



Urinary Detection of COVID-19 Virus and its Implication in Urology Practice

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Key words:

COVID 19, SARS-COV-2, RT-PCR, urine, pandemic.

Abstract

Background: More than 25 crores of world population is affected by the pandemic corona virus SARS-CoV-2 since its first detection from Wuhan, china on December 2019. The widely accepted routes of human to human transmission for COVID-19 are through respiratory droplets and direct contact, however viral shedding in urine has been reported and infection transmission through infected urine remains a possibility.

Objective of the study: To investigate the presence of COVID-19 virus in urine of infected patients and evaluate the probability of infection transmission through urine in different urological procedure.

Methodology: After obtaining approval from institutional review board (IRB) of BSMMU this prospective cross-sectional observational study was conducted in the department of urology BSMMU from September 2020 to august 2021. Informed written consent was taken from the patients, the patients who are in ventilators legal guardian signed the consent form. After taking relevant history from the patients admitted in covid dedicated unit of BSMMU urine of the patients was collected in sterile container and with appropriate labeling and it was sent in virology department to detect the presence of SARS-COV-2 by quantitative real time polymerase chain reactions (RT-PCR). The date of covid 19 infection, date of urine sample collection, previous renal status, present renal function all were recorded.

Results: Fifty patients were enrolled for investigation for detection of covid 19 virus in urine who were infected with SARS-COV-2. Thirty patients were male and Twenty were female. Male and female sex ratio was 3:2. We found the presence of SARS-COV-2 in urine of 2 patients, one male and one female. The rate of detection of SARS-COV-2 virus in urine of patients infected by covid 19 virus was 4%.

Conclusion: Urinary detection of COVID-19 Virus was lower than oropharyngeal and rectal samples. Urological surgical intervention should be performed with caution considering the possibility of urine infection and possibility of COVID-19 transmission through this route.

Introduction

To date more than 25 crores of world populations are affected by the pandemic corona virus SARS-CoV-2 since its first detection from Wuhan, china on December 2019. Around 8.5 lacs death confirmed globally by this virus. Bangladesh ranked 15 according to rate of infection worldwide¹.

The widely accepted routes of human to human transmission for COVID-19 are through respiratory droplets and direct contact, however viral shedding in urine has been reported and infection transmission through infected urine remains a possibility². The idea of virus transmission thorough urine originated form the

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homogeneity of viral SARS-CoV-2 genome with SARS virus and the abundant previous evidence on the presence of SARS virus in urine³.

Presently, the most common method used for COVID-19 diagnosis is the detection of SARS-CoV-2 in upper and lower respiratory specimens, including nasopharyngeal swabs, oropharyngeal swabs, sputum, lower respiratory tract aspirates, and bronchoalveolar lavage⁴. Genetic testing methods, such as real-time reverse transcription polymerase chain reaction (RT-PCR), are the standard methods of laboratory testing for COVID-19 that are currently in use in most countries⁵.

Distribution of virus in different samples varied. Some found that 5.74% (95% CI 2.88–9.44%) of COVID-19 patients had positive viral RNA in urine samples, but the duration of viral shedding in urine was unknown, 65.82% (95% CI 45.71–83.51%) of COVID-19 patients had positive viral RNA in stool samples⁵.

According to some investigators the virus detection rate in the serum, urine, and stool samples were 2.8% (9/323), 0.8% (2/247), and 10.1% (13/129)⁶.

In human beings, current researches have mixed results regarding the presence of SARS-CoV-2 in urine, as several studies with a large sample found no traces of the same with Real-Time Reverse method Transcriptase - Polymerase Chain Reaction or with method of nucleic acid amplification⁷. By contrast, in just over 6% of 58 patients with Real Time Polymerase Chain Reaction method have found the presence of SARS-CoV-2 in the urine, even at a distance from the last negative nasopharyngeal swab⁸.

As an urologists, we manage patients with urological diseases and we perform both transurethral and transrectal procedures in our clinical practices². It is possible that we might encounter COVID-19 patients in our urological practices. To protect ourselves, our colleagues and our patients, it is important to understand thoroughly about the urological manifestations of COVID-19, and the possible routes of viral transmission via urine and stool². It is also important to understand whether there are any special considerations in managing specific urological conditions under the circumstances of COVID-19⁹.

Method:

After obtaining approval from institutional review board (IRB) of BSMMU this cross sectional study was conducted in the department of urology BSMMU from September 2020 to August 2021 and special collaboration and a standard memorandum of understanding (MOU) with the department of virology, BSMMU were undertaken for their technical support.

Informed written consent was taken from all the patients. The patients who fulfilled selection criteria like age more than 18 years, documented infected with covid-19 virus was included in this study. Patients who had previous renal disease and who did not give consent were excluded from the study.

