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Study of renal dysfunction in Covid 19 Sars Cov 2 positive patients at a post graduate teaching institute in central India

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Abstract: The SARS-CoV-2 virus has had a significant impact on a major part of the world, with kidneys being identified as a major target for infection. The incidence of acute kidney injury (AKI) associated with COVID-19 has been reported to range from 5% to 40% worldwide. Pre-existing renal dysfunction has been identified as a risk factor for adverse outcomes. This observational study aimed to analyze the impact of COVID-19 on kidneys in Indian patients hospitalized with various presentations of the disease. A total of 300 adult hospitalized patients with COVID-19 were included, and baseline clinical and laboratory data were analyzed. Follow-up was conducted after 3 months to assess the frequency and outcomes of renal dysfunction in patients with or without previous renal disease. The study found that the mean age of the patients was 37.15 ± 9.78 years. The incidence of AKI was 12%, of which 80.6% of patients normalized their renal functions, while 8.30% progressed to chronic kidney disease (CKD). The mortality rate among these patients was 11.1%. Among the patients with pre-existing CKD, 66.6% experienced worsening renal function and 33.3% died. Additionally, 44.4% of these patients required hemodialysis. In conclusion, renal involvement was common among hospitalized COVID-19 patients, and outcomes were worse for patients with pre-existing CKD. The need for hemodialysis increased with disease severity and in patients with pre-existing CKD.

Keywords: SARS COV 2 virus; AKI; CKD; Hemodialysis.

1. Introduction

All reference must be cited within the text of the paper and it must appear numerically. There should not be any duplication in references. Reference must be in APA style. APA style is mentioned at the end of this document.

If there is only one author in the paper refer it as: Bablekos in [1] studied the changes in breathing control and mechanics after laparoscopic vs open cholecystectomy. If there are two authors in a paper, refer it as: Manion and Riou in [2] studied the changes in breathing control and mechanics after laparoscopic vs open cholecystectomy. If there are more then two authors, refer it as Majumder et al. [3] studied the changes in breathing control and mechanics after laparoscopic vs open cholecystectomy. We only have to write the last name of authors and do not need to add full names of authors within the text of the paper. For further guidelines, please see [4–6].

2. Material and methods

This observational study was carried out in a tertiary care teaching institute of central India and its four associated hospitals after approval from the Institutional Ethics Committee (IEC). 300 patients were studied after calculating the sample size. Afterinformed written consent, hospitalized COVID 19 positive patients of age group 18-70 years were included.Patients already on Haemodialysis, those with a history of AKI in recent past or history ofnephrotoxic medication (iodinated contrast media, aminoglycosides,NSAIDS),patients with long term symptoms suggestive of bladder outlet obstruction, prostate or bladder cancer,patients with active malignancy or receiving chemotherapy/radiotherapy and renal transplant recipients were excluded from the study.

Clinical evaluation of patients was done as per a defined protocol,laboratory tests (urea, creatinine, Uric acid,urine routine microscopy,serum sodium and potassium) and Imaging methods(USG KUB) were done.Baseline data of hospitalised patients was analysed and followed up after 3 months. GFR and creatinine of known cases of CKD were seen at baseline,during hospitalization and post COVID follow up as well asneed for dialysis was assessed during hospitalization and post COVID follow up.

3. Results

Table 1 shows the distribution of study participants according to the age. The mean age was 37.15 ± 9.78 years. Majority i.e. 64.70% of the study participants were in the age group of 20-40 years.

Table 1. Distribution of study participants according to the age

Age group	No. of patients(n)	Percentage (%)
20-40 Years	194	64.70%
41-60 Years	96	32.00%
61-80 Years	10	3.30%
Total	300	100%
Mean ± SD	37.15 ± 9.78	

Table 2 shows the distribution of study participants according to gender. Males constituted 72.60% of the study population forming the majority while females constituted 27.30%.

Table 2. Distribution of study participants according to gender

Gender	No. of patients(n)	Percentage (%)
Male	218	72.60%
Female	82	27.30%
Total	300	100.00%

Table 3 shows the distribution of study participants on the basis of presence or absence of AKI (Acute Kidney Injury). New onset renal dysfunction was present in 12% of the patients while 3% had acute on chronic kidney disease.

