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Comparison of Some Biochemical Parameters in Covid-19 Patients and Vaccinated Individuals in Kirkuk/Iraq.

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Abstract: Corona virus2019(Covid-19) or severe Acute respiratory syndrome coronavirus-2 (SARS-Cov-2) has been reported by the World Health Organization (WHO) are global clinical biomarkers have been important in determining its severity, although its aspect have been well characterized, so the aim of this study is to investigate some common alteration in some biochemical parameters in serum of covid-19patients (hospitalized and non-hospitalized, vaccinated and control group.

Study Design: The study conducted across sectional study in cohort of 167(40 hospitalized covid-19 whom paid a visit to Al-Shifaa-14 hospital, Kirkuk, from Iraq, 30 non-hospitalized covid-19, 67vaccinated individuals and 30 control healthy group), from december20,2021 till 20 March 2022. Their ages ranging from (20-75) years. The total 167 patients ,79 males and 88 were females.

Age, comorbidities, and abnormalities in several clinical biomarkers have all been shown to be important in determining the severity of covid-19 illness in several investigations. Although the clinical aspects of COVID-19 have been well characterized, the assessment of changes in the most common biochemical indicators reported in COVID-19 patients is still lacking. So the study aimed to investigate common alterations in some biochemical parameters in the serum of COVID-19 patients (hospitalized and non-hospitalized), vaccinated individuals and control group.

Sampling: Blood samples were collected from 167 individuals, then centrifuged to obtain serum for the biochemical tests that included B. urea and creatinine, Glutamic-pyruvic transaminase(GPT), Glutamic-oxaloacetic transaminase(GOT) and alkaline phosphatase (ALP). Nasopharyngeal swabs were collected from non-hospitalized of COVID-19 infection which was confirmed using real-time PCR technique. The study's findings revealed substantial variations in biochemical parameters between the examined groups in terms of creatinine (value >0.001) and urea (value >0.0001), as well as significant differences in GOT (value >0.0001) and ALP (value >0.0001). So this study can have concluded that patients infected with Covid-19 (hospitalized and infected outside the hospital- subsequently) have an increase in most biochemical parameters, however the effect was lower in the vaccinated group.

Keywords: COVID-19, vaccinated individuals, biochemical parameters, real-time PCR technique

Introduction

The Covid-19 virus first infected China, then spread to bordering countries, eventually affecting the majority of countries. The disease quickly permeates on a worldwide dimension, affecting people all over the world. As a result, on January 30, 2020, the WHO decreed COVID-19 disease to be an international public health hazard and nominated it a pandemic [1]. COVID -19 was first identified in our country (Iraq) in Najaf city on 24 February, then cases increased to 1,415 infections with 79 deaths and 812 recovered cases until the last update of Iraqi health ministry [2]. Compared to seasonal influenza, COVID-19 is more deadly. The COVID-19 death rate is higher in older patients, immunocompromised patients, and patients with chronic disorders than it is in younger patients without any underlying illnesses [3]. COVID-19 patients died mostly as a result of multiple organ failure. According to the most recent studies, COVID-19 is associated with organ failure in roughly 33% of cases, with acute renal damage accounting for 3-7% of those cases. [4,5]. Impaired renal function can cause a blockage in the excretion of metabolites and toxins in the body, which can disrupt the electrolyte and acid-base balance of the human body. Additionally, when renal function is severely affected, uremia develops, putting one's life in threat. The imp decreasing complications and enhancing prognosis cannot be overstated. The liver is another organ targeted by the Corona virus; SARS-CoV-2 employs the angiotensin-converting enzyme 2 (ACE2) as a docking and entrance receptor on host cells, which could explain why individuals with COVID-19 have abnormal liver function tests. [6]. Its cellular entrance is further aided by transmembrane serine protease 2 (TMPRSS2) [7]. Direct virus-induced cytopathic effects could theoretically play a role in COVID-19 LFT abnormalities [8]. The host immune response to SARS-CoV-2 infection can be fast and controlled, resulting in disease clearance with no or minor symptoms, or it can be slow and dysregulated, leading in host-damaging consequences. Acute respiratory distress syndrome (ARDS), a coagulopathy resembling disseminated intravascular coagulation (DIC) and thrombotic microangiopathy, multi-organ failure (MOF), and mortality are all COVID-19 consequences [9]. The relationship of some biochemical parameters with Covid-19 infection in Mosul City was done by across sectional study in cohort of 240(116 males and 124 females) individuals with positivity Covid -19 and healthy112 control. It revealed that the majority of the covid-19 patients showed increased levels of serum ferritin, LDH and D-Dimer, while having a reverse effect with serum GOT and GPT that showed normal value in patients with covid-19 compared with healthy control [3].

