Journal of
Kerman University of Medical Sciences

https://jkmu.kmu.ac.ir
doi:10.34172/jkmu.4106
JKMU 2026;33:4106

Original Article

Dermatologic Presentations of SARS-CoV-2 Infection in Children: Assessment of Rash Frequency and Related Factors

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Abstract

Introduction: Rash is a common complaint in children and may have diverse etiologies. Therefore, its differential diagnosis can be extensive. This study aimed to investigate the frequency of coronavirus disease 2019 (COVID-19) and rash in children with suspected COVID-19 clinical symptoms.

Methods: This descriptive cross-sectional study investigated the frequency of COVID-19 and skin rash in children with clinical symptoms associated with COVID-19 referred to Besat Clinic and Afzalipour Hospital, in Kerman, in 2020. To check for COVID-19 infection, polymerase chain reaction (PCR) test was performed by nasopharyngeal swab. A 1-mL blood sample was sent to the lab to be tested for immunoglobulin-M (IgM) and IgG serology using Pishtaz Teb Company's ELISA kits. To analyze the data, descriptive (prevalence, percentage, mean, and standard deviation) and analytical (independent samples *t*-test) statistics were used. The analyses were performed by SPSS software version 26.

Results: In this study, 107 children with skin rash and positive PCR test results for severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) were included. Boys accounted for 62.4% of the sample. The symptoms most observed in the children were cough, diarrhea, and vomiting, in descending order of prevalence. Examination of skin manifestations showed that 16.8% of children had skin rash. In 1.9% of children, skin itching was present. There was no significant difference in the serum levels of IgM and IgG between patients with skin rash and without skin rash ($P>0.05$).

Conclusion: In this study, 16.8% of children had skin rash, and 1.9% had itchy skin. Cutaneous involvement is helpful in clinical decision-making, as well as designing health literacy tools.

Keywords: COVID-19, SARS-CoV-2, Skin rash, Epidemiology, Children

Citation: Ghazanfari S, Sinaei R, Hosseininasab A, Parvaresh S, Jafari MA, Jamali Z et al. Dermatologic presentations of sars-cov-2 infection in children: assessment of rash frequency and related factors. Journal of Kerman University of Medical Sciences 2026;33:4106. doi:10.34172/jkmu.4106

Received: November 27, 2025, **Accepted**: June 2, 2026, **ePublished**: April 6, 2026

Introduction

In December 2019, a new infectious disease, caused by the virus SARS-CoV-2, emerged. It became known as COVID-19. Due to the high virulence of the virus, the outbreak was officially declared a pandemic by the World Health Organization on March 11, 2020 (1, 2). Its main route of transmission was through respiratory droplets and physical contact; however, transmission was also

possible via the fecal–oral route. Besides symptomatic patients, individuals without symptoms could also serve as significant sources of transmission (3).

The preliminary symptoms included fever, fatigue, and cold-like symptoms, and it could gradually progress to respiratory and several organ-specific symptoms and even death (4).

Children presented with less severe symptoms than adults. The respiratory symptoms remained one of the most well-known manifestations of COVID-19 and could affect the course of the disease and the prognosis of the patient. A severe and novel entity has emerged in children as a multi-system inflammatory syndrome (MIS-C). It is a delayed immune phenomenon affecting several organs between 2–4 weeks after initiation. However, both COVID-19 and MIS-C present with extra-pulmonary complications (5).

At a very early stage of the pandemic, the results of a study in China showed a connection between COVID-19 and skin rash (6). Skin rashes are unusual changes in the color or texture of the skin. They are usually caused by skin inflammation, which can have a variety of causes. Common skin rashes in children include viral rashes (e.g., measles, rubella, roseola, fifth disease, chickenpox, and hand, foot, and mouth disease [HFMD]), bacterial infections (e.g., scarlet fever), immune-mediated conditions (e.g., erythema multiforme, Henoch-Schönlein purpura [HSP], and Kawasaki disease), and drug-induced eruptions (7). The results of a study in 2020 showed that 2 out of 1,099 individuals diagnosed with COVID-19 across China developed a skin rash (6). In the study by Recalcati et al., skin manifestations including erythematous, chickenpox-like, and widespread rashes with itching were observed in 18 of the 88 patients with COVID-19. However, all disappeared in less than five days after initiation (8). Additionally, in a case-control study, a young patient with COVID-19 pneumonia who required hospitalization had a widespread rash consistent with viral exanthema (9).