After taking relevant history from the patients admitted in covid dedicated unit of BSMMU urine of the patients was collected in sterile container and with appropriate labeling was sent in virology department to detect the presence of SARS-COV-2 by quantitative real time polymerase chain reactions by Allplex SARS Cov2 Assay AndGeneProof RNA Extraction Kit. The date of covid 19 infection, date of urine sample collection, previous renal status, present renal function all were recorded.

Results:

Fifty patients were enrolled for investigation for detection of covid 19 virus in urine who were infected with SARS-COV-2. The age ranged from 20-75 years. Among them 10 patients were in age group of 20-40 years, 20 patients were in 40-60 years age group and 20 patients were 60-75 years age group.

Considering the distribution of sex, 30 patients were male and 20 were female. Male and female sex ratio was 3:2. We found the presence of SARS-COV-2 in urine of 2 patients, one male and one female. The rate of detection of SARS-COV-2 virus in urine of patients infected by covid 19 virus was 4%.

We collected all the urine sample from our covid 19 dedicated hospital. After getting admission, mean urine collection date was 9±2 days. One male who had positive urine sample detected at 8th day of admission and another female who was detected on 7th day. These two patients had moderate covid related illness.

Table I: Distribution of patients according to age and sex. (n=50)

Age (years)	Male	Female
20-40	4	3
40-60	17	11
60-75	9	6

Table II: Status of covid 19 in urine and duration of illness.(n=50)

Covid 19 in Urine	N (%)
Yes	2 (4%)
No	48 (96%)
Duration of covid illness (in days) mean \pm sd	9 \pm 2

Discussion:

This may be the first report from low sample size from September 2020 to August 2021 for detection of SARS-CoV-2 in urine samples.

Tremendous efforts have been investigating to understand this SARS-CoV-2, and its host response, epidemiological and clinical characteristics to diagnose, treat and prevent this highly contagious disease.¹⁰

COVID-19 is caused by a novel virus strain, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), that is prevalent worldwide. By January 31, 2021, more than 100 million confirmed cases and 2.3 million fatalities, spreading in almost all countries and regions of the world, has been reported.¹¹

The widely accepted routes of human to human transmission for COVID-19 are through respiratory droplets and direct contact, however viral shedding in urine has been reported and infection transmission through infected urine remains a possibility. The idea of virus transmission through urine originated from the homogeneity of viral SARS-CoV-2 genome with SARS virus and the abundant previous evidence on the presence of SARS virus in urine⁹. Initially during the COVID-19 outbreak, evaluation and investigation of urinary samples were considered part of routine sampling as stated by the World Health Organization interim guideline for laboratory testing in COVID-19¹¹.

Later publications pointed to the rarity of viral presence in urine or totally rejected the presence of COVID-19 in urine. Then, quite recently several publications revealed the presence of COVID-19 in urine¹¹.

Urine of the patients admitted in COVID dedicated unit of BSMMU, were collected in sterile container and with appropriate labeling which was sent in virology department to detect the presence of SARS-CoV-2 by quantitative real time polymerase chain reactions by Allplex SARS Cov2 Assay AndGeneProof RNA Extraction Kit. The date of COVID-19 infection, date of urine sample collection, previous renal status, present renal function all were recorded.

Fifty patients were enrolled for investigation for detection of COVID-19 virus in urine who were infected with SARS-CoV-2. The age ranged from 20-75 years. After getting admission, the mean urine collection date was 9 \pm 2 days. We found the presence of SARS-CoV-2 in urine of 2 patients, one male and one female. The rate of detection of SARS-CoV-2 virus in urine of patients infected by COVID-19 virus was 4%. One male who had positive urine sample detected at 8th day of admission and another female who was detected on 7th day.

The timeline for positivity of urinary samples is not consistent between reports. While Xu and colleagues reported urine positivity on day 7 after onset of symptoms and clearance of virus in urinary sample on the 10th day¹¹. These two patients had moderate COVID-related illness.

Ling and colleagues reported 66 patients with COVID-19 from Shanghai, China. Urine samples of 4 patients (6.9%) were positive for COVID-19 from 430 patients. In 3 patients, urinary samples were positive even after clearance of virus in oropharyngeal samples.

Peng et al. reported the presence of COVID-19 in urine of one of the 9 studied patients on day 7 after symptom onset. The patient with positive urinary PCR for COVID-19 did not complain of any urinary symptoms.

Wang et al. investigated urinary samples of patients with chronic kidney disease (CKD) versus patients with normal renal function. Urinary PCR was positive in one of 5 patients with CKD versus 3 out of 48 patients with normal renal function. In this

study, the clinical course of COVID-19 disease and characteristics of patients with COVID-19 in urine were not different compared with patients without COVID-19 in their urine.

Conclusion:

Overall positive rate of COVID-19 infection in patients urinary samples were lower than rectal or oropharyngeal samples.

Intervention like urethral catheter insertion and urinary endoscopic operations should be performed with caution considering the possibility of urine infection and possibility of COVID-19 transmission through this route. Urologist as well as other related medical personal can protect themselves considering this urinary presence of COVID 19 virus.

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