The high fatality rate is due to the virus's damage and an overly aggressive immune response to various body tissues, which can be recognized by biochemical changes in the patient's serum. So considered it necessary to conduct the same tests to identify the safety of the vaccine for Covid-19 and study its effect on kidney and liver functions in vaccinated people.

Materials and methods

1. Data collection

One hundred and sixty-seven patients from Al-Shifaa hospital, Kirkuk, Iraq, out patients infected with COVID-19, vaccinated individuals and control group were obtained samples between December 20, 2021 and March 20, 2022. Clinical characteristics as well as blood biochemical testing were assessed and documented. Gender, age, and clinical characteristics such as diabetes, hypertension, heart illness, and

vaccination status were all taken into account. Patients and those who had been immunized gave their informed permission.

2. Sample Collection and Data Processing

Venous blood (5 mL) was obtained from patients, vaccinated persons and control group. Then, kept in plain tubes and centrifuge for five minute at 3000 rpm for separation of serum . Renal and liver function tests, such as blood urea and creatinine, as well as Glutamic-pyruvic transaminase(GPT), Glutamic-oxaloacetic transaminase(GOT), and alkaline phosphatase (ALP), are also obtainable, were measured using GenoTEK, Automatic chemistry analyzer (Smart 150), USA company, according to the manufacturing protocols. Nasopharyngeal swab specimens were obtained from patients (non-hospitalized COVID-19 patients), COVID-19 infection was confirmed using real-time PCR (polymerase chain reaction), by using Sacace Sacyclers 96, Italy company.

3. Statistical Analysis

Statistical analyses were performed using Graph Pad Prism version 5 analytical software. The results of continuous variable were expressed as mean ± S.D. and were tabulated and analyzed [10].

Results

This study involved assessment of some biochemical parameters in four different groups included COVID-19 patients (hospitalized and non-hospitalized), vaccinated and control. Of the total 167 patients, 79 were males and 88 were females. COVID-19 was determined to be positive in 40 case hospitalized and out patients 30 case. The number of vaccinated persons was 67 while the control group included 30 persons.

In figure (1) it show urea values in four tested groups with *P.*value <0.0001 and urea significantily affected in hospitalized COVID-19 group (mean=57.95) and there is a significant difference between them and between non-hospitlized (mean=26.83), vaccinated (mean=24.09) and control group (mean=5.655) while no signifcant difference between other groups.

