

## PREVALENCE OF SARS-COV-2 IN ASYMPTOMATIC END STAGE RENAL DISEASE PATIENTS ON HEMODIALYSIS & DIALYSIS PROVIDERS DURING SARS-COV-19 SPIKE IN LAHORE,

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### Abstract

**Background and objective:** The global pandemic of Coronavirus Disease 2019 (SARS-COV-2) poses a significant threat to both hemodialysis staff and patients. However, the prevalence of SARS-COV-2 among asymptomatic end-stage renal disease (ESRD) patients on chronic hemodialysis (MHD) and healthcare staff including nurses and technicians in dialysis unit remains uncertain. Given that hemodialysis patients and dialysis nurses are particularly prone in congregate settings, the objective of this study was to investigate how widespread SARS-COV-2 was within two specific hemodialysis units located at Jinnah Hospital Lahore (JHL).

**Methods:** This cross-sectional study involved the participation of 198 maintenance hemodialysis patients with end-stage renal disease (ESRD) and 83 dialysis staff members. These patients or staff members did not have any symptoms at the time of testing. Testing was conducted using qualitative reverse transcription-polymerase chain reaction (RT-PCR) on nasal & pharyngeal swabs collected from June 18th to June 23rd, 2020.

**Results:** Out of the total 281 participants, 45 dialysis patients from a total of 198 (22.7%) and 10 dialysis staff members from a total of 83 (12%) were found to be SARS-COV-2 positive. Combining both staff and patients, the overall prevalence of SARS-COV-2 was 55(19.8%). The mortality rate among the infected patients was 6.6% (3 out of 45).

**Conclusion:** This study demonstrate a significant frequency of SARS-CoV-2 among hemodialysis staff and patients in Lahore, Pakistan.

**Key words:** SARS-COV-2; chronic hemodialysis; end-stage renal disease; dialysis.

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Since its emergence in December 2019, Coronavirus disease (SARS-COV-2) has been identified as an extremely contagious illness caused by the SARS-CoV-2 virus. The airways and lungs are primarily impacted by the virus, potentially leading to complications like lower respiratory tract infection and ARDS. Furthermore, the virus can also impact various other systems of the body, including the gastrointestinal,<sup>1</sup> heart,

genitourinary, and central nervous systems (Sedaghat 2020). The rapid spread of this outbreak began in Wuhan, Hubei Province, China, and on the 11<sup>th</sup> of March, 2020, it was officially declared a global pandemic by the World Health Organization (WHO 2023). Thus far, the disease continues to escalate, and various sources provide updated and reliable statistics on its prevalence. Among the vulnerable populations, maintenance hemodialysis (MHD) patients are at a heightened risk of contracting the infection and experiencing its complications. Their heightened vulnerability to SARS-COV-2 can be attributed to various factors, such as hyper-tension, Diabetes Mellitus, age, coronary artery disease, chronic respiratory diseases, and compromised

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immune systems. Furthermore, their frequent hospital visits and close proximity to other hemodialysis patients further heighten their vulnerability.

The prevalence of SARS-COV-2 is escalating swiftly within the common populace of Pakistan. Current statistics indicates that there are 15,759 confirmed cases out of 144,365 individuals tested, with a prevalence rate of 60 cases per one million people, as of April 30, 2020. Worldwide, as of April 28, 2020, more than 3 million individuals have been confirmed to have SARS-COV-2, resulting in 212,000 deaths.

Considering the rapid spread of the disease within communities, it becomes imperative to test all asymptomatic patients residing in nursing homes and similar congregate living settings. Such testing measures would greatly assist in controlling the transmission of SARS-CoV-2 infection among healthcare providers and other vulnerable patients.

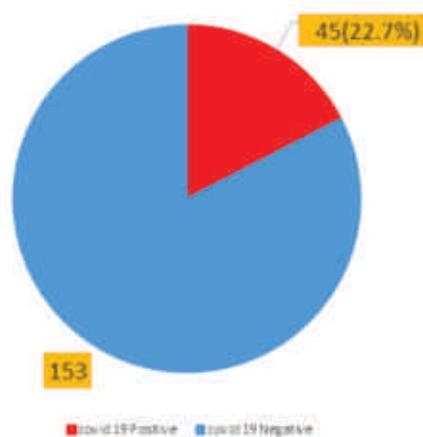
## METHODS

A cross-sectional study was undertaken, encompassing 198 asymptomatic patients with end-stage renal disease (ESRD) undergoing maintenance hemodialysis, as well as 83 dialysis team members. This research specifically concentrated on hemodialysis recipients and dialysis team members from two dialysis centers situated at JHL. Participants were selected by convenience sampling. Included were participants meeting local guidelines for testing. Excluded were those identified prior to participation as having inability to complete the consent, sampling, or survey process. A Nasopharyngeal swab was collected from these individuals between June 18<sup>th</sup> and June 23<sup>rd</sup>, 2020, and the qualitative SARS-COV-2 Real-Time Polymerase Chain Reaction (RT-PCR) test was used for analysis. The tests were conducted using the VERSANT K PCR (SIEMENS) Fully Automated PCR System (Extraction Siemens-Amplification Anatolia) at the Arif Qayyum Khan Lab located in pathology department of JHL.

