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Retrospective comparison of ALT-AST values of patients before and after the COVID-19 period in Ardahan province

Umit Yasar[1], Umut Kokbas[2]

[1]Ardahan University, Nihat Delibalta Göle Vocational School, Department of Laboratory and Veterinary Health, Ardahan, Türkiye
[2]Nevşehir Hacı Bektaş Veli University, Faculty of Dentistry, Department of Basic Medical Sciences, Nevşehir, Türkiye

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Abstract

The primary purpose of this study was to evaluate the significance level between the liver damage marker (ALT-AST) levels taken in both periods from individuals who came to Ardahan State Hospital before and after the coronavirus disease of 2019 (COVID-19) disease period that appeared in our country in March 2020. Patients with chronic viral infections, alcohol use problems, liver cancer, chronic liver disease and cirrhosis were excluded from the study. Considering the period of March 2020, which was the first time it was seen in our country, liver marker levels of the same patients were examined in both periods, before and after. Statistical significance levels were evaluated and discussed in the literature. It was determined that 68 of 96 individuals (70.8%), whose ALT and AST enzyme levels were examined before and after COVID-19, had an increase in ALT and AST levels compared with the pre-COVID-19 period. The COVID-19 pandemic, a new era in human life, continues even though it has lost its effect. These effects include the stress of the illness period, the side effects of the medications used and the permanent damage caused by the COVID-19 infection. Because of these results, liver checquese and orientation towards a healthy life are of great importance after the COVID-19 period.

Keywords: Alanin aminotransferaz-aspartat aminotransferaz, coronavirus disease of 2019, liver damage

Introduction

Sars Cov 2 virus, which emerged in the Wuhan province of China in 2019, is known as COVID-19 because it emerged in 2019. COVID-19 virus is a viral infection that has caused the death of approximately 6,625,000 people worldwide since its emergence. In our country, the COVID-19 virus caused the death of approximately 101,000 people [1].

The prognosis of most patients (81%) is good, some (14%) are severely severe, and a minority (5%) are critically ill [2] . Clinical symptoms include severe pneumonia, multiple organ failure and respiratory failure [3]. Since there is no effective clinical treatment, nearly 30 drug trials have been conducted. Some of the drugs in this drug cocktail include steroids, antihistamines, receptor blockers, and viral or antibiotics [4]. It is thought that such a dangerous disease has direct or indirect effects on the liver [5]. Studies of patients affected by COVID-19 have shown that in addition to heart damage, gastrointestinal, hepatic and renal complications are among the early or long-term effects of the disease [6].

Alanine Aminotransferase enzyme (ALT) is an enzyme produced by the liver, which is the largest organ in the human body. Another name for this enzyme is serum glutamic pyruvic transaminase enzyme (SGPT). ALT is an enzyme mainly localised in the liver. A damaged liver for any reason causes the circulatory system to release more ALT than normal, causing the ALT level to rise. A high level of ALT enzyme may indicate a disease in the liver [1,7].

Conditions that damage liver cells, which play an important role in metabolic integration, affect ALT levels. Therefore, ALT is a marker used to detect damage to liver cells and to diagnose liver diseases [7].

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Corresponding Author: Umit Yasar , Ardahan University, Nihat Delibalta Göle Vocational School, Department of Laboratory and Veterinary Health, Ardahan, Türkiye
Email: umityasar@ardahan.edu.tr

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Aspartate aminotransferase (AST) enzyme produced in the liver, the largest organ of the human body. Another name for the AST enzyme is serum glutamic oxaloacetic transaminase enzyme (SGOT). AST, like ALT, is found at low levels in red blood cells, muscle, heart, kidney and brain, as well as in the liver. Due to cell damage from the liver, which is damaged for any reason, more AST than normal is released into the circulation, causing the AST level to rise. Elevated AST can be considered as an indicator of liver damage, similar the ALT enzyme [1,7].

In addition to basic metabolic functions, the liver produces blood clotting factors and clean the blood from toxic substances. Liver damage or lack of function, which also has a significant impact on the development of the human body's immune system, can cause many diseases. Since the activities of ALT and AST enzymes alone do not give a definitive result, the results of both values should be evaluated together [8]. When AST and ALT values are high, diseases such as hepatitis and cirrhosis are thought of as the cause of liver damage [9]. In the literature, ALT and AST enzymes are also referred to as liver function tests.