Duramaz et al. discussed the occurrence of rash in three children with COVID-19 who received the drug hydroxychloroquine (10). Few studies have addressed cutaneous symptoms related to COVID-19 in children. Skin rashes are among the rare symptoms of COVID-19 that physicians should consider. This review focuses on the various skin manifestations seen in children and adolescents with COVID-19–related multisystem inflammatory syndrome (MIS-C). In a recent review aimed to highlight the cutaneous symptoms in children with COVID-19 and MIS-C, Sati et al. found that skin manifestations can be diverse and are frequently overlooked. These cases highlight the need for continuous research regarding the diverse cutaneous manifestations associated with COVID-19 in children, aiding in early diagnosis and prompt therapeutic strategies (11). Therefore, this study aimed to investigate the frequency of rash in children with suspected clinical symptoms of COVID-19.

Methods

Study design and participants

This descriptive cross-sectional study examined the frequency of COVID-19 and rash in children with suspected clinical symptoms of COVID-19 referred to Besat Clinic and Afzalipour Hospital, Kerman, in 2020. Children with any type of skin rash, pityriasis versicolor, or morbilliform eruptions were included in the study.

The exclusion criteria comprised a history of underlying conditions like lupus, use of medications known to cause skin rashes, malnutrition or obesity, and any prior significant disease or kidney dysfunction.

Data Collection

Patients with any type of skin rash, urticaria, pityriasis versicolor, or morbilliform eruptions were examined by a dermatologist. A COVID-19 PCR test was performed using a swab from the nasopharynx. A 1 mL blood sample was collected and tested for COVID-19 IgM and IgG serology using a SARS-CoV-2 IgM Capture ELISA Kit and a SARS-CoV-2 IgG ELISA Kit (Pishtaz Teb Company), respectively (12). In addition, a questionnaire including demographic information was completed for them.

In the SARS-CoV-2 IgG ELISA kit, the wells of the plate are covered in the N antigens (core coating) of the SARS-CoV-2 virus. During the test, the diluted samples are poured into the wells. If there are antibodies against SARS-CoV-2 antigens, these antibodies bind to the antigens at the bottom of the well. After washing, if anti-SARS-CoV-2 IgG antibodies are present, they are detected by adding an anti-human IgG antibody conjugated to HRP. After washing, the dye solution is poured into the wells. The intensity of the blue color is proportional to the immune complex formed in the wells. Addition of stopping solution turns the blue color to yellow, which has the best light absorption at the wavelength of 450 nm.

Statistical analysis

To analyze the data, descriptive statistics (frequency, percentage, mean, and standard deviation) and analytical statistics (independent samples t-test) were used. SPSS version 26 software was used for the statistical analyses. The confidence level of 95% (5% alpha error) was set as the boundary of accepting and rejecting the null hypothesis. A p-value less than 0.05 was considered significant.

Ethical Issues/Statement

After giving full explanations about how the research would be conducted, the researchers obtained written informed consent from the parents of the patients. All the regulations of the national code of ethics in research and all international regulations (Helsinki and Nuremberg) were observed in this study. This study was approved by the ethics committee of Kerman University of Medical Sciences (code: IR.KMU.AH.REC.1400.013).

Results

In this study, 150 children with suspected COVID-19

were examined clinically, of which 107 (71.3%) were PCR-positive. The average age of the patients was 14.78 ± 2.59 with a range of 1–15 years, and most of the patients were male (62.6%). In terms of disease symptoms, 76.6% had fever, 20.7% diarrhea, 21.4% cough, and 14% nausea. There were 5 people (4.6%) with MIS-C. The prevalence of skin rash among children with positive PCR was 18 (16.8%) (Table 1) (Figure 1, 2).

The predominant type of skin lesion observed was a maculopapular rash (Table 2).

There was no significant difference in the serum levels of SARS-CoV-2 IgM in patients with and without skin rash ($P = 0.559$). Similarly, there was no significant difference in the serum levels of SARS-CoV-2 IgG in patients with and without skin rash ($P = 0.799$) (Table 3) (Figure 1).

All the laboratory findings followed the normal distribution. According to Table 4, the mean laboratory findings in patients with and without skin rash did not differ significantly (Table 4).

