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CLINICAL AND EPIDEMIOLOGICAL CHARACTERISTICS OF LIVER DAMAGE DURING COVID-19 IN PATIENTS WITH A FATAL OUTCOME

©**Mahto Monika Rani**, ORCID: 0009-0009-3636-2728, International Higher School of Medicine, Bishkek, Kyrgyzstan, mahtomonika72878@gmail.com

©**Bommineni Sekar Swathy**, ORCID: 0009-0009-2465-3034, International Higher School of Medicine, Bishkek, Kyrgyzstan, bs.swathy9@gmail.com

©**Zakirova G.**, ORCID: 0009-0009-8592-7035, International Higher School of Medicine, Bishkek, Kyrgyzstan, zakirovagulkaiyr@gmail.com

©**Buranchieva A.**, ORCID: 0000-0001-5262-3638, SPIN-code: 4885-5600, M.D., International Higher School of Medicine, Bishkek, Kyrgyzstan, buranchieva99@gmail.com

КЛИНИКО-ЭПИДЕМИОЛОГИЧЕСКИЕ ХАРАКТЕРИСТИКИ ПОРАЖЕНИЯ ПЕЧЕНИ ПРИ COVID-19 У БОЛЬНЫХ С ЛЕТАЛЬНЫМ ИСХОДОМ

©**Махто Моника Рани**, ORCID: 0009-0009-3636-2728, Международная высшая школа медицины, г. Бишкек, Кыргызстан, mahtomonika72878@gmail.com

©**Бомминени Секар Свати**, ORCID: 0009-0009-2465-3034, Международная высшая школа медицины, г. Бишкек, Кыргызстан, bs.swathy9@gmail.com

©**Закирова Г. Ш.**, ORCID: 0009-0009-8592-7035, Международная высшая школа медицины, г. Бишкек, Кыргызстан, zakirovagulkaiyr@gmail.com

©**Буранчиева А. А.**, ORCID: 0000-0001-5262-3638, SPIN-код: 4885-5600, канд. мед. наук, Международная высшая школа медицины, г. Бишкек, Кыргызстан, buranchieva99@gmail.com

Аннотация. В настоящее время известно, что вирус SARS-CoV-2 может инфицировать клетки желудочно-кишечного тракта, а также печени. Дисфункция печени обнаруживается у 14–53% пациентов с COVID-19. Ученые установили, что вирус SARS-CoV-2 может напрямую инфицировать клетки печени и клетки, выстилающие внутри- и внепеченочные желчные протоки (холангиоциты), так как они содержат, хотя и в низких концентрациях, особый фермент ACE-2, служащий точкой входа в клетки некоторых коронавирусов, в том числе SARS-CoV-2. Следующим этапом развития патологии является воспаление и образование тромбов. При бурной реакции иммунной системы происходит избыточный выброс цитокинов, усугубляющий состояние и в ряде случаев приводящий к реактивному гепатиту.

Abstract. It is now known that the SARS-CoV-2 virus can infect cells in the gastrointestinal tract as well as the liver. Liver dysfunction is found in 14-53% of patients with COVID-19. Scientists have found that the SARS-CoV-2 virus can directly infect liver cells and cells lining the intra- and extrahepatic bile ducts (cholangiocytes), since they contain, although in low concentrations, a special enzyme ACE-2, which serves as an entry point into cells of some coronaviruses, including SARS-CoV-2. The next stage in the development of pathology is inflammation and the formation of blood clots. With a violent reaction of the immune system, an excessive release of cytokines occurs, which aggravates the condition and, in some cases, leads to reactive hepatitis.

Ключевые слова: коронавирусная инфекция, аланинаминотрансфераза, аспаратаминотрансфераза, жировой гепатоз.

Keywords: coronavirus infection, alanine aminotransferase, aspartate aminotransferase, fatty liver.

It is now known that the SARS-CoV-2 virus can infect cells in the gastrointestinal tract as well as the liver. Liver dysfunction is found in 14–53% of patients with COVID-19. Scientists have found that the SARS-CoV-2 virus can directly infect liver cells and cells lining the intra- and extrahepatic bile ducts (cholangiocytes), since they contain, although in low concentrations, special enzyme ACE-2 which serves as the entry point into cells for some coronaviruses, including SARS-CoV-2 [1-17].

