British Journal of Global Ecology and Sustainable Development
Volume- 46, November 2025
ISSN (E): 2754-9291

LABORATORY, INSTRUMENTAL, AND CLINICAL FEATURES OF SYSTEMIC LUPUS ERYTHEMATOSUS IN CHILDREN DURING THE POST-COVID-19 PERIOD

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Abstract

Background. COVID-19 infection triggers a multisystem inflammatory response and negatively affects the course of autoimmune diseases. In children, autoimmune disorders such as systemic lupus erythematosus (SLE) may worsen or manifest with new clinical features after COVID-19.

Objective. To compare the clinical and laboratory characteristics of systemic lupus erythematosus in children who had COVID-19 with those of patients treated before the pandemic.

Materials and Methods. The study was conducted at the Republican Specialized Scientific and Practical Medical Center of Pediatrics. Twenty-one patients with SLE who had recovered from COVID-19 (Group 1, prospective) were compared with forty-two SLE patients treated before the pandemic (Group 2, retrospective). Clinical, laboratory, and instrumental features were evaluated.

Results. In Group 1, leukocyte counts were increased ($5.2 \pm 0.5 \times 10^9$/L vs. $4.1 \pm 0.4 \times 10^9$/L; $p < 0.05$), ESR was elevated (22.5 ± 2.2 mm/h; $p < 0.05$), and CRP levels were higher (14.5 ± 3.4 mg/L; $p \leq 0.05$). Platelet counts were decreased ($180.2 \pm 10.2 \times 10^9$/L vs. $211.3 \pm 11.2 \times 10^9$/L; $p < 0.05$). Ultrasound examination revealed a higher frequency of reactive hepatitis (57.1%) and cholecystitis (57.1%).

Conclusion. Post-COVID-19 systemic lupus erythematosus in children is characterized by enhanced inflammatory activity, hematologic imbalance, and hepatobiliary system involvement. These findings underscore the need for individualized rehabilitation strategies and immunomodulatory monitoring.

Keywords: COVID-19, systemic lupus erythematosus, inflammation, CRP, ESR, reactive hepatitis, cholecystitis, post-COVID syndrome.

Introduction

COVID-19 infection (SARS-CoV-2) is a multisystem disease that leads to endothelial dysfunction and immune dysregulation. By binding to ACE-2 receptors, the virus enters host cells, triggering systemic inflammation and potentially developing multisystem inflammatory syndrome in children (MIS-C).

In pediatric patients with autoimmune diseases, particularly systemic lupus erythematosus (SLE), these inflammatory mechanisms may intensify disease activity. According to data from Johns Hopkins University, children account for approximately

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8% of all COVID-19 cases. Therefore, assessing the post-COVID course of SLE in children is both clinically and scientifically significant.

Materials and Methods

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

Study design: Mixed — prospective and retrospective.
Participants:
- **Group 1:** 21 children diagnosed with SLE after recovering from COVID-19;
- **Group 2:** 42 children diagnosed and treated for SLE before the pandemic.

Parameters evaluated:
- **Laboratory:** hemoglobin, erythrocytes, leukocytes, platelets, ESR, CRP, total protein, LDH.
- **Instrumental:** liver and biliary system assessment via ultrasonography, including reactive hepatitis, pancreatitis, and cholecystitis.
- **Clinical:** general asthenic symptoms, joint pain, and neurovegetative complaints.

Statistical analysis: Mean values were presented as mean ± standard error (SE). Intergroup differences were assessed using Student's t-test, with significance set at $p \leq 0.05$.

