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INSTRUMENTAL, LABORATORY, AND CLINICAL FEATURES OF JUVENILE IDIOPATHIC ARTHRITIS IN CHILDREN DURING THE POST-COVID-19 PERIOD

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Abstract: Background. *COVID-19 infection affects multiple organ systems, activating inflammatory and autoimmune processes and worsening the course of chronic diseases. In particular, juvenile idiopathic arthritis (JIA) in children may exhibit altered clinical and laboratory manifestations during the post-COVID-19 period.*

Objective. *To identify the clinical, laboratory, and instrumental features of JIA in children with a history of COVID-19 and to compare them with pre-pandemic cases.*

Materials and Methods. *The study was conducted at the Republican Specialized Scientific and Practical Medical Center of Pediatrics. Twenty-six JIA patients who had recovered from COVID-19 (Group 1, prospective observation) were compared with fifty-two JIA patients treated before the pandemic (Group 2, retrospective control). Laboratory, ultrasound, and clinical parameters were statistically analyzed.*

Results. *In Group 1, hemoglobin levels were lower (97.5±1.5 g/L), while platelet counts (322.2±14.2 ×10⁹/L) and LDH levels (395.4±33.6 U/L) were significantly higher (*$p<0.05$*). According to ultrasound data, hepatomegaly (30%), cholecystopathy (43.3%), and reactive hepatitis (33.3%) were more frequent compared to Group 2. Clinically, dizziness, memory decline, cardiac pain, irritability, and constipation were more common.*

Conclusion. *The post-COVID course of JIA in children is characterized by activation of inflammatory and metabolic processes, hematologic alterations, and*

hepatobiliary involvement. Individualized approaches in rehabilitation and follow-up programs are required.

Keywords: *COVID-19, juvenile idiopathic arthritis, LDH, reactive hepatitis, cholecystopathy, hepatomegaly, post-COVID period.*

Introduction

The novel coronavirus (SARS-CoV-2) infection damages not only the respiratory system but also the cardiovascular, nervous, and immune systems. Its interaction with ACE2 receptors leads to endothelial dysfunction, microcirculatory disturbances, and systemic inflammation. In children, these processes may manifest as **multisystem inflammatory syndrome (MIS-C)**. In patients with autoimmune diseases, including **juvenile idiopathic arthritis (JIA)**, COVID-19 infection may exacerbate disease activity.

According to Johns Hopkins University data, children constitute about 8% of all COVID-19 cases. Therefore, studying the clinical and laboratory course of JIA in the post-COVID-19 period is of high scientific and practical relevance.

Materials and Methods

The study was carried out at the Department of Cardioreumatology, Republican Specialized Scientific and Practical Medical Center of Pediatrics.

Study design: Mixed (prospective and retrospective) comparative observation.

Participants:

- **Group 1 (post-COVID JIA):** 26 children diagnosed with JIA after recovering from COVID-19.
- **Group 2 (control):** 52 children diagnosed and treated for JIA before the COVID-19 pandemic.

Parameters evaluated:

- **Laboratory tests:** Hemoglobin, erythrocytes, leukocytes, platelets, ESR, C-reactive protein (CRP), total protein, and lactate dehydrogenase (LDH).
- **Instrumental assessments:** Ultrasound examination of the liver and biliary system (hepatomegaly, cholecystopathy, reactive hepatitis, pancreatitis).

- **Clinical features:** Subjective complaints, articular symptoms, and neurovegetative manifestations.

Statistical analysis: Results are presented as mean ± standard error. Differences between groups were assessed using Student's *t*-test, and values of $p \leq 0.05$ were considered statistically significant.

Results

Table 1. Laboratory parameters in the study groups

Indicators	Group I	Group II	p
Hemoglobin , g / l	9 7 .5±1.5	10 7 .9±3.5	≤ 0.05
Erythrocytes	3.9±1.3	4.7±0.3	< 0.05
Leukocytes , 10^9/l	1 0.2 ±0.5	8.2 ±0.4	< 0.05
Platelets	322.2 ± 14.2	261.3 ± 11.2	< 0.05
ECHT mm/s	8.5 ±2.2	7.8±2.7	
C-reactive protein	13.5 ± 3.4	10.4 ± 3.2	≤ 0.05
Indicators	Group I	Group II	p
Hemoglobin , g / l	9 7 .5±1.5	10 7 .9±3.5	≤ 0.05

In Group 1, the following changes were observed:

- **Hemoglobin:** 97.5 ± 1.5 g/L (vs. 107.9 ± 3.5 g/L in Group 2; $p \leq 0.05$);
- **Platelets:** 322.2 ± 14.2 × 10^9/L (vs. 261.3 ± 11.2 × 10^9/L; $p < 0.05$);
- **LDH:** 395.4 ± 33.6 U/L (vs. 302.1 ± 30.7 U/L; $p < 0.05$).