The next stage in the development of pathology is inflammation and formation of blood clots. With a violent reaction of the immune system, an excessive release of cytokines occurs, aggravating the condition and in some cases leading to reactive hepatitis [4, 7-17].

To study the incidence of liver pathologies and the nature of its manifestations in COVID-19 patients with a fatal outcome. The material of the study was the data of a retrospective analysis of 63 case histories of patients with a fatal outcome, hospitalized in the Republican Clinical Infectious Diseases Hospital for the period from May to November 2021. Statistical analysis was performed using Microsoft Office Excel 2016 (Microsoft, USA) and Statistica 10 software (StatSoft Inc., USA).

Results

For the period from May to November 2021, there were more men (62%) than women (38%) among the hospitalized patients at the Republican Clinical Infectious Diseases Hospital. The age groups of patients were presented as follows: 25-44 years old — 3 patients (4%), 45-60 years old — 13 patients (21%), 61-75 years old — 37 patients (59%), 76-90 years old — 10 patients (16%) (Figure 1) [3, 8].

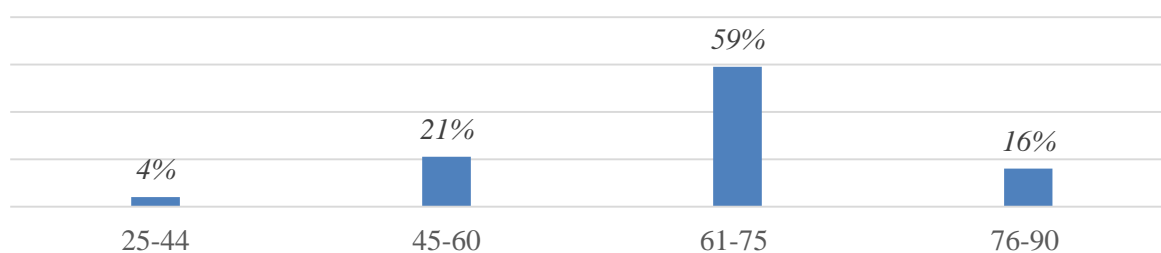


Figure 1. Age structure of COVID-19 patients

As can be seen in Figure 2., the majority of patients were over the age of 60 years and in general accounted for 75% of the total number of patients with a fatal outcome. According to the epidemiological anamnesis, the majority of patients with a fatal outcome, 69.8%, were urban residents, and 30.2% of patients were rural residents, respectively (Figure 2) [5].

Close family contact was noted in 73% of patients, and in 27% of cases contact was not established (Figure 3).

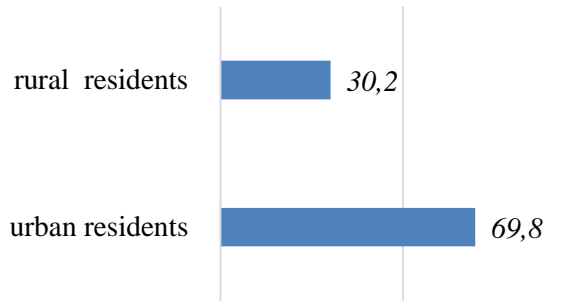


Figure 2. Residents allocation

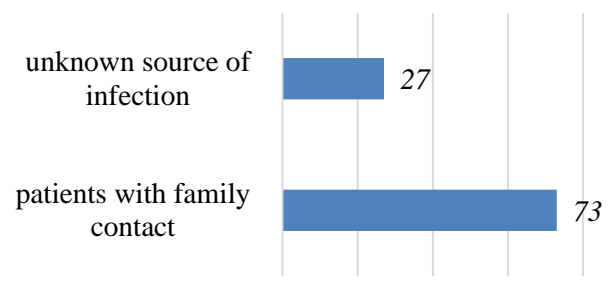


Figure 3. The epidemiological contact with COVID-19 patients

The prevalence of patients by region is shown in Figure 4, which shows that the majority of patients were from the city of Bishkek and the Chui region. Among patients with fatal outcome, 35 patients (55.5%) were pensioners, 20 patients (31.8%) were unemployed and the remaining 8 patients (12.7%) were employed (Figure 5). The first cases of severe coronavirus infection with a fatal outcome in the period from May to November 2021 began to appear in May. Figure 7 shows that the highest mortality rates were registered in July (51.3%) and November (43%).