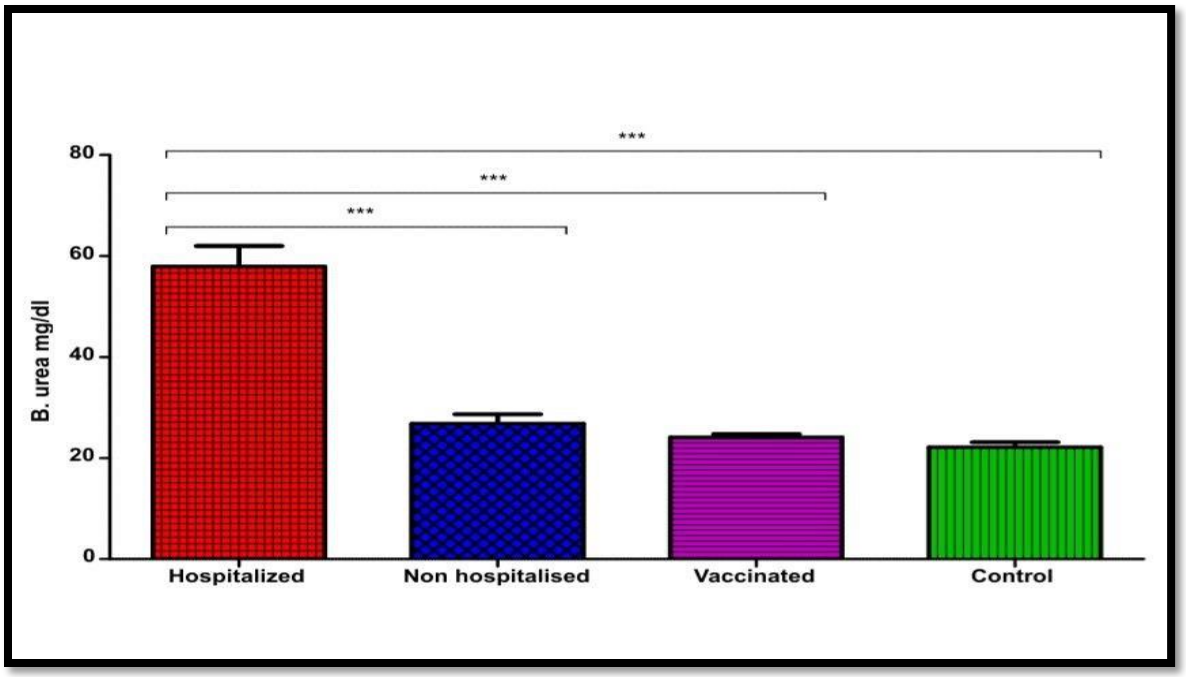

Figure (1): Show Blood.urea concetration in four tested groups with significant difference between the groups *P*.value <0.0001 by applied One Way ANOVA test.

Regarding creatinin test, when One Way ANOVA test was applied there was significant difference between the four tested groups with *P*.value <0.001. In figure (2) there was significant increment of creatinin in hospitalized patients (mean=0.775) compared with vaccinated (mean=0.644) and control (mean=0.58) groups. On the other hand, non-hospitalized patients (mean=34.51) also showed significant elevation of creatinine compared to vaccinated and control . While there was no significant difference between vaccinated and control individual.

