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Original Research

Association of renal biomarkers in COVID-19 patients: A retrospective study

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Abstract

Background: The new severe acute respiratory syndrome coronavirus 2 is the cause of the transmissible sickness known as coronavirus disease 2019 (COVID-19) (SARS-CoV-2). Although it often presents as an acute respiratory infection, it can also have a negative impact on the kidneys, heart, gastrointestinal, and nervous system. The aims of this study to find out the association of renal biomarkers among dialysis patients in COVID-19 positive and negative. Methods: A retrospective study was conducted in the Department of medical laboratory technology, the university of Haripur, Khyber Pakhtunkhwa, Pakistan. A Total of 129 Dialysis patients blood samples were collected from March 2022 to April 2022 in which 13 males and 20 females are COVID-19 positive while 41 males and 55 females are COVID-19 negative. The obtained data was statistically analyzed by using PRISM version 5.0 by applying two-way ANOVA and Comparisons between Covid positive and negative patients RFTs by using Bonferroni posttest. Results: Male patients with chronic kidney disease (on dialysis) with COVID-19 negative and positive their mean urea difference was 95.20mg/dl and 159.6mg/dl, while COVID-19 negative and positive the mean creatinine difference was 8.534mg/dl and 13.81mg/dl respectively. While there was no significance difference in uric acid concentration in CKD patients with COVID-19 negative and positive. Female patients with chronic kidney disease (on dialysis) with COVID-19 negative and positive their mean urea difference was 103.20mg/dl and 152.6mg/dl, while COVID-19 negative and positive the mean creatinine difference was 8.114mg/dl and 8.584mg/dl respectively. While there was no significance difference in uric acid concentration in CKD patients with COVID-19 negative and positive. Conclusion: This study concludes that there is positive relationship or association of renal biomarkers in COVID-19 positive patients. Significance association between urea and creatinine in COVID-19 positive.

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Introduction: The new severe acute respiratory syndrome coronavirus 2 is too responsible for the 2019 coronavirus disease (COVID-19), a contagious illness (SARS-CoV-2). It primarily presents as an acute respiratory illness but can also harm the kidneys, heart, digestive system, nervous system, and other organs [1]. Acute kidney damage (AKI), which was observed in 5–15% of patients in earlier reports of SARS and Middle East Respiratory Syndrome coronavirus, was linked to significant fatality rates (60–90%) [2]. Recent findings indicated COVID-19 individuals had renal problems, [3] although the kidney involvement has not yet been well defined (only retrospective cohorts using urine dip-stick tests) [4]. AKI was cited as an independent risk factor for death in a recent Chinese research [5]. The precise process of kidney involvement, nevertheless, is yet unknown [6] either a direct virus-induced cellular damage or a cytokine storm associated with sepsis [7].

As they host a significant number of people who are infected with SARS-CoV-2, hospitals are recognized as one of the sites of secondary SARS-CoV-2 transmission [8]. Although SARS-CoV-2 can infect persons of any age, it is far less prevalent in those under the age of 14 and frequently goes asymptomatic in young people [9]. COVID-19 increases with age, making aging a risk factor for the illness. Middle-aged adults often get the illness from others in the neighborhood, while elderly people typically contract it through hospitalization or coughing and sneezing from sick family members and friends [10]. The death rate is greater among the elderly. Lung function is negatively impacted by aging, which also delays the activation of the acquired immune system. As a result, the virus may multiply more easily, leading to greater pro-inflammatory reactions and a higher chance of mortality [11]. Male sex is one of the risk factors for COVID-19 since men are more susceptible to COVID. Men appear to be more prone to have this disease since it is spread through social contact, they spend more time outside the home owing to job obligations, and they are more active in the society in some nations, like Iran [12]. It is important to note that men and women behave differently, particularly when it comes to health advice and paying less attention to the problem of social distance. The liver and lung have higher levels of a protein known as A disinterring and metalloprotease 17 (ADAM17), which is responsible for shedding surface proteins like ACE2. By increasing ADAM17, the quantity of soluble ACE2 is increased and can be used to prevent SARS-CoV-2 from entering cells by enhancing shedding[11]. Estradiol, which is present in women in high concentrations, enhances the expression and activity of ADAM17, raising the soluble ACE2 in women as a result. This may be one of the reasons why women have lower COVID-19 prevalence than males, as a result [8].