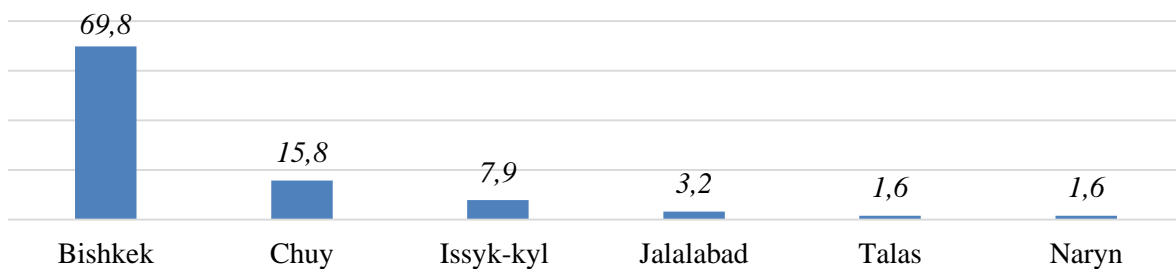


Figure 4. Prevalence by region

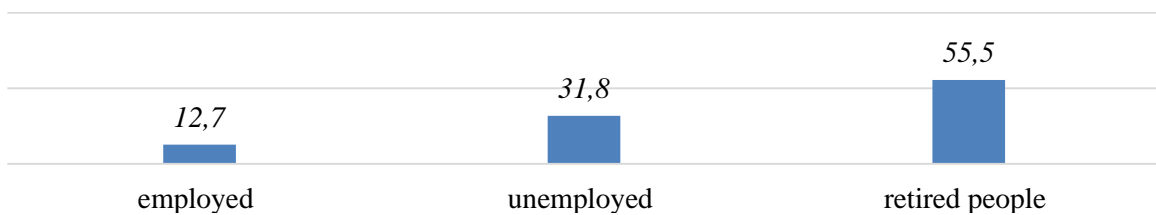


Figure 5. Employment structure

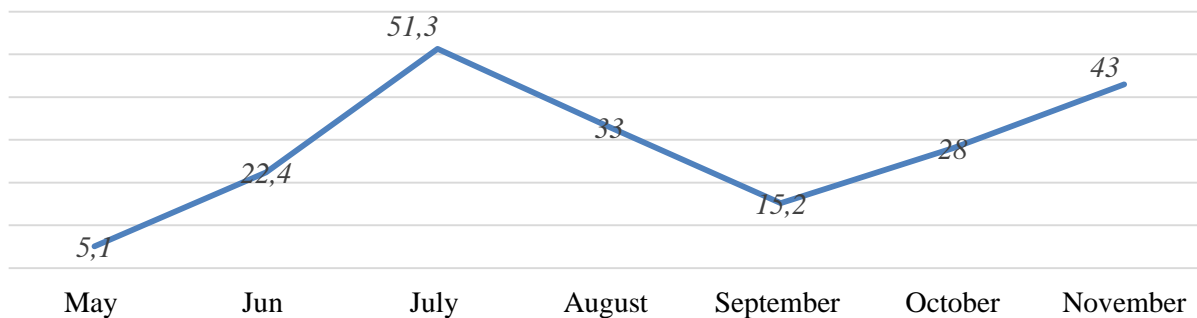


Figure 6. The number of cases of COVID-19 by months

The analysis of clinical symptoms showed that the most common symptoms of patients with Covid-19 were weakness (100%), headache (94%), fever (100%), cough (81%), anosmia, ageusia (52%), loss or lack of appetite (81%), abdominal pain (68%), pain in the right hypochondrium (64%) (Table). Such symptoms as chest discomfort (21%), palpitations (17%), and peripheral edema (3%) were less common.