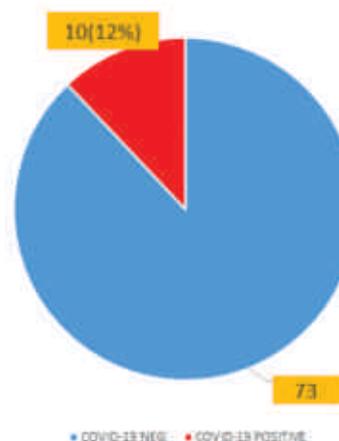
## RESULTS

### Hemodialysis Patients

The study enrolled a total of 198 asymptomatic individuals with end-stage renal disease (ESRD) who were undergoing maintenance hemodialysis. The participants consisted of 128 males (63.4%) and 70 females (36.5%). The average age of the patients was 50 years. Out of the 198 asymptomatic hemodialysis patients, 45 individuals (22.7%) tested positive for SARS-CoV-2 infection. Among the infected patients, the mortality rate was 6.6% (3 out of 45), while no deaths were reported in the SARS-COV-2 negative group during the specified period.



**Figure 1:** Proportions of SARS-COV-2 Infection Among Asymptomatic Hemodialysis Patients



**Figure 2.** Proportions of SARS-COV-2 Infection among Asymptomatic Hemodialysis Facility Staff

### Dialysis Staff:

Before conducting the patient screenings, all 83 dialysis staff members, which comprised doctors, nurses,

and paramedical staff, were also tested for SARS-CoV-2 infection. The testing took place from June 18<sup>th</sup> to June 23<sup>rd</sup>, 2020. Among the 83 facility staff members, 10 individuals (12%) tested positive for the virus. Among the positive cases, 3 were staff nurses and 7 were ward boys.

In summary out of a total of 299 individuals comprising both dialysis staff and ESRD patients undergoing hemodia-lysis, 55 individuals (1.67%) tested positive for SARS-COV-2.

Details are shown in table 1:

**Table 1:**

	SARS-COV-2 NEGATIVE	SARS-COV-2 POSITIVE	Total
Hemodialysis patients	153 (77.27%)	45 (22.7%)	198
Hemodialysis team	73 (88%)	10 (12%)	83
Total	226 (98.32%)	55 (19.5%)	281

## DISCUSSION

Similar to the findings reported from Wuhan, China (16.1% in patients and 12.1% in staff), this cross-sectional research unveiled a significant prevalence of SARS-COV-2 among asymptomatic hemodialysis patients (22.7%) and dialysis staff (Wang 2020). However, during April, when the study was conducted, the number of positive cases was considerably lower. In April, the prevalence among dialysis patients was 0.92%, and among staff, it was 3.6%. A similar pattern was noted during the outbreak at Renmin Hospital, Wuhan University, with the initial occurrence being diagnosed on January 14, 2020, and the peak of the epidemic occurring on February 17, 2020. To prevent a widespread outbreak within our dialysis unit, all healthcare personnel and patients were tested and placed in quarantine in a designated SARS-COV-2 unit. Routine dialysis was carried out in the SARS-COV-2 ward to ensure continuity of treatment. By testing everyone, we were able to identify positive cases that could have otherwise gone unnoticed and potentially contributed to an outbreak. This study represents the first assessment of SARS-COV-2 prevalence among and healthcare personnel and dialysis patients at a tertiary care hospital in Pakistan.

Our testing process commenced from the month of April after a hospital orderly of ours was found to be positive. Although the subject showed no symptoms, the screening was conducted due to his contact with a SARS-COV-2-positive patient in the ICU who required ventilator support. During phase 1, comprehensive SARS-COV-2 RT-PCR testing was administered to all dialysis staff members, comprising of hospital orderlies, physicians, nurses, and all other healthcare personnel. Among the 83 PCR ltests conducted, one registered nurse (RN) & one launderer yielded positive results. The RN had additional exposure to a private hospital and lived in a hostel, making it uncertain where the infection originated from. Every individual in contact with the nurse were advised to undergo testing. The laundryman was not directly employed by the dialysis center but provided laundry services privately. Concerned that these individuals may have spread or triggered an outbreak at our dialysis center, we initiated phase 2, which involved testing the entire dialysis patient population rather than just their potential contacts. At the Arif Qayyum Khan PCR lab of JHL, 216 nasopharyngeal swabs were gathered from dialysis patients and subjected to RT-PCR testing for SARS-COV-2. In June, during the peak of SARS-COV-2 cases in Pakistan, all patients and staff were retested. While most were symptomless, a few exhibited minor symptoms like rise in temperature, and upper respiratory tract symptoms. The outcomes unveiled a notable rise in the rate and prevalence of SARS-COV-2. Additionally, three dialysis patients required mechanical ventilation and subsequently passed away, with one patient experiencing a hemorrhagic stroke.