No statistically significant differences were observed for other parameters.

Table 2. Ultrasound examination findings in the study groups (%)

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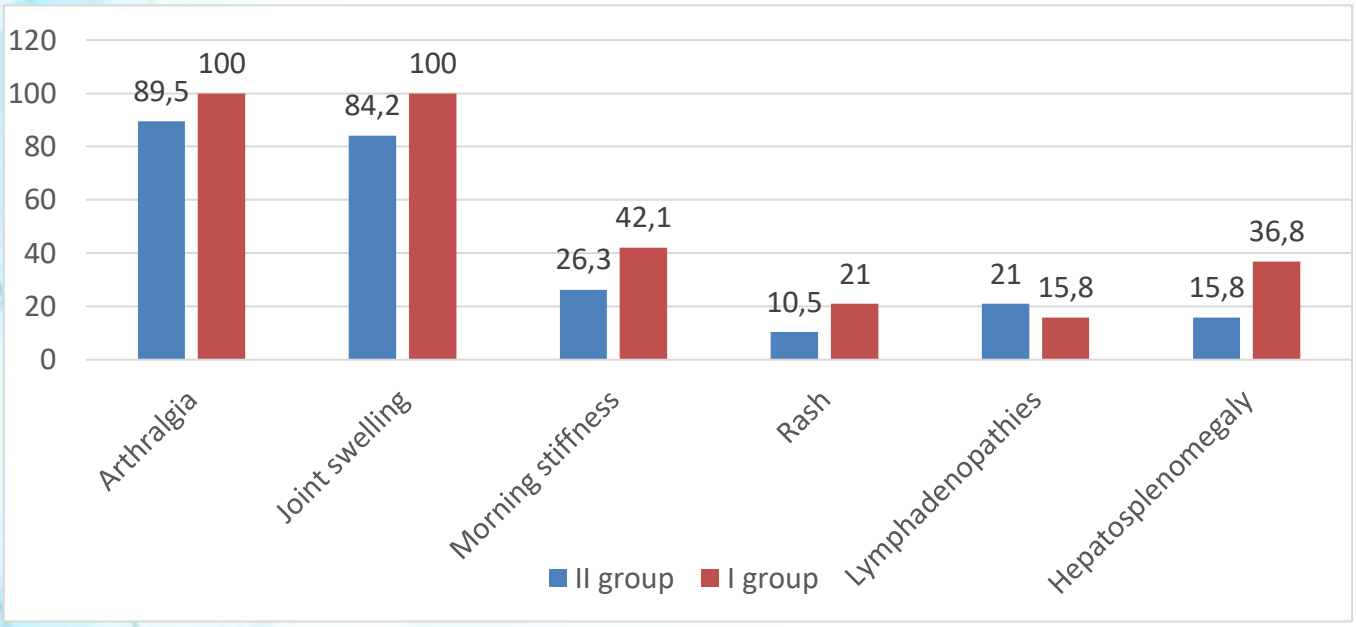
Characters	Group I	Group II
Intestinal pneumatosis	16.7	10
Hepatomegaly	30	16.7
Cholecystopathy	43.3	20
Reactive pancreatitis	20	6.7
Reactive hepatitis	33.3	13.3

Ultrasound examination revealed that in Group 1, the incidence of hepatomegaly (30%), cholecystopathy (43.3%), reactive pancreatitis (20%), and reactive hepatitis (33.3%) was significantly higher compared to Group 2.

Diagram 1.*Main complaints of patients in the study groups (%)*



Group 1 patients had more symptoms such as arthralgia, joint swelling, rash, and hepatosplenomegaly compared to group 2.

