

CLINICAL AND LABORATORY FEATURES OF EXANTHEMATOUS SYNDROME IN CHILDREN WITH COVID-19

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Abstract

Objective: To determine the clinical and laboratory features of exanthematous syndrome in children with COVID-19. **Methods:** A combined retrospective and prospective study was performed at Zangiota Specialized Multidisciplinary Infectious Diseases Hospital No. 1. The retrospective stage included 19,682 children treated in 2020–2022, while the prospective stage included 363 children observed in 2022–2024. Clinical manifestations, disease severity, rash characteristics, hematological indices, coagulation parameters, and inflammatory markers were analyzed. **Results:** Moderate disease predominated (73%), while severe and critical forms accounted for 25% and 2%, respectively. Fever (98%), rhinopharyngitis (91%), intoxication syndrome (72%), diarrhea (68.2%), respiratory failure (63%), and pneumonia (58%) were among the most frequent manifestations. Exanthema was observed in 40.5% of patients and was associated with a higher proportion of severe disease. Maculopapular rash was the most common type (52%). Children with exanthema demonstrated more pronounced hematologic and coagulation abnormalities. **Conclusion:** Exanthematous syndrome is a clinically significant manifestation of pediatric COVID-19 and may serve as an early marker of more severe systemic involvement.

Keywords: children, COVID-19, exanthema, rash, clinical manifestations, laboratory findings, severity, pneumonia, respiratory failure, pediatric infection

Introduction

Coronavirus disease in children is usually milder than in adults, but a considerable proportion of pediatric patients develop multisystem manifestations, including skin involvement. Exanthematous syndrome in COVID-19 is clinically important because rash may appear at different stages of illness, complicate differential diagnosis, and reflect the intensity of systemic inflammation. In pediatric infectious disease practice, these manifestations require differentiation from measles, scarlet fever, allergic eruptions, varicella, and other infectious exanthems. The present study was undertaken to characterize the clinical and laboratory features of exanthematous syndrome in children with COVID-19 using the author's retrospective and prospective clinical material.

Materials and Methods

The study was carried out at Zangiota Specialized Multidisciplinary Infectious Diseases Hospital No. 1 and included retrospective and prospective stages. The retrospective stage covered 19,682 children treated with confirmed COVID-19 during 2020–2022. The prospective clinical stage included 363 children aged 1 month to 18 years treated during 2022–2024. The study design included clinical examination, complete blood count, urinalysis, stool examination, biochemical blood tests (ALT, AST, total protein, glucose, urea, creatinine), coagulation profile (prothrombin time, prothrombin index, international normalized ratio, fibrinogen, activated partial thromboplastin time, thrombin time), C-reactive protein, interleukin-6, assessment of integral hematologic indices, and chest CT when indicated. Children were grouped according to disease severity and the presence or absence of exanthema.

Table 1

Study design and core sample characteristics

Study stage	Period	Sample	Main indicators assessed
Retrospective analysis	2020–2022	n=19,682	Sex distribution, age distribution, annual severity structure, epidemic dynamics
Prospective clinical study	2022–2024	n=363	Clinical manifestations, disease severity, exanthema frequency, laboratory and coagulation changes
Exanthema subgroup	Within prospective cohort	n=147	Rash morphology, localization, comparison with children without rash

Results

Retrospective analysis of 19,682 children showed that boys predominated in all years of observation: 53% in 2020, 62% in 2021, and 51% in 2022. The highest burden of disease was observed among children aged 1–3 years (30%) and adolescents aged 15–18 years (26%), while the proportions in the 0–12 months and 8–14 years groups were 12% each. Across all three years, moderate forms predominated: 87% in 2020, 89.9% in 2021, and 91% in 2022. Severe forms accounted for 12.1%, 8.9%, and 8.4%, while critical forms remained below 1.2%.

In the prospective cohort of 363 children, moderate disease was documented in 73% of cases, severe disease in 25%, and critical disease in 2%. The leading clinical manifestations were fever (98%), rhinopharyngitis (91%), intoxication syndrome (72%), diarrhea (68.2%), respiratory failure (63%), sweating (61%), hyperthermic syndrome (60%), acute bronchitis (58%), and pneumonia (58%). Exanthema was identified in 40.5% of patients and anosmia in 11%.

