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Original Article

COVID-19 in Dialysis and Kidney Transplant Patients

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ABSTRACT

COVID-19 problems are more common in recipients of kidney transplants. There is, however, a dearth of information on the likelihood of allograft damage or death in kidney transplant recipients recuperating with COVID-19. **Objective:** To investigate the effect of Covid-19 on kidney transplant and dialysis patients. **Methods:** This Retrospective study was conducted at Department of Medicine, Avicena Medical College, Lahore from 1st October 2022 to 31st March 2023. One hundred patients with age >18 years being kidney patients diagnosed with kidney failure or had a kidney allograft were included. Patients were grouped as either kidney transplant (Group A) or hemodialysis (Group B) where both groups were Covid-19 positive on diagnosis. The score represented 1 as fit and 9 as terminally ill. Any comorbidity related with these patients apart from the kidney failure was recorded including their obesity level. The eGFR (estimated glomerular filtration rate) was considered as zero in dialysis cases with residual diuresis ≤ 200 mL/day and 5 mL/min/1.73 m2. **Results:** There were 40% kidney transplant patients positive with Covid-19 infection and 60% with hemodialysis having positive Covid-19 infection. Majority of the patients in both groups A and B were males with a percentage of 57.5% and 59.4% respectively. The clinical frailty score was higher in group B than A. Odds ratio results showed that 28 days probability risk ratio of death was higher in the kidney transplant group A patients suffering from Covid-19 virus than hemodialysis. **Conclusions:** Kidney transplant cases have higher severity of complication and death in cases where patients become corona virus positive.

INTRODUCTION

With the emergence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) kidney transplant recipients are at higher risk of this deadly infection due to their usage of immunosuppressive agents. Cases of COVID-19 vary from country to country on the basis of their testing capacity, case ascertainment and public health policy [1-5]. Coronavirus virus disease had laid an adverse effect on organ transplantation, worldwide. It particularly effect large group of kidney transplant recipients and resulted into its related mortalities and morbidities. Substantial reduction in kidney transplant also occur during this pandemic to avoid and minimize the chances of COVID-19 exposure but on the other hand, leads to more severe disease or fatal outcome [6-8]. Kidney transplant patients with varying severity of the disease often leads to death and making it difficult to assess the exact cause and associated factors of corona virus disease mortality. Advanced age is considered as an additional risk factor of mortality and patients of this age are immuno-compromised and already prone to various diseases. Studies have reported that, kidney patients of age >70 years had higher chances of associated mortality [9-13]. Another complicating factor in chronic kidney patients is how they are diagnosed for COVID-19. Screening of corona virus in immunosuppressed patients should not only rely on confirmation by sign and symptoms but routine

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surveillance after contact with infected or suspected person. Differential effect of COVID on different ethnicities is crucial for policy making regarding patient care of kidney failure patients [14]. Only limited number of data are available regarding consequences of kidney replacement therapy. Chronic kidney disease patients are particularly at high risk due to underlying condition including diabetes, hypertension, and cardiovascular disease.

Present study is designed to find the association and risk factors of kidney transplant and dialysis with corona virus disease.

METHODS

This retrospective study was conducted at Department of Medicine, Avicena Medical College, Lahore from 1st October 2022 to 31st March 2023. The patients age was >18 years and were kidney patients diagnosed with kidney failure or had a kidney allograft were included and those patients who had renal carcinoma or already critical before Covid19 infection were excluded. Fisher's formula was used to estimate the sample size. Z 2 pq e 2 = n where the intended sample size, n, is Z is the standard deviation at the required accuracy level, or 1.96 at the 95% accuracy level. These patients were diagnosed with coronavirus infection through PCR nasal swab test. Detailed demographic and clinical information of each patient was documented. Clinical frailty score was used to assess frailty of each patient. A total 100 cases were enrolled. These cases were divided into two groups depending upon that either they had kidney transplant or they were on hemodialysis. The kidney transplant patients were designated as group A and hemodialysis as group B. The score represented 1 as fit and 9 as terminally ill. Any comorbidity related with these patients apart from the kidney failure was recorded including their obesity level. The eGFR was considered as zero in dialysis cases with residual diuresis ≤200 mL/day and 5 mL/min/1.73 m2. The primary-outcome of the study was vital conditions at day 28 of infection. These outcomes included either patient was still in critical care unit, intensive care, hospitalized or discharged. The Student's t-test was utilized to compare characteristics between groups for continuous data, and the Pearson chi-square test was employed for categorical variables. Data were analyzed by SPSS version 26.0.

RESULTS

There were 40% kidney transplant patients positive with Covid-19 infection and 60% with hemodialysis having positive Covid-19 infection. Majority of the patients in both groups A and B were males with a percentage of 57.5% and 59.4% respectively. The mean age of the patients was 55 ± 15 years in group A while 67 ± 14 years in group B (Table 1).