Additionally, it was determined that the prevalence of patients with cardiomyopathic conditions was high during the COVID-19 epidemic. It has been mentioned that this condition may increase susceptibility to cardiovascular damage [10,11]. COVID-19 infection may increase the incidence of major cardiovascular diseases [12]. Therefore, determination of troponin levels in clinical diagnosis is considered an important marker of myocardial damage in humans and animals [13-15]. Evaluating hematological data together with biochemical analyses is important in determining long-term effects [16,17].

In this study, the change in ALT and AST level values of individuals before and after the COVID-19 period, due to COVID-19 and its indirect effects, was investigated and compared with patients in the previous period [16]. In clinical studies, the variability of liver enzyme function markers that each patient will show at certain time intervals cannot meet the need for diagnosis and treatment alone with a limited number of patients. The aim of this study is to investigate the indirect effect of the pandemic, which affects the whole world, on liver health.

Material and Methods

All data of this study included ALT-AST analysis data. The study was conducted retrospectively with Ardahan Province public hospital data. It was approved by Ardahan University Scientific Research and Publication Ethics Committee (Date: 04.01.2023, protocol no: 2022-2ÖNP-0114). Procedures performed were in accordance with the ethical standards of the institutional research committee.

Data collection

Demographic data (age, gender, comorbidities) and vital parameters of the patients were obtainedfrom the hospital information management system. In the study, conditions such as gallbladder disease, chronic viral hepatitis, decompensated/ decompensated cirrhosis, biliary disorders, alcohol use disorder, primary liver cancer, chronic liver disease, chemotherapy, patients associated with immunodeficiency, diabetes mellitus, endocrine disorders, and autoimmune diseases were examined, which may change the findings of the participants. people were excluded. The sample of the study was comprised of individuals who applied to Ardahan State Hospital before and after March 2020, the date when the COVID-19 case was first observed in our country, and whose ALT-AST levels were measured in both applications. The ALT and AST enzyme data of these samples were evaluated by dividing them into the period before and after COVID-19.

Statistical analyses

All data were analyzed using the IBM SPSS 20 statistical program. While evaluating the study data, the suitability of the data for normal distribution was evaluated with the Shapiro-Wilk test. When the data showed normal distribution, they were analyzed using Student's t-test. A p value of 0.05 was taken as a basis for the data obtained to be considered statistically significant.

Results

A total of 96 samples over the age of 40 were randomly selected from the data used in the study. Descriptive information regarding the sample group included in the study is shown in Table 1.

Table 1. Distribution and demographic data of patients included in the study according to groups

	N	Ages	ALT before COVID-19	ALT after COVID-19	AST before COVID-19	AST after COVID-19
Woman	49	54.87	22.83	27.14	22.64	23.94
Man	47	52.45	22.55	27.84	21.02	22.69
Woman	49	54.87	22.83	27.14	22.64	23.94
Man	47	52.45	22.55	27.84	21.02	22.69

N: number of participants; AST and ALT are U/L

Discussion

It is not known what complications people who have recovered from COVID-19 will have in the medium and long term. All current estimates must be accompanied by evidence of sequelae. In studies conducted to date, it has been mentioned that damage such as non-specific systemic inflammation may occur through angiotensin converting enzyme-2 [18-20]. In post-COVID-19 evaluation, organ and dysfunctions due to irregular pro-inflammatory responses may occur [21,22].

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Studies conducted on COVID-19 patients have mentioned organ failure and immune system weakening due to comorbidity, in which bacterial and fungal co-infections may develop depending on the course of the disease [23]. However, demographic factors, older age, and poor prognosis have been described in asymptomatic cases. In addition to frequently observed symptoms such as expectoration and cough in such patients, gastrointestinal findings have also been reported [24].

Shaw and colleagues mentioned the possibility of insidious infection and permanent infectivity of pulmonary function abnormalities even months later in their follow-up of patients after COVID-19 and reported the need to be monitored [25]. In another study, they reported autoimmune hepatitis developing after COVID-19 vaccination and liver damage through liver biopsy taken in their study [26].

Patients with SARS-CoV-2 infection often have varying degrees of liver function indices. Reported research shows that ALT, AST or both tend to increase to certain degrees with COVID-19. This situation also facilitates possible predictions in people who do not have severe disease [24,27,28].

In a study conducted by Gameil et al, they mentioned high ALT and AST levels in a significant number of survivors in a long-term clinical biochemical parameter study after COVID-19 [29]. Meta-analyses in the literature mentioned that the levels of hepatic inflammatory markers (AST and ALT) increased [30].