Table

CLINICAL SYMPTOMS OF COVID-19

FREQUENT SIGNS (30%) >		OCCASIONAL SIGNS (30%) <	
Clinical signs		Clinical signs	
Headache	94%	Nausea	27%
Fever	100%	Vomiting, diarrhea	20%
Dry cough	81%	Chills	25%
Loss of smell, loss of taste	52%	Muscle and joint pain	21%
Weakness	100%	Chest discomfort	21%
Shortness of breath	78%	Palpitation	17%
Loss of appetite	81%	Dizziness	27%
Abdominal distention, abdominal pain	68%	Peripheral edema	3%
Pain in the right upper part of abdomen	64%		

The severe form of the disease was predominant, and this form developed in patients with a burdened premorbid background.

As can be seen in Figure 8, 62% of patients with a fatal outcome had concomitant diseases from the cardiovascular system, pathologies of the gastrointestinal tract (35%), diabetes mellitus (35%), hypertension (32%), chronic hepatitis (30%), which contributed to the severe course of the disease with the development of a lethal outcome. Patients experienced complications such as ARDS (98.5%), multiple organ failure (92.3%), DIC (96.8%), respiratory failure (90%), community-acquired pneumonia (98.3%), brain edema (86.5%), cardiovascular insufficiency (83%), sepsis (56%) and others. Pneumonia and acute respiratory distress syndrome, DIC were the leading causes of death in the period from May to November 2021.

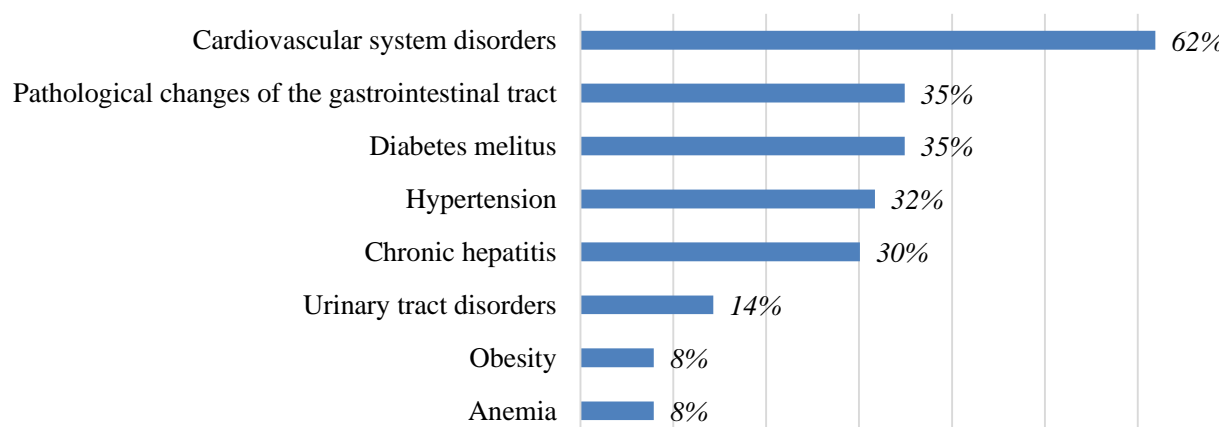


Figure 7. Comorbidities in COVID-19 patients with fatal outcome

A complex of clinical and laboratory studies revealed the following. On average, patients with a fatal outcome were admitted on the 7th-8th day of illness and stayed in hospital for 26 days. It is

necessary to note the dynamics of the increase in the level of transaminases on days 12-13 of the disease with a predominance of the ALT level, which indicated the severity of the course of the disease (Figure 8). In a laboratory and instrumental study of abdominal ultrasound in patients with a fatal outcome, the following changes in the function of the gastrointestinal tract were found: fatty hepatosis (47%), chronic hepatitis (46%) and steatohepatitis (7%) (Figure 9) [3, 9].