The most prevalent metabolic disorder in the world is diabetes mellitus. It is a condition that impairs immunity [11]. The number of diabetics worldwide is rising, particularly in emerging nations. Diabetes raises the risk of COVID-19, according to studies. Patients with diabetes had a greater chance of dying (14% vs. 31%) and are less receptive to therapy (p=0.0051). The action of cytokines depending on type I helper T lymphocytes (Thl) is disrupted by glycosylation because innate immunity is compromised in diabetes individuals due to high blood glucose levels)[13]. Patients who have pulmonary microangiopathy, tissue damage brought on by oxidative stress in hyperglycemia, and lung inflammation are more likely to develop COVID-19 than those who are prone to TB [14]. Additionally, COVID-19 patients with cancer enter crisis states at a greater rate than people without cancer (8% vs. 39%)[15]. Because the development and multiplication of immune cells are inhibited by cancer and treatment procedures like chemotherapy, an immunosuppressive state will be produced in the body, making cancer patients more susceptible to infection than non-cancerous people. Therefore, COVID-19 is more likely to arise in cancer patients than in non-cancerous ones [8]. The most typical COVID-19 symptoms are Flu, cough, exhaustion, and a loss of taste or smell [16]. Less common symptoms rash on the skin, coloring of the fingers or toes, diarrhea, a sore throat, headache, aches and pains, red or itchy eyes [17]. Serious signs chest discomfort, shortness of breath, slurred speech, trouble moving around, or disorientation [18]. If you have significant symptoms, get quick medical treatment. Always give your doctor or a medical facility a call before going. People who are well overall and just have minor symptoms should take care of themselves at home. The usual time it takes for symptoms to appear once a person contracts the virus is 5–6 days, but it can take up to 14 days [18].

Even in those with severe COVID-19 infections who did not have any underlying renal issues before to becoming infected, some patients will exhibit evidence of kidney impairment [19]. Patients with COVID-19 may exhibit excessive quantities of protein or blood in the urine as well as abnormal blood test results as symptoms of renal issues. According to studies, more than 30% of COVID-19 patients who are hospitalized experience renal damage, and more than 50% of these patients may need dialysis while in the critical care unit. Early in the pandemic, according to Sperati et al., several hospitals were lacking the equipment and sterile fluids necessary to carry out dialysis [20].The aims of this study to find out the association of renal biomarkers among dialysis patients in COVID-19 positive and negative. Chronic renal failure patients' sample were collected and then analyze the patient data.

Methodology: Data Source: The current study was design at department of Medical Lab Technology, The University of Haripur, Khyber Pakhtunkhwa, Pakistan in collaboration with Miangul Abdul Haq Jahanzeb Kidney Hospital Swat, Khyber Pakhtunkhwa, Pakistan. The test samples were collected at Miangul Abdul Haq Jahanzeb Kidney Hospital Swat. A Total of 129 Dialysis patients blood samples were collected from March 2022 to April 2022 in which 13 males and 20 females are COVID-19 positive while 41 males and 55 females are COVID-19 negative.

Inclusion and Exclusion Criteria: All patients who depend on dialysis were included in study while those who are non-dialysis will be excluded from study.

Ethical considerations: Logistic and ethical issues were thoroughly discussed with supervisors and written permission was obtained from the Ethical review committee of the university, and the authorities of the hospital. All of the participants gave their written approval with an accompanying informed consent form. During the

whole of the research, participant identities were concealed. The participants were notified that there are no potential drawbacks or dangers associated with the methodology of the research. Participants were notified that they can withdraw from the study at any moment throughout the research. Participants remained anonymous and all information and data collection was kept confidential.

Data Analysis: The obtained data was statistically analyzed by using PRISM version 5.0. The data are presented as mean± standard deviation by applying two-way ANOVA and Comparisons between Covid positive and negative patients RFTs by using Bonferroni posttest. A p-value < 0.05 indicated statistical significance.

Results:

A total of 131 patients participated in the current study with kidney failure attending OPD Miangul Abdul Haq Jahanzeb Kidney Hospital Swat for dialysis. Patients were randomly divided into two groups. Group1 having patients with kidney failure and COVID-19 positive. While the 2nd group included patients with kidney failure and COVID-19 negative. Both the groups received dialysis and their results were collected and noted.

The figure 1 represent male patients with chronic kidney disease (on dialysis) with COVID-19 negative and positive their mean urea difference was 95.20 mg/dl and 159.6 mg/dl. And Covid-19 negative and positive the mean creatinine difference was 8.534 mg/dl and 13.81 mg/dl respectively. While there was no significance difference in uric acid concentration in CKD patients with Covid-19 negative and positives. The figure 2 represent female patients with chronic kidney disease (on dialysis) with COVID-19 negative and positive their mean urea difference was 103.20 mg/dl and 152.6mg/dl. And COVID-19 negative and positive the mean creatinine difference was 8.114 mg/dl and 8.584 mg/dl respectively. While there was no significance difference in ureic acid concentration in CKD patients with Covid-19 negative and positives.