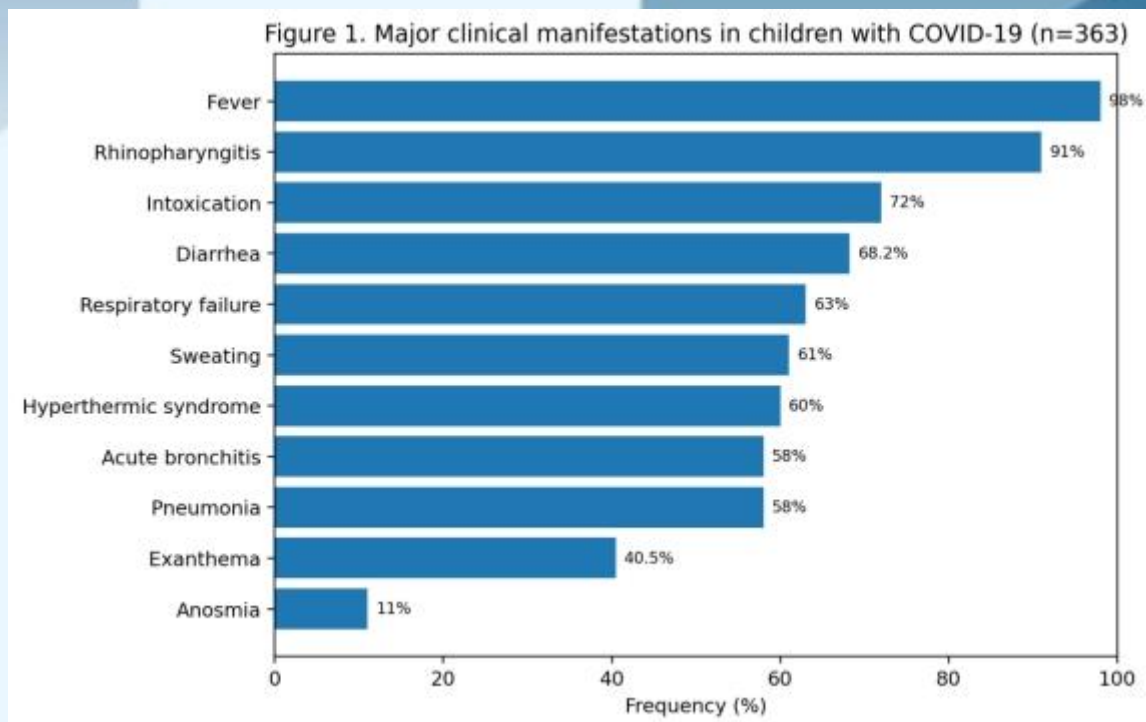


Figure 1. Frequency of major clinical manifestations in children with COVID-19 (n=363).

Table 2

Retrospective and prospective clinical indicators used in the article

Indicator	Group / period	Value	Comment
Boys among all children with COVID-19	2020 / 2021 / 2022	53% / 62% / 51%	Male predominance was present in each year
Age groups with highest incidence	2020–2022	1–3 years: 30%; 15–18 years: 26%	Lower proportions were seen in infants and 8–14 years groups
Moderate severity in retrospective cohort	2020 / 2021 / 2022	87% / 89.9% / 91%	Moderate disease predominated throughout
Prospective cohort severity	2022–2024	Moderate 73%; Severe 25%; Critical 2%	Clinical cohort n=363
Exanthema frequency	Prospective cohort	40.5%	Rash was a common COVID-19 manifestation
Most common rash type	Exanthema group (n=147)	Maculopapular 52%	Other types: vesicular 32.2%, urticarial 23.7%, fine-spotted 12.3%, petechial 3.5%

Clinical analysis of the exanthema subgroup (n=147) demonstrated heterogeneity of rash morphology. Maculopapular rash was the dominant type (52%), followed by vesicular rash (32.2%), urticarial rash (23.7%), fine-spotted rash (12.3%), and petechial rash (3.5%). Maculopapular lesions were most often distributed over the upper trunk, whereas vesicular lesions more frequently affected the hands and fingertips.