When the data of our study was evaluated, it was observed that the COVID-19 pandemic, which significantly affected the world and our country, had an effect on the liver both directly and indirectly. In the study conducted by Cichoż-Lach and Michalak in 2021, in parallel with our study, they reported that the drugs used especially in the treatment of COVID-19 caused significant hepatic damage [31]. Similarly, the COVID-19 and liver damage research conducted by Alqahtani and his colleagues in 2020 appears to support the results of our study [32].

One of the common mistakes is not paying much attention to slight aminotransferase increases. However, the point that should not be forgotten is that chronic liver disease is accompanied by aminotransferase levels that slightly exceed normal. Moreover, in some chronic diseases, these levels remain within the normal range [33].

There are many studies in the literature conducted on different populations that support our study. Although the enzyme level increases in our results are among the reference values, is the observed increase an indicator of direct or indirect liver damage in the past? Or is it a potential serious side effect of the COVID-19 vaccine used? [34]. As mentioned in the literature, more studies are needed for definitive results, with its pathogenesis not yet fully clarified [29].

An increase in the levels of these enzymes, which are liver function tests, was observed in individuals whose ALT and ALT levels were compared retrospectively before and after the COVID-19 period (Figures 1 and 2). Although this increase is between the ALT and AST reference values, the increase after COVID-19 may bring possible risks.

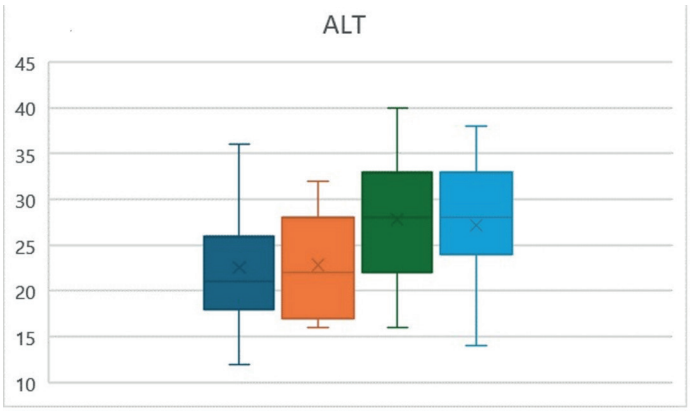

Figure 1. Scatter plot of ALT values by gender before and after COVID-19. (Blue: Male before COVID-19, Orange: Female before COVID-19, Grey: Male after COVID-19, Yellow: Female after COVID-19)

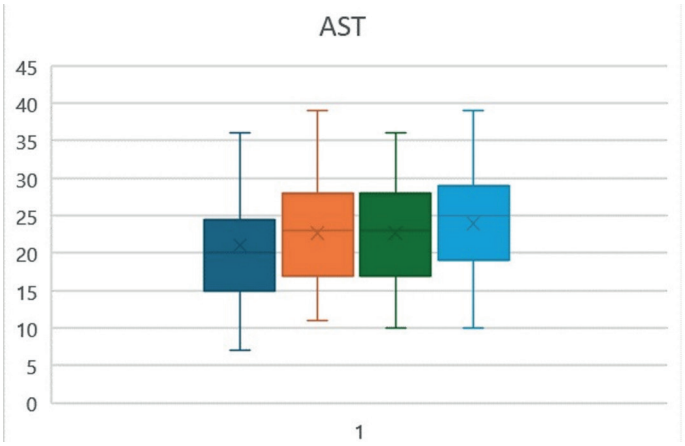

Figure 2. Scatter plot of AST values by gender before and after COVID-19. (Blue: Male before COVID-19, Orange: Female before COVID-19, Grey: Male after COVID-19, Yellow: Female after COVID-19)

Evaluating other factors that will affect the change in ALT and AST values within the scope of further research will contribute to a more comprehensive interpretation of the findings obtained from this study. In addition, since this research is specific to Ardahan province, expanding the sample in further studies will be more useful to understand the indirect effects of COVID-19.

Conclusion

As a result, the COVID-19 pandemic, which is a new era in human life, continues even though it has lost its effect. These effects are the stress of the illness period, the side effects of the medications used and the permanent damage caused by the COVID-19 infection. Due to these results, liver checks and orientation towards a healthy life are of great importance after the COVID-19 period.

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Conflict of Interests
The authors declare that there is no conflict of interest in the study.

Financial Disclosure
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Ethical Approval
The study was conducted retrospectively with Ardahan Province State Hospital Laboratory Operating System data. Approved by Ardahan University Scientific Research and Publication Ethics Committee (Date: 04.01.2023, protocol no: 2022-2ÖNP-0114). This study was presented orally at the 5TH International Euroasian Conference on Biological and Chemical Science, November 2022, Ankara/Türkiye.

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