

Prevalence of COVID-19 in Asymptomatic ESRD Patients on Maintenance Hemodialysis and Dialysis Staff.

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Abstract:

The outbreak of coronavirus disease 2019 (COVID-19) has become a global pandemic and posing a serious threat to hemodialysis staff and patients. The prevalence of COVID-19 caused by SARS-CoV-2 in asymptomatic ESRD patients on maintenance hemodialysis (MHD) and dialysis staff is unknown. Hemodialysis patients and staff are a fragile population in a mandatory congregate setting. The purpose of this study is to determine the prevalence of COVID-19 in two hemodialysis units of Jinnah Hospital, Lahore. In this cross-sectional study, 216 asymptomatic ESRD patients on maintenance hemodialysis and 83 dialysis staff members were tested for COVID-19. They were tested using qualitative RT-PCR on nasopharyngeal swabs taken from 20th April to 25th April 2020. Two out of 216 (0.92%) dialysis patients and 03 out of 83 (3.6%) dialysis staff members were tested positive for COVID-19. Cumulative prevalence of patients and staff was 1.67% (05/299). It was concluded that prevalence of COVID-19 is low in dialysis staff and asymptomatic hemodialysis patients in Lahore, Pakistan.

Key words: *COVID-19, corona virus, hemodialysis, infection, ESRD, CKD, prevention, transmission, pandemic.*

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Introduction:

Since December 2019, novel Coronavirus disease (COVID-19) is a newly discovered highly contagious disease caused by SARS-CoV-2 virus. It involves upper and lower respiratory tracts that can be complicated to pneumonia and acute respiratory distress syndrome. It may affect other organ systems such as the heart, digestive tract, kidneys, blood, and nervous system¹. The rapidly spreading outbreak, which first emerged in Wuhan, Hubei Province in China, was declared a global pandemic on March 11, 2020, by the World Health Organization (WHO).^{2,3}

The magnitude of disease spread is increasing daily and each country and international organizations have setup monitoring cells for day by day authentic statistics.² End stage renal disease (ESRD) patients on maintenance hemodialysis (MHD) are a highly vulnerable population and susceptible to infections due to its comorbidities including COVID-19.⁴ Many of these risk factors such as old age, Diabetes Mellitus, hypertension, ischemic heart disease, chronic lung diseases, and other immunocompromised conditions make this population group vulnerable to COVID-19 infection. This vulnerability is further enhanced by their frequent hospital visits and close proximity to other hemodialysis patients.³

Burden of COVID-19 is increasing rapidly in general population of Pakistan as recent data is suggesting that current confirmed cases of COVID-19 are 15,759 out of 144365 tested people with prevalence of 60 cases per one million population till 30th April 2020.³ As of April 28, 2020, COVID-19 has been confirmed in over 3 million individuals worldwide and resulted in 212,000 deaths.² Rapid spread of COVID-19 infection in the community demands, testing all the asymptomatic patients who are frequently visiting health care facilities like dialysis patients, nursing homes and other congregate living situations⁵. This would be helpful in identifying, isolating and thus controlling the transmission of SARS-CoV-2 infection in health care providers and other patients.

Methods:

A cross-sectional study was conducted including 216 asymptomatic ESRD patients on maintenance hemodialysis and 83 dialysis facility staff members for identifying asymptomatic COVID-19 carrier state. The study was conducted on dialysis patients and staff of two dialysis centers of Jinnah hospital, Lahore, Pakistan. The study period included April 20- April 25, 2020.

Test: They were tested using qualitative COVID-19 Real Time (RT)-PCR on nasopharyngeal swabs taken from 20th April to 25th April 2020. This test was performed on VERSANT K PCR (SIEMENS) Fully Automated PCR System (Extraction Siemens-Amplification Anatolia) at AQ Khan PCR Lab of Jinnah Hospital, Lahore, Pakistan.

Results:

ESRD patients on Hemodialysis:

Total 216 asymptomatic ESRD patients on maintenance hemodialysis were tested out of which 137 (63.4%) were male and 79 (36.5%) were female. Mean age of patients was 50 years. Out of 216 asymptomatic hemodialysis patients, only 02 patients (0.92%) were tested positive for SARS-CoV-2 infection, and both were male.

The first patient is 53 years old, and had been on hemodialysis for the last four years. This patient had no history of diabetes, ischemic heart disease, lung disease or prior renal transplant. The second patient is 59 years old, and had been on hemodialysis for last two years. He did not have any history of ischemic heart disease, lung disease or prior renal transplant. Both COVID-19 positive patients did not have any symptoms like cough, fever, shortness of breath etc.