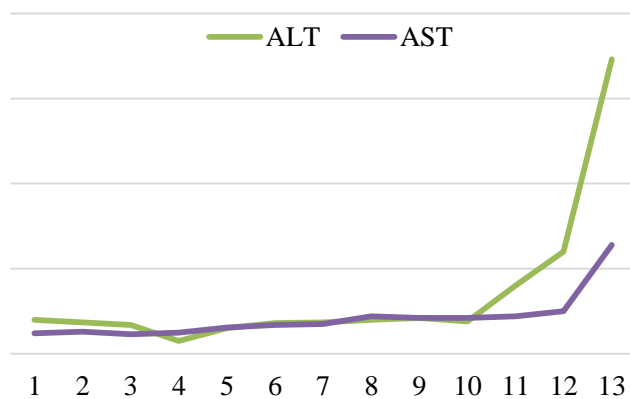


Figure 8. Dynamics of AST and ALT activity during hospitalization

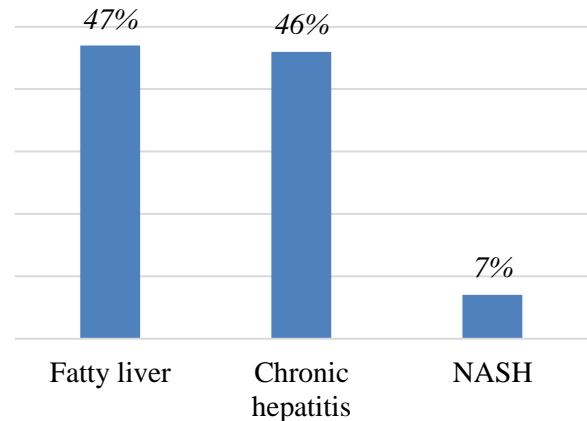


Figure 9. Liver ultrasound data in patients with fatal outcome

As can be seen from Figure 9, fatty hepatosis (47%) and chronic hepatitis (46%) occurred with almost the same frequency, which may have contributed to the aggravation of the course of the disease and the development of lethal outcome. In Figure 10, we see a persistent rise in the D-dimer index, which are determinants of thrombosis.

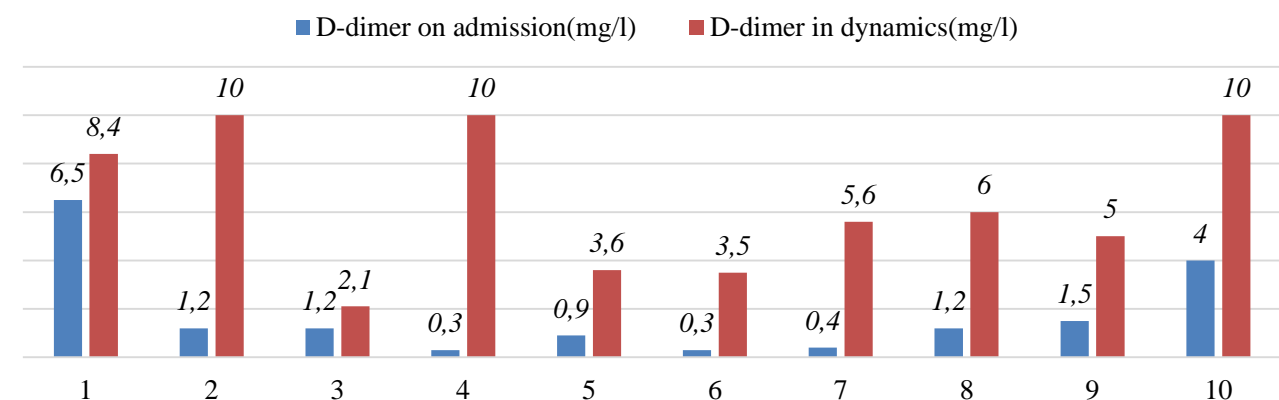


Figure 10. Dynamics of D-dimer during hospitalization

Conclusions

Liver pathology is often developed in males over 60 years of age. Liver pathology is often developed with concomitant diseases of the hepato-biliary system. Transaminase activity increases in the second week in patients with a fatal outcome. The causes of death in patients were pneumonia, ARDS, DIC. Ultrasound data of patients with COVID-19 with fatal outcome more often detected NAFLD and chronic hepatitis.

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