Table 1: Demographic Information of the Patients

Characteristics	Kidney Transplant (n=40)	Hemodialysis (n=60)	p-Value
Gender N (%)			
Male	23 (57.5%)	38 (59.4%)	0.17
Female	17 (42.5%)	22 (36.6%)	
Age (Mean ± S.D)			
Age (years)	55 ± 15	67 ± 14	<0.001
BMI (kg/m^2)	27.1 ± 5.1	26.5 ± 5.8	0.34

The clinical frailty score presented a significant difference between kidney transplant Covid-19 positive patients in comparison with hemodialysis Covid-19 positive patients. Obesity, diabetes and coronary heart diseases were higher in group B than group A (Table 2).

Table 2: Comparison of Clinical Fatality Score and Comorbidities in Groups A and B

Characteristics	Kidney Transplant (n=40)	Hemodialysis (n=60)	p-Value
Clinical Fatality Score (Mean ± S.D)	3.0 ± 1.6	4.0 ± 1.7	<0.001
Comorbidities N (%)			
Obesity	9 (22.5%)	13 (21.6%)	0.70
Hypertension	34 (85%)	49 (81.65)	0.14
Diabetes Mellitus	11 (27.5%)	25 (41.6%)	<0.001
Coronary Artery Disease	6 (15%)	21 (35%)	<0.001

Odds ratio results showed that 28 days probability risk ratio of death was higher in the Kidney transplant group A patients suffering from Covid-19 virus than hemodialysis. The rate of hospitalization was higher in group A as well as ICU admissions were more common than group B (Table 3).

Table 3: Death Related Risk Comparison between Groups A and B

Characteristics	Kidney Transplant (n=40)		Hemodialysis (n=60)	
	Percentage (%)	95% CI	Percentage (%)	95% CI
28 Days Death Probability	23.8%	21.6–26.5	16.8%	13.9–20.5
Hospitalization Risk	16%	1.20 (1.00–1.47)	13%	1.0 (0.9-1.2)
ICU Admission	19%	2.4 (1.35–3.9)	15%	2.38 (1.33–3.29)

The residual diuresis greater or equal to 200 ml/day was only presented in group B as 32%. Patients underwent kidney transplant were majorly having primary glomerulonephritis while diabetic kidney disease was more common in hemodialysis cases (Figure 1).

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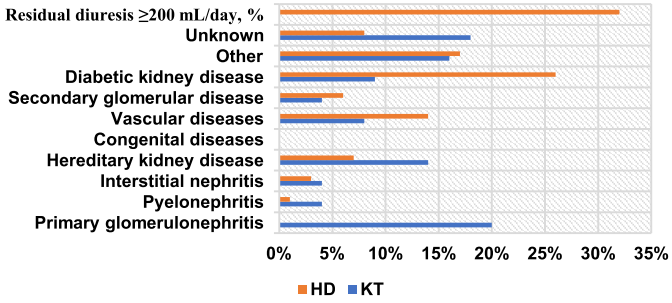

Figure 1: Frequency of Various kidney Complications in Hemodialysis and kidney Transplant Cases

DISCUSSION

From the beginning of the outbreak of corona virus, it's a matter of discussion whether immune-compromised patients are more prone to complications related to COVID-19. This study is specifically designed to analyze the burden of corona virus on nephrology community. Corona virus is particularly fatal in kidney replacement therapy or chronic kidney disease patients [15-17]. There were majority males with mean age 63.5 years had mean BMI 27 lg/m2 in our study. These findings were in line with previous studies conducted by Li MT *et al.*, and Goyal P *et al* [7-9]. Comorbidities were also widely present in current study which further worsens the situation. These results were not expected as higher age group patients were more in number. Moreover, diabetes, obesity and cardiovascular diseases all are related with COVID-19 death in addition to chronic kidney diseases. All these together deteriorate already underlying condition and escalate the death chances upto10 fold [15-18]. The clinical frailty score presented a significant difference between kidney transplant Covid-19 positive patients in comparison with hemodialysis Covid-19 positive patients. These were comparable to the studies conducted in past in which significant differences were seen in patients with hemodialysis [18, 19]. Supportive care is considered a mainstay for the prevention and treatment of corona virus. Kidney transplant patients were often visited hospitals and admitted in intensive care unit as compared to dialysis patients. Frequent hospital visits exacerbate the chances of COVID-19 exposure. Mortality rate was also varied among dialysis and kidney transplant group. Other studies also proved that significant death were reported in dialysis patients. This could be possible as advanced care was offered to transplant patients. Effective policy should be formulated to minimize the exposure of COVID-19 and to prevent the death associated with chronic kidney diseases [19-21].

CONCLUSIONS

Kidney transplant cases have higher severity of complication and death in cases where patients become corona virus positive.

Authors Contribution

Conceptualization: MA
Methodology: MA, AMQ
Formal analysis: MA, AMQ, SSAT, PK
Writing, review and editing: MA, SSAT, AN

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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