Results

Table 1. Laboratory parameters in the study groups

Parameters	1 group	2 group	p
Hemoglobin, g/L	105,5±2,5	102,9±3,5	
Erythrocytes	3,8±0,4	4,1±0,3	
Leukocytes, $\times 10^9$/L	5,2±0,5	4,1±0,4	< 0,05
Platelets	180,2±10,2	211,3±11,2	< 0,05
ESR, mm/h	22,5±2,2	14,9±2,7	< 0,05
C-reactive protein	14,5±3,4	10,4±3,2	≤ 0,05
Total protein, g/L	61,6±12,4	63,8±11,9	
LDH	305,4±33,6	309,1±30,7	

According to the data presented in Table 1:
- Leukocyte count was higher in Group 1 ($5.2 \pm 0.5 \times 10^9$/L) compared to Group 2 ($4.1 \pm 0.4 \times 10^9$/L; $p < 0.05$);
- Platelet count was reduced (180.2 ± 10.2 vs. 211.3 ± 11.2; $p < 0.05$);

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• ESR and CRP levels were significantly elevated (22.5 ± 2.2 mm/h; 14.5 ± 3.4 mg/L; p ≤ 0.05);
• No significant differences were observed in LDH levels.

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

Findings	I group	II group
Reactive pancreatitis	14,3	14,3
Intestinal pneumatosis	14,3	14,3
Cholecystitis	57,1	14,3
Reactive hepatitis	57,1	28,6

According to the ultrasound findings:
• Reactive hepatitis was detected in 57.1% of patients in Group 1 (compared to 28.6% in Group 2);
• Cholecystitis was identified in 57.1% (vs. 14.3% in Group 2);
• Reactive pancreatitis and intestinal pneumatosis were recorded in approximately 14.3% of cases.
These changes indicate an intensification of autoimmune processes in the post-COVID-19 period.

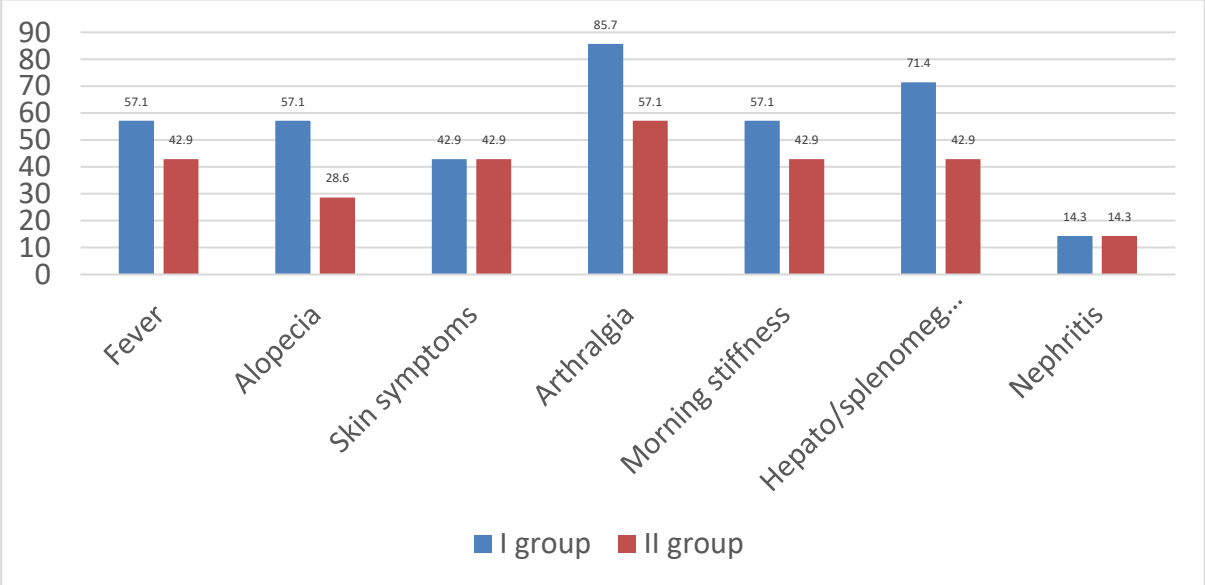

Figure 1. Main complaints of patients in the study groups (%)