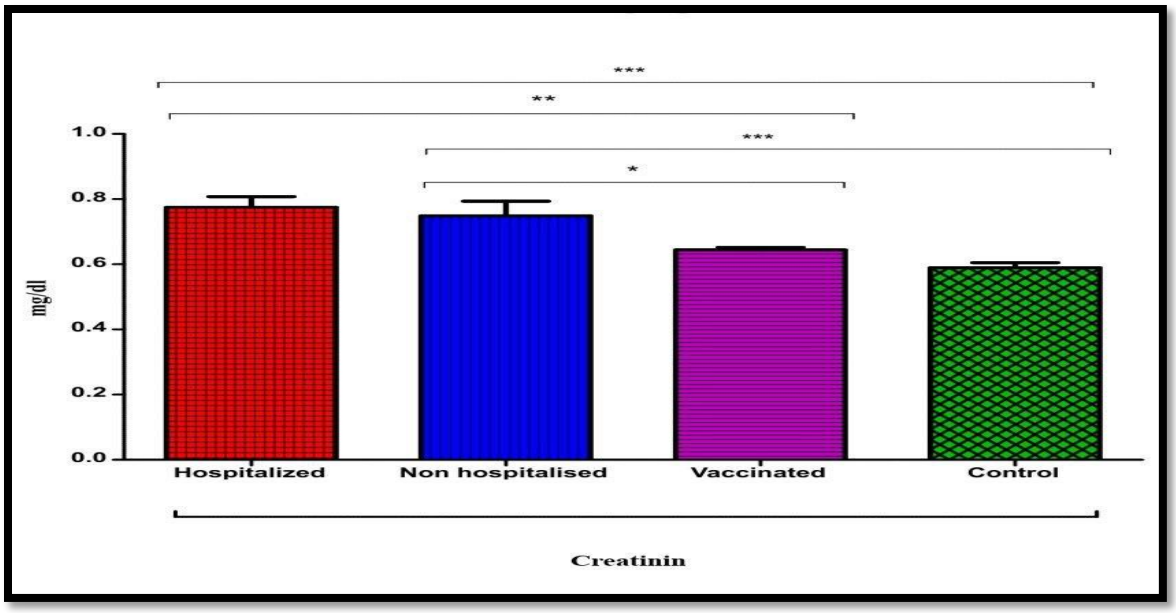

Figure (2): Show creatinine concetration in four tested groups with significant difference between the groups *P.*value <0.001 by using One Way ANOVA test.

In figure (3) it show that there is significant difference with *P.*value < 0.0001 in Alkaline phosphatase (ALP) for tested groups. In hospitalized patients (mean=340.2) it increased and there is significant difference compared with non-hospitalized (mean=230.8), vaccinated (mean=200.4) and control (mean=126.7), Whilst in non-hospitalized patients there is significant difference with control group only where vaccinated group was significant also with control group only.

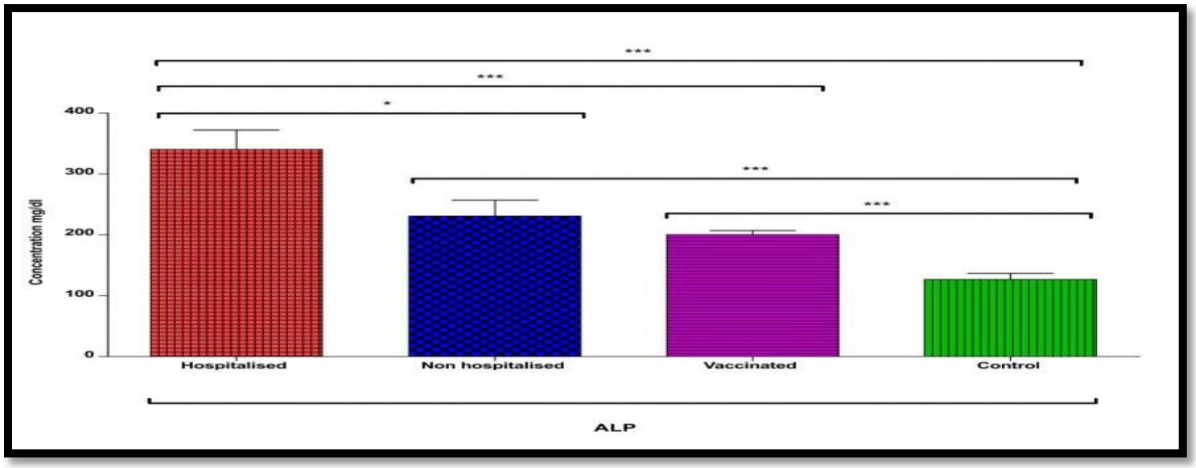

Figure (3): Show ALP concetration in four tested groups in One Way ANOVA test demonstrate with significant difference between the groups *P.*value <0.0001.

In figure (4) it show there is a significant difference in Glutamic-oxaloacetic transaminase (GOT) between tested groups with P.value < 0.0001 . In hospitalized patients (mean=56.43) significant difference with vaccinated (mean=19.79) and control group (mean=18.1), and no significant difference with non-hospitalized

patients (mean=34.51), thus in non-hospitalized patients there is significant difference with vaccinated and control group, and there is no significant difference in vaccinated and control group.

