patients

LUTS	Overall frequency	Frequency in males	Frequency in females
Frequency	21	16	5
Dysuria	9	7	2
Incomplete emptying	1	1	0
Hematuria	0	0	0
Hesitancy	4	4	0
Urgency and urge incontinence	7	4	3

urinary symptom is frequency. There is no clear and solid evidence on the etiology of urinary symptoms in SARS-CoV-2 infected cases. Understanding the pathophysiology of SARS-CoV-2 related LUTS is complicated as these patients have no signs of acute kidney injury, bacterial infection, or prostatitis.

Cardona Maya and Carvajal showed that a significant group of SARS-CoV-2 patients are susceptible to suffering from prostatitis (10). They have

hypothesized that this virus, by binding to the Angiotensin Converting enzyme 2 (ACE2) receptor in the prostate, can be the potential cause of tissue alterations, prostatitis, and virus secretion into the ejaculatory fluid. However, as several cases with LUTS in our study were female, this hypothesis cannot explain the exact correlation between urinary tract symptoms and SARS-CoV-2.

Mumm *et al* suspected that viral cystitis due to

SARS-CoV-2 is the cause of the urinary frequency (7). Haghpanah *et al* showed that SARS-CoV-2 can lead to inflammation and metabolic derangement in prostate gland (13). On the other hand, some studies have shown that SARS-CoV-2 has been detected in the urine (11). Although above mentioned studies are important steps to facilitate the understanding of the virus pathophysiology, yet future research is needed to evaluate the mechanism of action of this virus in the urinary system.

This study had certain limitations; firstly, our study sample included only hospitalized patients and therefore the results may not be generalizable to all COVID-19 patients. Secondly, the high prevalence of urinary symptoms, especially frequency, in our series may be due to a confounding factor. In Iranian culture, people increase their fluid intake whenever infected with a viral respiratory disease, as

a traditional treatment. However, the intake volume was not evaluated in our patients. Thirdly, this study is a case series study and suffered from methodological limitations of descriptive studies.

## Conclusion

In conclusion, based on the available evidence, there is no clear explanation on the relationship between lower urinary tract symptoms and SARS-CoV-2. However, the potential ability of the virus for causing viral cystitis may be a reasonable hypothesis. Therefore, still further studies are required to determine the role of COVID-19 virus in urinary tract symptoms.

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