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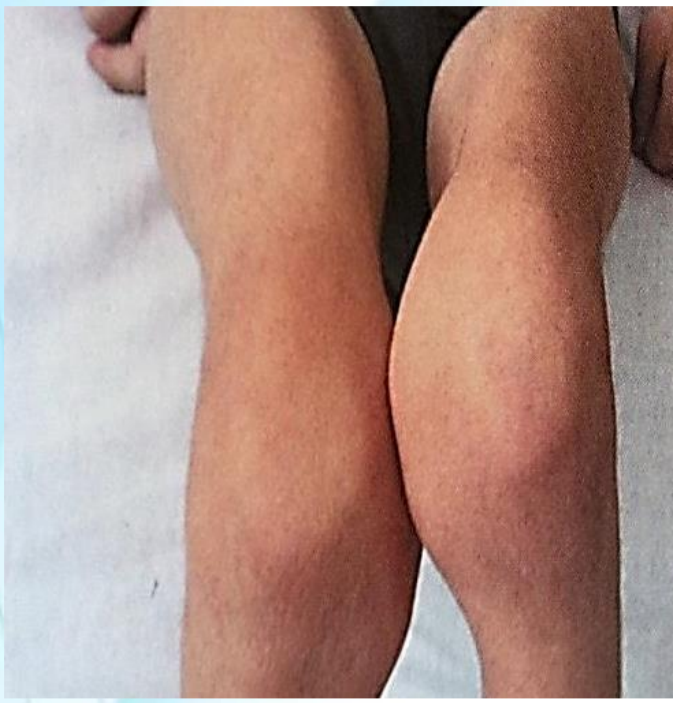

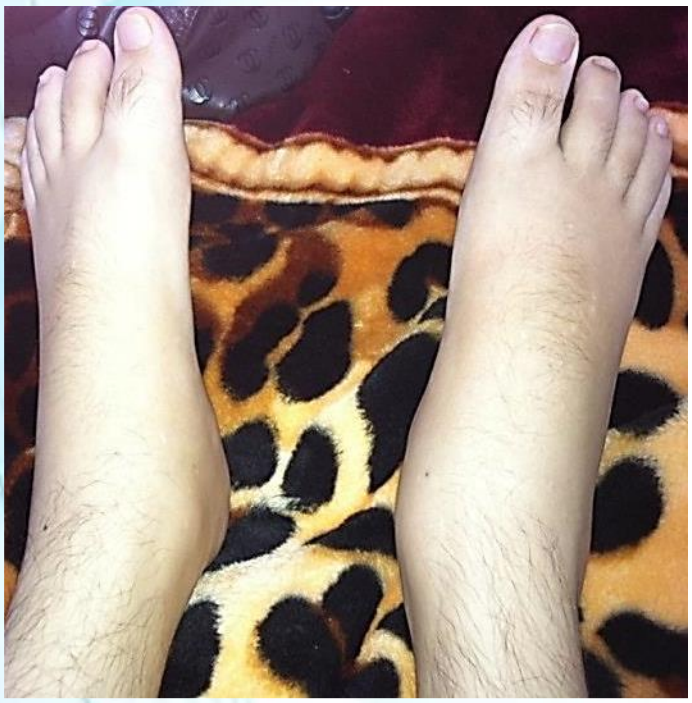

Figure 1. A 15-year-old boy with the articular form of juvenile idiopathic arthritis. Following COVID-19 infection, the disease exacerbated, leading to generalized inflammatory involvement of the knee joint.

Figure 2. A 16-year-old boy with the articular form of juvenile idiopathic arthritis. After recovering from COVID-19, disease activity increased, resulting in generalized inflammatory damage of the ankle joint.