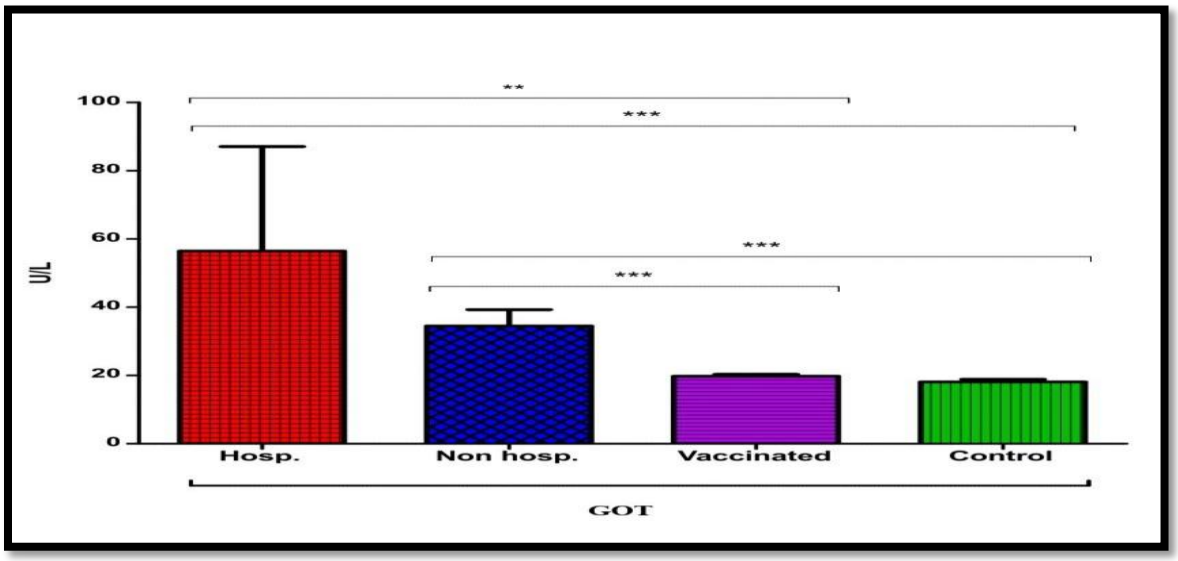

Figure (4): Show GOT concetration in four tested groups with significant difference between the groups *P.*value <0.0001, by One Way ANOVA test.

In figure (5) it show there is no significant difference in Glutamic-pyruvic transaminase (GPT) between the four tested groups hospitalized COVID-19 (mean=44.9), non-hospitalized COVID-19 (mean=29.53), vaccinated (mean=200.4) and control group (mean=26.17) with *P.*value <0.1107.

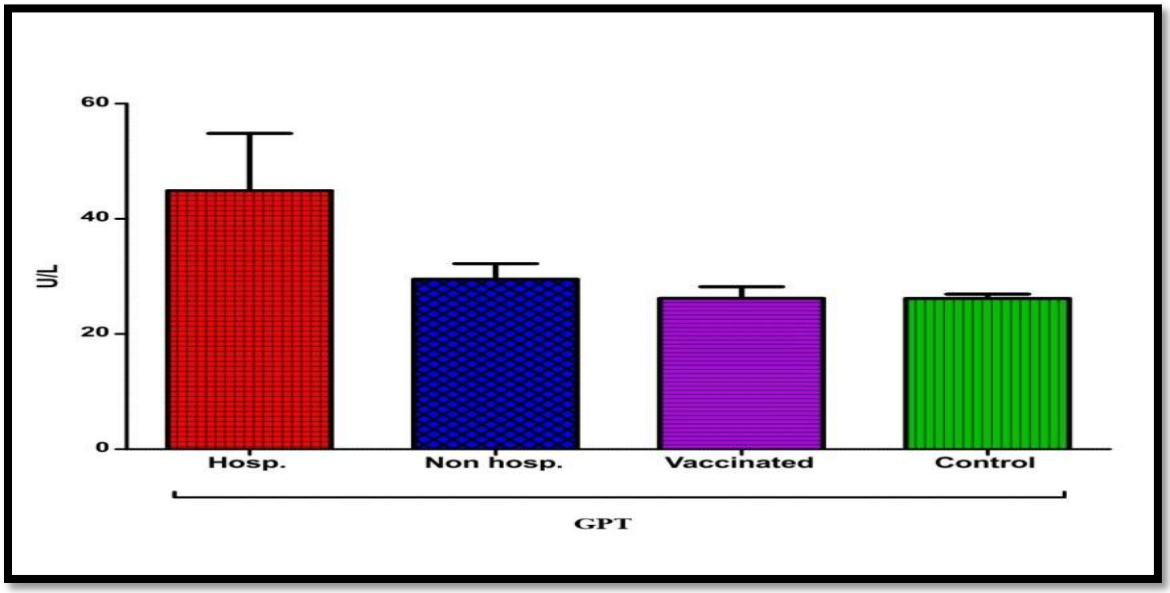

Figure (5): By susing One Way ANOVA test display GPT concetration in four tested groups with no significant difference between the groups *P.*value <0.1107.