Table 3. Distribution of study participants on the basis of presence or absence of AKI

	No. of patients	%
New Onset Renal Dysfunction	36	12.00%
Acute On CKD	9	3.00%
No Renal Dysfunction	255	85.00%
Total	300	100.00%

Table 4 shows the distribution of study participants on the basis of outcomes in relation to new onset renal dysfunction. 66.70% of these patients returned back to normal, 13.9% required hemodialysis, 8.30% progressed to CKD and 11.10% of them succumbed to death.

Table 4. Distribution of study participants on the basis of outcomes in relation to new onset renal dysfunction

Outcome Of Patients With AKI	Number	Percentage (%)
Normalization	24	66.7
Required Hemodialysis	5	13.9
Progression to CKD	3	8.3
Death	4	11.1

Table 5 shows the distribution of study participants according to the outcome of pre-existing CKD. Among those who had pre-existing CKD, 66.66% showed increase in creatinine levels at follow up, 44.40% were taken on maintenance hemodialysis (MHD), and 33.30% of the study subjects succumbed to death.

Table 5. Distribution of study participants according to the outcome of pre-existing CKD

Pre-existing CKD	Number	Percentage
Increase in serum creatinine at follow up	6	66.66 %
Maintenance Hemodialysis	4	44.4 %
Death	3	33.3 %

4. Discussion

In our study of 300 patients, mean age of the population was 37.15 ± 9.78 years with 72.6% males and 27.3% females.The study of Sampath Kumar et alfound the mean age to be 58 years with 9% males and 8% females. Their study describes 7% incidence of COVID-19 AKI. Renal replacement therapy in the form of haemodialysiswas given to 23% of these patients and in hospital mortality was reported in 44% of AKI patients [7]. AKI incidence of 8.6% has been reported by a South Asian country in intensive care unit COVID-19 admissions [3]. Being a tertiary care institute in Central India, our study found the occurrenceof new onset renal dysfunction in 12% patients out of which 13.9% patients had to undergo haemodialysis and 11.1% succumbed to death. This is in contrast to several studies from China, US and Europe where the proportion ofdialysis requirement varied from 35-70% [1,4]. Though differences in severity of illness could have contributed to higher need for dialysis in other studies, our decision for delayed dialysis is in line with outcome data of several recent trials where early dialysis did not provide a survival benefit. Greater age; comorbidities, mainly diabetes; and need for mechanical ventilation are some of the important factors associated with increased incidence of AKI.

AKI is an independent risk factor for mortality in COVID patients. Patients with AKI have high mortality ranging from 35% to 71%, and mortality is even higher in Stage 3 AKI ranging from 52% to 88%, regardless of renal replacement therapy [11].

As per the study done by Sinha et al, among patients who survived post-COVID-19 AKI, almost half (49%) progressed to CKD while in our study, 8.3% progressed to CKD [2].

In an initial report from India by Trivedi et al. [12] describing 37 ESRD patients with COVID-19, the mortality was 38% which is almost 10 times the mortality of general population with the infection [12]. In another study from Bronx describing ESRD patients with COVID-19, Fisher et al (n=114) found a mortality of 28% [6]. In these patients, an existing pro-inflammatory state with maladapted innate and adaptive immunity results in higher risk of infections including COVID-19 and frequent visits to the dialysis centres leads to an increased exposure to the virus. In addition, presence of concomitant underlying co-morbidities like diabetes and hypertensionfurther elevate the risk of the infection. In our study, we found the mortality rate to be 33.3% in the patients with per-existing CKD and 44.4% patients had to be taken on maintenance haemodialysis.

We now understand that renal involvement in COVID19 is much more frequent than initially thought and it independently contributes to morbidity and mortality. The pathophysiological mechanism of COVID-19 AKI is multifactorial which is in line with the other forms of AKI. Given extensive need for intensive caresupport and its economic implications, prognostic markers identified in different study populations around the world could potentially help in effective clinical triaging and cost-effective management. Future research should focus on variation in disease-epidemiology based on geographical location, variation in healthcare delivery system, socio- economic indicators and how these factors influence clinical outcomes.

5. Conclusion

The ARDS of COVID-19 is highly feared and tends to outweigh the renal complications. Acknowledging the need to evaluate and effectively treat the patients with renal complications in COVID-19 may increase the chances of patient survival and overall outcome. Hence, renal involvement in COVID-19 has immense prognostic implications and is a big challenge for the healthcare systems especially for resource-constraint countries like India.

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Conflicts of Interest: The authors declare that they do not have any conflict of interests.

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