Diagram 2. *Additional complaints of patients in the study groups (%)*

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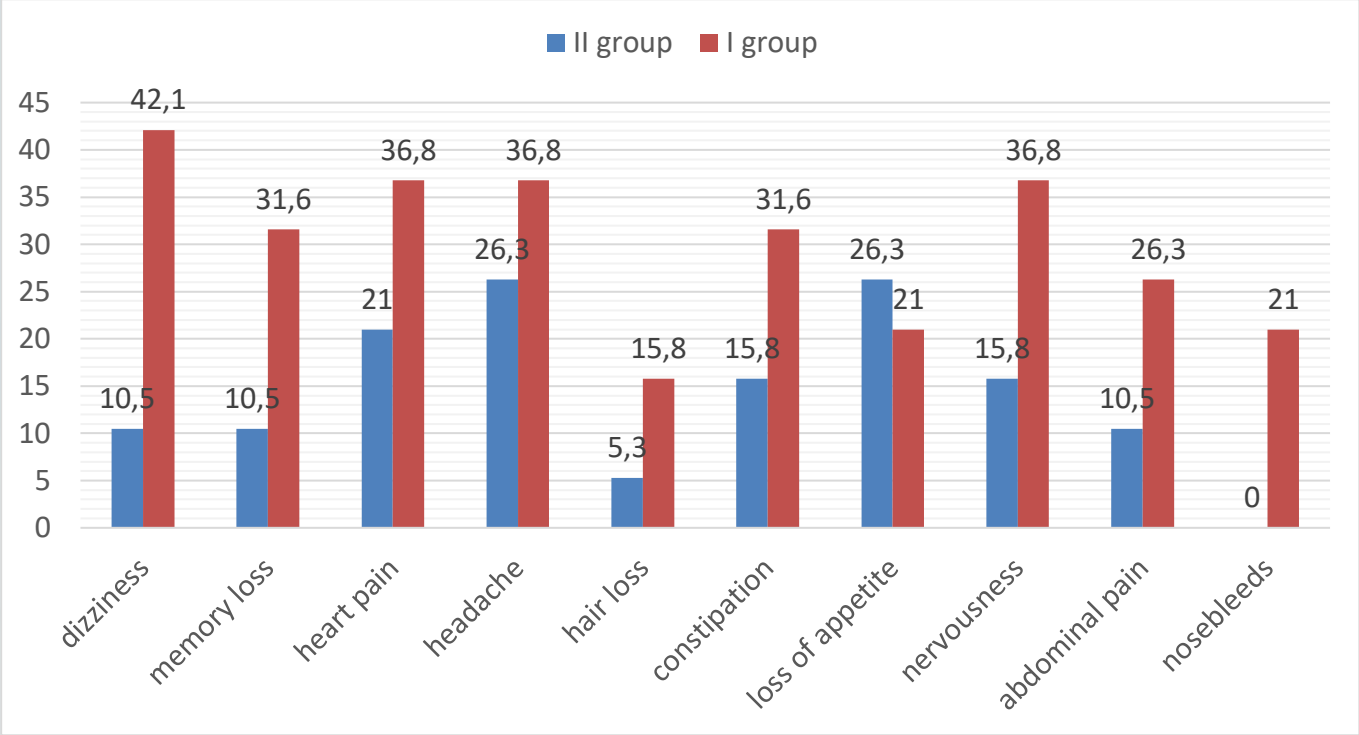

It was found that in patients with juvenile idiopathic arthritis, the incidence of complaints such as dizziness, memory decline, cardiac pain, constipation, irritability, and nasal bleeding increased significantly after recovering from COVID-19.

Discussion

The obtained results indicate that SARS-CoV-2 infection activates autoimmune and inflammatory responses in children with juvenile idiopathic arthritis (JIA). This is manifested by hematologic imbalance (anemia, thrombocytosis) and reactive changes in the hepatobiliary system. The increased level of LDH reflects metabolic stress in tissues, which may be associated with post-viral hypoxia and oxidative stress. These findings are consistent with the observations reported by Feldstein et al. (2020) and Whittaker et al. (2020), who described multisystem inflammatory syndrome (MIS-C) in pediatric patients following COVID-19 infection. Therefore, children with JIA who have recovered from COVID-19 require long-term clinical monitoring and rehabilitation measures to prevent exacerbation and systemic complications.

Conclusion

1. Laboratory analyses in children with juvenile idiopathic arthritis after COVID-19 revealed decreased hemoglobin levels and elevated platelet counts and LDH activity.

2. Ultrasound examination showed a significantly higher frequency of reactive hepatitis, cholecystopathy, and hepatomegaly in post-COVID JIA patients.

3. Clinically, post-COVID JIA patients more frequently reported dizziness, memory decline, cardiac pain, and constipation.

4. Considering the post-COVID features of JIA progression, individualized rehabilitation programs and long-term follow-up are recommended.

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