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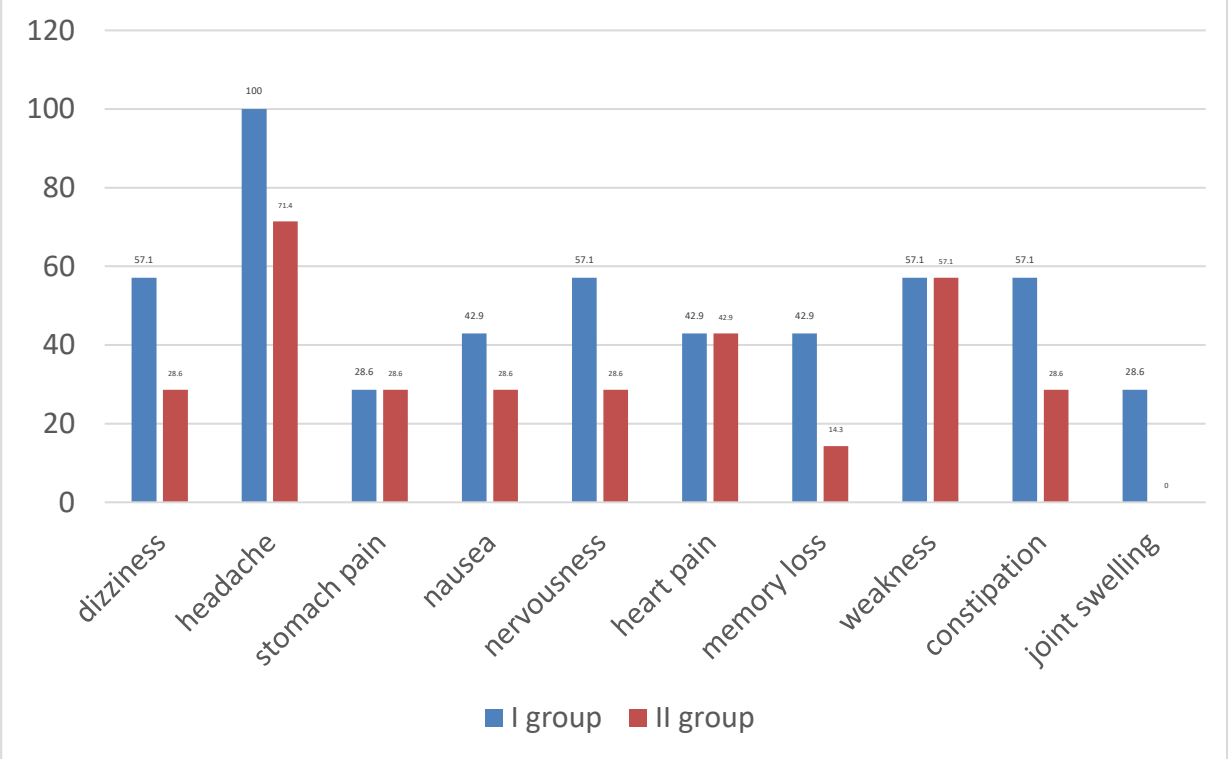

Figure 2. Additional complaints of patients in the study groups (%)

Patients with juvenile rheumatoid arthritis experienced a significant increase in complaints such as dizziness, memory impairment, cardiac pain, constipation, irritability, and nasal bleeding following COVID-19 infection.

Discussion

The obtained data confirm that COVID-19 infection may aggravate the course of systemic lupus erythematosus (SLE) in children. SARS-CoV-2 induces endothelial injury and cytokine storm, which activate autoimmune mechanisms.

In our study, elevated leukocyte counts, ESR, and CRP levels indicate intensified inflammatory activity. Thrombocytopenia is likely associated with autoimmune hematologic reactions.

The ultrasound findings of reactive hepatitis and cholecystitis further demonstrate immunologically mediated hepatic and biliary system involvement.

These results are consistent with the findings of Feldstein et al. (2020) and Whittaker et al. (2020), who documented multisystem inflammatory responses in children after COVID-19.

Conclusion

1. Children with systemic lupus erythematosus demonstrated increased inflammatory markers (ESR, CRP, leukocytes) and decreased platelet count in the post-COVID-19 period.

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2. Reactive hepatitis and cholecystitis were significantly more frequent on ultrasound examination.
3. Among clinical symptoms, asthenic and neurovegetative manifestations predominated.
4. Immunometabolic monitoring and individualized rehabilitation are essential for children with systemic lupus erythematosus in the post-COVID-19 period.

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