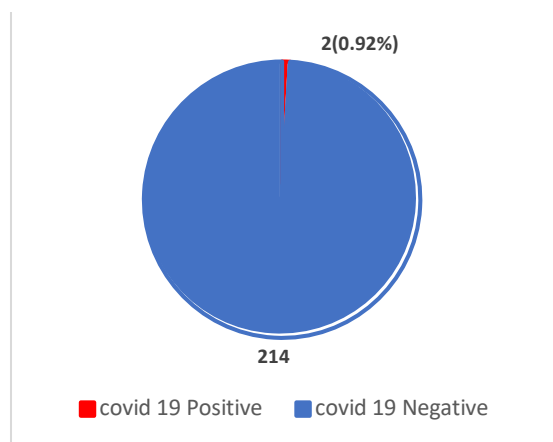


Figure 1: Frequency of SARS-CoV-2 infection among asymptomatic hemodialysis patients is 0.92%. (2 out of 216)

Dialysis Staff:

Prior to screening of patients, all dialysis staff members were also tested for SARS-CoV-2 infection, from 20th April to 22nd April 2020. All 83 dialysis staff members (including doctors, nurses and paramedical staff) were tested. Three (3.6%) out of 83 facility staff members were tested positive. Positive individuals included 01 staff nurse, 01 ward boy and 01 laundry worker.

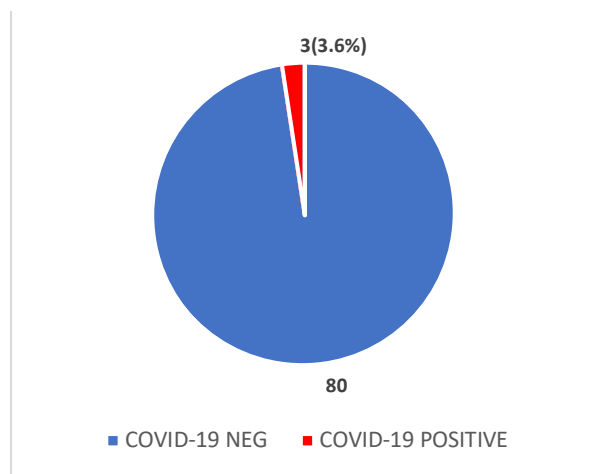


Figure 2: Frequency of SARS-CoV-2 infection among asymptomatic hemodialysis facility staff is 3.6%. (3 out of 83)

Cumulative Results:

The combined result of both dialysis staff and ESRD patients on hemodialysis showed 05 (1.67%) out of 299 were tested positive for COVID-19, Table 1.

Table 1: COVID-19 PCR results of patients and dialysis staff of two centers of Jinnah Hospital, Lahore, Pakistan

	COVID-19 NEGATIVE	COVID-19 POSITIVE	TOTAL
ESRD PATIENTS ON MHD	214 (99.08%)	02 (0.92%)	216
DIALYSIS UNIT STAFF	80 (96.4%)	03 (3.6%)	83
GRAND TOTAL	294 (98.32%)	05 (1.67%)	299

Discussion:

This is the first single center study of prevalence of COVID-19 in hemodialysis patients and staff of a tertiary care center in Pakistan. This cross-sectional study showed low prevalence (hemodialysis patients: 0.92% and staff: 3.6%) of COVID 19 in asymptomatic hemodialysis population and dialysis staff. This is much lower as compared to the prevalence of 16.1% (37/233) in hemodialysis patients and 12.1% (4/33) in staff.⁶ Our results are more reassuring since we had more than double the number of staff compared to the above study, that was taking care of the MHD patients. We however, suspect that these positive COVID-19 cases may increase over the next several weeks as COVID-19 outbreak in Pakistan has still not peaked. This was observed when the epidemic emerged in the HD center of Renmin Hospital, Wuhan University from January 14, 2020, the day the first case was confirmed, till February 17, 2020, the day of the epidemic's extinction⁶.

Our positive patients and HD staff were quarantined in our dedicated COVID-19 ward. The patients are getting their routine dialysis in designated COVID-19 ward. If we had not tested all the patients and our staff, we would have never known about these positive cases and they might have become the source of a widespread outbreak in our dialysis unit.

The screening started when one of our 'ward boy' was tested positive. He was asymptomatic but his test was done since he had contact with one of the ICU patients on ventilator who later was diagnosed positive for COVID-19. We, in phase 1, did COVID 19 RT-PCR on all the dialysis staff including nurses, ward boys/girls, doctors and other employees. A total of 83 tests were done and one nurse and one laundryman were found positive. The nurse also works at a private hospital and lives in a hostel. But we were not sure if she contracted this from the patients or staff at the dialysis center, from her hostel, or from the private hospital. All of her contacts have been advised to be tested. The laundryman was not a dialysis center employee, but he would collect and deliver laundry privately for our dialysis center. We were worried that the ward boy, laundryman, or nurse might have spread or become the source of outbreak in our dialysis center. So, in phase 2, we decided to test our whole dialysis patient population rather than the potential contacts of these positive cases. Thus overall 216 nasopharyngeal swabs at the bed side of dialysis patients were collected. RT-PCR for COVID-19 were carried out at AQ Khan PCR lab of Jinnah Hospital Lahore.