HD patients and staff have been shown to be an especially susceptible group at an increased risk of contracting SARS-COV-2 (Weiner 2020). Therefore, implementing measures to prevent, protect, screen, and isolate individuals is crucial in managing an epidemic, ideally at the onset of an outbreak. Due to the stringent adherence to precautionary measures recommended by WHO, CDC, and NKF at our dialysis center, only two patients were found positive for SARS-COV-2. After ensuring the availability of sufficient

protective gear, we also ensured that every physician and hemodialysis team member strictly followed protocols for wearing and removing such equipment. Moreover, our dialysis stations were structured with individual cubicles separated by glass walls, potentially reducing the risk of cross-contamination. This diligent adherence to precautions has also contributed to a significant reduction in HCV seroconversion.

Despite the potential for asymptomatic patients to transmit SARS-COV-2 to other hemodialysis patients, there is limited data available on screening them. In Wuhan, 7,184 patients from 61 hemodialysis centers were observed. At Renmin Hospital, Wuhan University, between 14-01-20 and 17-02-20, 37 of 230 hemodialysis patients and 4 of 33 workers were diagnosed with SARS-COV-2. Among the 7 deceased hemodialysis patients, 6 had SARS-COV-2, but their cause of death was attributed to cardiovascular reasons rather than the infection itself. Notably, hemodialysis patients with SARS-COV-2 exhibited milder symptoms, lower levels of inflammatory cytokines, and less lymphopenia compared to other SARS-COV-2 patients.

A drawback of our research is the reduced sensitivity of the presently optimum screening technique, RT-PCR, for detecting SARS-CoV-2 from nasopharyngeal swabs. This lower sensitivity may have resulted in the omission of positive cases (Ma 2019). It is important to note that negative test results do not completely exclude the possibility of SARS-CoV-2 infection. Factors contributing to false negatives include poor specimen quality, early or late collection during the infection, and technical issues with the test.

Adherence to official guidelines from the CDC and ASN is crucial in ensuring effective management and mitigation of SARS-COV-2 in outpatient hemodialysis facilities. This includes providing education to workers and patients regarding hand hygiene, cough etiquette, and correct utilization of personal protective equipment (PPE). Staff members should also encourage patients to notify them in advance if they experience any symptoms of illness and implement triage protocols accordingly. Effective management of symptomatic

patients and staff is crucial, including the use of face masks, isolation, maintaining physical distance, routine cleaning, tracking PPE inventory, and optimizing resource utilization.

The CDC recommended on March 10, 2020, that stable hemodialysis patients could receive treatment in outpatient settings, while the End-Stage Renal Disease Networks emphasized on March 26, 2020, the significance of reserving hospital utilization for those with genuine needs.

Currently, three healthcare staff members and two hemodialysis patients, who are under quarantine, continue to remain stable and show no symptoms. In contrast, a recent case report from China described five SARS-COV-2 cases in a hemodialysis center with symptoms such as fever, diarrhea, and fatigue. The recommendation put forth by Weiner DE et al. suggests the continuation of robust screening programs, minimizing overcrowding in waiting areas, regular disinfection of frequently touched surfaces, and identifying symptomatic hemodialysis patients as individuals under investigation (PUIs) for SARS-COV-2 testing and implementing additional precautions.

The study's cross-sectional design allowed us to collect data from many different individuals at a single point in time to compare differences between groups. The study's limitation include its inability to infer causality due to this study design.

## CONCLUSIONS

Maintaining strict compliance with CDC guidelines is of utmost importance when dealing with presumed or proven SARS-COV-2 cases in dialysis centers. This study demonstrates a significant prevalence of SARS-CoV-2 among hemodialysis staff and patients in Lahore, Pakistan.

The relaxation of lockdown measures, negligence in preventive measures, and allowing congregational prayers during Ramadan contributed to significant SARS-COV-2 transmission in Pakistan. This cross-sectional research unveiled a significant prevalence of SARS-COV-2 among asymptomatic hemodialysis patients (22.7%) and dialysis staff. We recommend

conducting screening for all patients and staff within dialysis facilities to mitigate the transmission of infection from symptomless patients.

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