Discussion

As in other studies, we found that blood urea and creatinine levels were higher in hospitalized COVID-19 patients with impaired renal function. In comparison to non-hospitalized individuals, the majority of whom received a virus vaccine, their results show that they are unaffected by the virus or have a lower impact than those who did not receive the vaccine, and according to our study, the vaccinated group is most similar to the control group, excepted that there are a few results that the kidneys are affected and may be caused by chronic diseases or receiving some treatments that would raise urea and creatinine in the blood.

The levels of GOT were advanced in COVD-19 instances, while there was no such rise in GPT. This was supported by a Chinese study [11,12]. This increase could be linked to viral load as well as alterations in hepatic synthesis capacity. Changes in liver function can also be caused by ACE2-mediated direct viral infection of hepatocytes, severe illness, or immune-mediated damage. Pre-existing (chronic) liver disorders could cause abnormal LFTs at admission. The incidence of pre-existing liver disease in COVID-19 patients has been shown to range from 1% to 11% [13,14,15,16]. Both SARS-CoV and SARS-CoV-2 use angiotensin-converting enzyme 2 (ACE2) as a cell entrance receptor [17,18]. Due to reduced ACE2 expression in hepatocytes, SARS-CoV2 is thought to be less prone to cause liver infection. In hepatocytes, however, we discovered a large number of SARS-CoV-2 virus particles. In most cases, the receptor distribution is thought to be similar to that of infected organs. Despite this, there are significant differences in ACE2 expression in SARS-CoV-infected multiorgans [19,20]. Such as virus replication in colonic epithelial cells that lack ACE2 and virus infection in endothelium cells that do [21].

Conclusion

In our study LFT was increased in hospitalized COVID-19 patients compared with non-hospitalized who were the majority received vaccine against the virus and their results indicate that they are not affected by the virus or have a less impact than the groups who did not receive the vaccine and according to our study the vaccinated group is a proximally resemble to control group.

Our results concluded that renal function tests represented by urea and creatinine. Moreover, liver function tests included GOT and ALP in COVID-19 patients were higher compared to the control group. While the vaccine was safe and does not effect on the kidneys and liver functions in the vaccinated group.

References

[1] Othman, I. A., & Mustafa, B. S. (2022). Predict the Risk Level in Iraqi Governorates According to the Spread of COVID-19 Using Data Mining. *NTU Journal of Pure Sciences*, *1*(2), 22-28.

[2] Faiq, T. N., Ghareeb, O. A., & Fadhel, M. F. (2021). Characteristics and outcomes of covid 19 patients in kirkuk city, iraq. *Annals of the Romanian Society for Cell Biology*, 12432-12438.

[3] Haddad, M. F., Alhamadany, A. Y. M., & Al-Taie, A. A. (2021). SOME BIOCHEMICAL PARAMETERS IN PATIENTS OF COVID-19 IN MOSUL CITY, IRAQ. *Biochemical and Cellular Archives*, 2091-2096.

[4] Yang, X., Yu, Y., Xu, J., Shu, H., Liu, H., Wu, Y., ... & Shang, Y. (2020). Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. *The Lancet Respiratory Medicine*, *8*(5), 475-481.

[5] Chen, N., Zhou, M., Dong, X., Qu, J., Gong, F., Han, Y., ... & Zhang, L. (2020). Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *The lancet*, *395*(10223), 507-513.