It has been shown that HD patients and staff are distinct group of individuals that are more susceptible to contract COVID-19. Measures of prevention, protection, screening and isolation are essential in the epidemic management and should be taken at an early stage of an outbreak⁶. We had only 2 patients who tested positive for COVID-19. This low prevalence could have been secondary to strict 'WHO, CDC and NKF precautions' we had implemented at our dialysis center. Luckily, we have had no shortage of protective equipment (thanks to our donor organization: Sheikh Ejaz Ahmad Trust) and all doctors and dialysis staff were using it as per protocol and were following standard donning and doffing procedures (Figure 1 of our dialysis staff). Recently, we had significantly decreased HCV seroconversion by strict implementation of all the CDC precautions over the last year (personal experience) and that might have helped us in preparation for COVID 19. Moreover, our dialysis stations are separated by glass walls into separate cubicles (Picture 2) which might have also prevented the cross contamination.



Figure 1: Hemodialysis unit staff with proper PPE taking care of patients at hemodialysis unit of Jinnah hospital, Lahore, Pakistan.



Figure 2: separate cubicle for each hemodialysis patient separated by full length glass walls at hemodialysis unit of Jinnah hospital, Lahore, Pakistan.

Limited data is available on screening in asymptomatic patients for COVID-19 infection, but it presents a special threat to patients on dialysis. Recent report among 7184 patients on MHD in 61 hemodialysis facilities in Wuhan City, China, the epicenter of COVID-19 infection is reassuring. At a single HD center in Renmin Hospital, Wuhan University, 37 out of 230 patients on HD and 4 of 33 staff members developed COVID-19 infection between January 14 and February 17, 2020.⁶ A total of 7 patients on MHD died, of whom 6 had COVID-19 infection. However, the deaths were deemed to be due to cardiovascular causes and not directly due to the COVID-19 infection. Patients on HD with COVID-19 had less lymphopenia, lower serum levels of inflammatory cytokines, and milder clinical disease than other patients with COVID-19 infection.

One of the limitations of our study is low sensitivity of current gold standard in testing for COVID-19 (RT-PCR detection of SARS-CoV-2) from nasopharyngeal swabs.⁷

There is a possibility that a few positive cases might have been missed because of the low sensitivity of the test. One or more negative results do not rule out the possibility of SARS-CoV-2 infection. A number of factors could lead to a negative result in an infected individual, including Poor quality of specimen, containing little amount of patient's secretions, the specimen was collected late or very early in infection and technical reasons inherited in the test, e.g. virus mutation or PCR inhibition.

Official guidance from the Centers for Disease Control and Prevention (CDC), interim guidance for infection prevention, and control recommendations for patients with suspected or confirmed COVID-19 in outpatient Hemodialysis facilities, can be freely accessed at the CDC⁸ and American Society of Nephrology websites.⁹

While more information is collected, the following efforts to coordinate appropriate prevention and control of COVID-19 infection in outpatient Hemodialysis facilities has been advised during this interim period:

- Education of patients and health care workers (HCWs) about basic hand and respiratory hygiene,
- coughing etiquette
- Use of PPE,
- preparedness so that we can advise patients to call ahead,
- place signs,
- creating appropriate space,
- implementation of triage protocol,
- proper management patients and HCWs with symptoms or illness,
- appropriate initial care,
- surveying,
- face masks,
- isolation in separate rooms,
- cohorting if multiple patients,
- separation by 6 feet in all directions,
- routine cleaning and disinfection procedures,
- resource utilization by keeping track of PPE inventory,
- preserving PPE
- efficient use of human resources.⁸

On March 10, 2020 the CDC advised that hemodialysis could be performed on clinically stable patients in the outpatient dialysis setting⁸, and, on March 26, 2020, the End-Stage Renal Disease Networks broadcast that "COVID (+) patients who are stable need outpatient dialysis," emphasizing the critical importance of limiting hospital use to those who truly require hospitalization.¹⁰

Currently 3 of our staff members and 2 of our hemodialysis patients, who have been quarantined, are clinically stable and to-date remain asymptomatic. This is in contrast to recent case report of 5 cases of COVID-19 in hemodialysis center of china where fever, diarrhea and fatigue were the main symptoms.³ As suggested by Weiner DE et al., we should continue implementing rigorous screening programs at hemodialysis facilities to identify potential cases; reducing crowding in waiting rooms; disinfecting items not typically addressed, such as hand rails on scales, waiting room seats, door knobs, and elevator buttons; and designating hemodialysis patients who are symptomatic as persons under investigation (PUIs), who are tested for COVID-19 and treated with enhanced precautions.^{10,11}

We all should be ready in Pakistan, for the “peak of curve” in weeks to come and continue to follow the strict precautions and official guidance from the Centers for Disease Control and Prevention (CDC), along with the interim guidance for infection prevention and control recommendations for patients with suspected or confirmed COVID-19 in outpatient Hemodialysis facilities.⁸ Lockdown relaxation, carelessness in taking preventive and control measures and the decision to allow congregational prayers during the holy month of Ramadan might become a major source of COVID-19 transmission in Pakistan unless preventive measure are strictly implemented.

Conclusion

In conclusion, given limited resources one might argue to screen only symptomatic patients but we strongly recommend, if possible, to screen all the patients and staff in a dialysis facility to prevent spread of infection to others from asymptomatic individuals. May God protect our doctors, health care providers, patients and all the mankind!

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