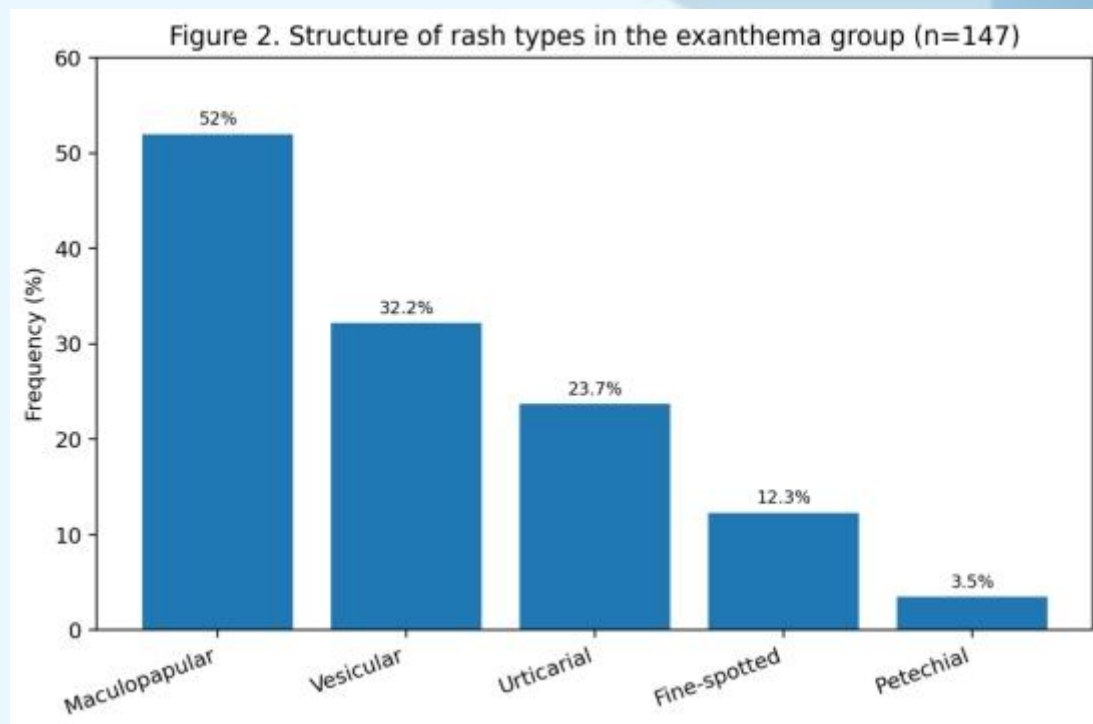


Figure 2. Distribution of rash morphology in the exanthema group (n=147).

Children with exanthema had more pronounced hematologic and coagulation changes than children without rash. According to the dissertation dataset, the exanthema group showed lower hemoglobin, erythrocyte count, hematocrit, lymphocyte count, and platelet count, alongside higher leukocyte, neutrophil, eosinophil, ESR, and coagulation abnormalities. These changes support the association between exanthema and a more active inflammatory response.

Discussion

The present clinical material indicates that exanthematous syndrome in pediatric COVID-19 is not merely a dermatologic finding but a marker of broader systemic involvement. The combination of fever, upper respiratory tract involvement, intoxication, pneumonia, and respiratory failure demonstrates the multisystem nature of pediatric COVID-19. The relatively high frequency of rash, together with the predominance of severe forms within the exanthema subgroup, suggests that exanthema may be useful for risk stratification in routine clinical practice. The observed hematologic and coagulation shifts further support this interpretation.

Conclusion

Exanthematous syndrome was identified in 40.5% of children with COVID-19 and was associated with a more severe clinical course and more pronounced laboratory abnormalities. Moderate forms

predominated overall, but severe disease remained substantial in the prospective cohort. Fever, rhinopharyngitis, intoxication syndrome, diarrhea, respiratory failure, acute bronchitis, pneumonia, and exanthema formed the main clinical profile. The findings support the practical value of exanthema as an early marker of disease severity in children with COVID-19.

Source note

This article was prepared from the author's dissertation materials on exanthematous syndrome in children with COVID-19, including retrospective (n=19,682) and prospective (n=363) clinical datasets.