[6] Hoffmann, M., Kleine-Weber, H., Schroeder, S., Krüger, N., Herrler, T., Erichsen, S., ... & Pöhlmann, S. (2020). SARS-CoV-2 cell entry depends on ACE2 and TMPRSS2 and is blocked by a clinically proven protease inhibitor. *cell*, *181*(2), 271-280.

[7] Gao, F., Zheng, K. I., Wang, X. B., Sun, Q. F., Pan, K. H., Wang, T. Y., ... & Zheng, M. H. (2020). Obesity is a risk factor for greater COVID-19 severity. *Diabetes care*, *43*(7), e72-e74.

[8] Chai, X., Hu, L., Zhang, Y., Han, W., Lu, Z., Ke, A., ... & Lan, F. (2020). Specific ACE2 expression in cholangiocytes may cause liver damage after 2019-nCoV infection. *biorxiv*.. https://doi. org/10.1101/2020.02.03.931766 [Epub ahead of print].

[9] Picchianti Diamanti, A., Rosado, M. M., Pioli, C., Sesti, G., & Laganà, B. (2020). Cytokine release syndrome in COVID-19 patients, a new scenario for an old concern: the fragile balance between infections and autoimmunity. *International Journal of Molecular Sciences*, *21*(9), 3330.

[10] Kim, H. Y. (2014). Analysis of variance (ANOVA) comparing means of more than two groups. *Restorative dentistry & endodontics*, *39*(1), 74-77.

[11] Feng, G., Zheng, K. I., Yan, Q. Q., Rios, R. S., Targher, G., Byrne, C. D., ... & Zheng, M. H. (2020). COVID-19 and liver dysfunction: current insights and emergent therapeutic strategies. *Journal of clinical and translational hepatology*, *8*(1), 18.

[12] Wong, S. H., Lui, R. N., & Sung, J. J. (2020). Covid-19 and the digestive system. *Journal of gastroenterology and hepatology*, *35*(5), 744-748.

[13] Zhang, C., Shi, L., & Wang, F. S. (2020). Liver injury in COVID-19: management and challenges. *The lancet Gastroenterology & hepatology*, *5*(5), 428-430.

[14] Lei, F., Liu, Y. M., Zhou, F., Qin, J. J., Zhang, P., Zhu, L., ... & Yuan, Y. (2020). Longitudinal association between markers of liver injury and mortality in COVID-19 in China. *Hepatology*, *72*(2), 389-398.

[15] Oyelade, T., Alqahtani, J., & Canciani, G. (2020). Prognosis of COVID-19 in patients with liver and kidney diseases: an early systematic review and meta-analysis. *Tropical medicine and infectious disease*, *5*(2), 80.

[16] Mantovani, A., Beatrice, G., & Dalbeni, A. (2020). Coronavirus disease 2019 and prevalence of chronic liver disease: A meta-analysis. *Liver international*, *40*(6), 1316-1320.

[17] Zhou, P., Yang, X. L., Wang, X. G., Hu, B., Zhang, L., Zhang, W., ... & Shi, Z. L. (2020). A pneumonia outbreak associated with a new coronavirus of probable bat origin. *nature*, *579*(7798), 270-273.

[18] Li, W., Moore, M. J., Vasilieva, N., Sui, J., Wong, S. K., Berne, M. A., ... & Farzan, M. (2003). Angiotensin-converting enzyme 2 is a functional receptor for the SARS coronavirus. *Nature*, *426*(6965), 450-454.

[19] Hamming, I., Timens, W., Bulthuis, M. L. C., Lely, A. T., Navis, G. V., & van Goor, H. (2004). Tissue distribution of ACE2 protein, the functional receptor for SARS coronavirus. A first step in understanding SARS pathogenesis. *The Journal of Pathology: A Journal of the Pathological Society of Great Britain and Ireland*, *203*(2), 631-637.

[20] Cheung, O. Y., Chan, J. W. M., Ng, C. K., & Koo, C. K. (2004). The spectrum of pathological changes in severe acute respiratory syndrome (SARS). *Histopathology*, *45*(2), 119-124.

[21] Chen, J., & Subbarao, K. (2007). The immunobiology of SARS. *Annual review of immunology*, *25*(1), 443-472.