Discussion: The research's main goal is to provide descriptive details, including clinical characteristics, laboratory data, and treatment plans. Millions of individuals throughout the world have been impacted by COVID-19. Numerous chronic medical conditions, such as chronic renal disease, were included as risk factors for higher mortality and COVID-19 severity [21]. A new set of risk factors for CKD patients has emerged as a result of the SARS-CoV-2 pandemic, and these variables might have a terrible effect on clinical outcomes in these at-risk people [10]. Indications and therapy alternatives are expected to vary and evolve over very short periods of time since information on many elements of this global issue is increasing at a surprisingly quick rate [22]. Clinicians need to be aware of the patients' underlying fragility and increased risk of cardiovascular events, which in our opinion requires thorough monitoring. To enable prompt care and to optimize therapeutic approaches in this situation, nephrologists and physicians must work closely together. We gathered the test data from all CKD patients in our research to examine the effects of COVID-19 on their urea, creatinine, and uric acid levels as well as hospitalization, incidence, ICU admission, disease severity, and unfavorable outcomes [23]. We discovered that individuals with CKD were more likely than those without CKD to experience worse COVID-19 results. This may be due to CKD patients' increased vulnerability to infections due to decreased innate and adaptive immune system activity [24]. In dialysis patients, we can lower the risk of COVID by using personal protective equipment. The Peking University First Hospital for Dialysis's recommendations have been modified by the International Society for Dialysis (ISD) Standards and Guidelines Committee [25]. This article contains broad ideas that readers will be familiar with, such as safety precautions for both patients and staff. The obvious objective is to stop the spread of the infection within the dialysis facility, guaranteeing the highest standards of safety for both patients and staff and giving patients the information they need to find support services if they become ill [26].

Conclusion: In this research we compared the renal function test (RFTs) results of Covid-19 positive patients with Covid-19 negative patients and found a significance difference in the Urea of both males and females of Covid-19 positive patient, but no effect seen on Uric Acid and on Dialysis duration. Dialysis patients are more vulnerable to develop severe Covid-19 and are at high risk and worst prognosis same time death may occur. Further studies are necessary to better understand, the chronic kidney diseases associated with Covid-19 infection, and potential therapies.

Authors contributions: S Khan, S Usman, H Rafiq, has collected and interpreted the secondary data from hospital. MS Nazar makes the draft and makes changes according to checklist for the retrospective study. N Qamar revise and review the article.

Availability of data and materials: Data will be available on requirement.

Consent for publication: All authors declare consent for publication.

Conflict of interests: The authors declare that they have no conflicts of interests.

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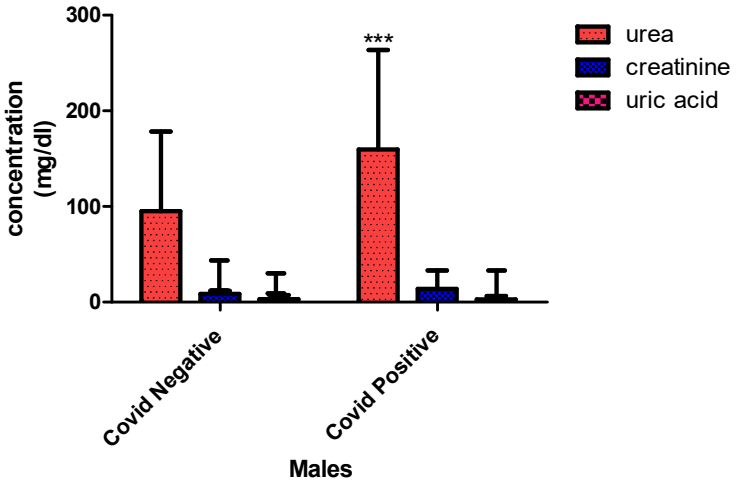

Fig. 1.Y –axis represent concentration of male Urea, Creatinine and Uric acid while X- A-axis demonstrate COVID-19negative and positive patient

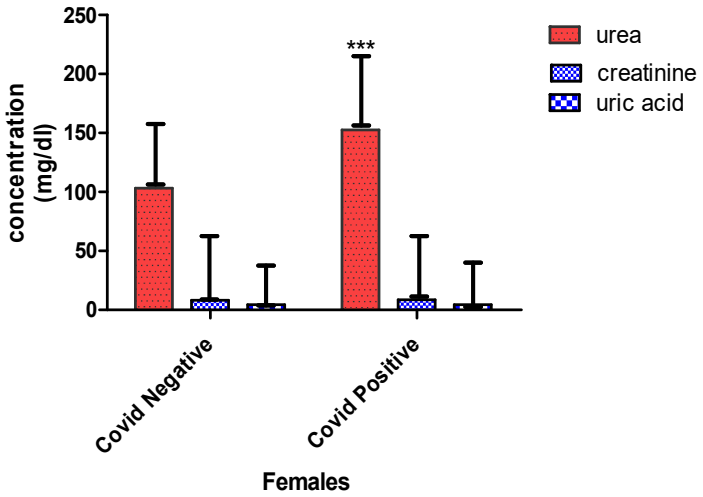

Fig. 2. Y-axis show concentration of female urea, creatinine and uric acid while X-axis represent COVID-19 negative and positive patients.