Discussion

In this study, we evaluated 150 children with suspected COVID-19, of whom 107 (71.3%) tested positive by RT-PCR. The mean age of participants was 14.78 ± 2.59 years, with a predominance of males (62.6%). Clinical manifestations were largely consistent with previous pediatric COVID-19 reports, with fever (76.6%), cough (21.4%), diarrhea (20.7%), and vomiting (14%) being the most commonly observed symptoms. Only a small percentage of children (4.6%) developed multisystem inflammatory syndrome (MIS-C), highlighting the generally milder course of SARS-CoV-2 infection in pediatric populations.

Among mucocutaneous manifestations, skin rash and itching were observed in 16.8% and 1.9% of children, respectively. No notable differences were observed in SARS-CoV-2 IgM or IgG serum levels between patients with and without skin rash, suggesting that cutaneous manifestations may not correlate with humoral immune response during acute infection. Similarly, other laboratory parameters, including WBC, ESR, CRP, liver enzymes, and renal function markers, did not differ significantly between children with and without rash. These results align with earlier studies showing that skin manifestations in COVID-19 are not necessarily associated with disease severity or systemic inflammation.

COVID-19 affects individuals across all age groups. However, children generally present with less severe courses than adults. An increasing number of reports have been published from Europe, North America, Asia, and Latin America describing children and adolescents with MIS-C, which typically presents late in the course of disease. In response to this emerging challenge, the European and United States Centers for Disease Control and Prevention (CDC), the Australian Department of Health, and the World Health Organization (WHO) have published recommendations for MIS-C (13,14). In our study, MIS-C accounted for 4.7% of affected children. Since children often show mild symptoms of COVID-19 and are tested less than adults, the prevalence of COVID-19 and the reported cases of MIS-C in children infected with SARS-CoV-2 may not be reliable. In an

Table 1. Demographic characteristics of patients

Variable	Value
Age mean (SD)	14.78 (2.59)
Sex	
Male	67 (62.6)
Female	40 (37.4)
Symptoms	
Fever	82 (76.6)
Diarrhea	22 (20.7)
Cough	23 (21.4)
Vomiting	15 (14)
MIS-C*	
Yes	5 (4.6)
No	102 (95.4)
Skin rash	
Yes	18 (16.8)
No	89 (83.1)

* Multisystem inflammatory syndrome (MIS-C)

Table 2. Types of skin manifestation

Types of skin manifestation	n (%)
Maculopapular	9 (50)
Hives (urticarial)	4 (22.22)
Vesicular	2 (11.11)
Purpuric/vasculitic	3 (16.66)
Total	18 (100)

The Kolmogorov–Smirnov test showed that the serum levels of IgM ($P = 0.48$) and IgG ($P = 0.36$) followed a normal distribution

Table 3. The relationship between the serum levels of SARS-CoV-2 IgM and IgG in patients with and without skin rash.

Variable		n	IgM Mean ± SD	*P*-value*	n	IgG Mean ± SD	*P*-value*
Skin rash	+	18	11.83 ± 5.30	0.559	5	72 ± 17.70	0.799
	–	89	12.62 ± 4.62		102	74.17 ± 13.83	

* Independent Samples t-test, a *P*-value less than 0.05 was considered significant

Table 4. Comparison of laboratory findings in patients with and without skin rash.

Variable	All patients	Skin rash	Normal skin	*P*-value*
WBC ($\times 10^3$ /mm^3)	9.10 ± 12.21	9.01 ± 12.97	8.01 ± 11.37	0.47
ESR (mm/h)	18.45 ± 47.7	13.12 ± 49.3	18.74 ± 47.16	0.33
CRP (mg/dL)	19.53 ± 35.5	11.95 ± 36.15	8.95 ± 35.16	0.53
AST (U/L)	12.1 ± 63.12	15.68 ± 69.34	21.18 ± 60.63	0.054
ALT (U/L)	21.3 ± 51.9	32.6 ± 62.6	31.1 ± 36.8	0.15
Total Pro (g/dL)	1.6 ± 5.5	2.8 ± 3.7	2.9 ± 5.9	0.23
Bun (mg/dL)	6.54 ± 25.19	10.72 ± 28.73	13.11 ± 24.06	0.52
Cr (mg/dL)	0.07 ± 0.51	0.11 ± 0.76	0.21 ± 0.52	0.45

* Independent samples *t*-test, a *P*-value less than 0.05 was considered significant

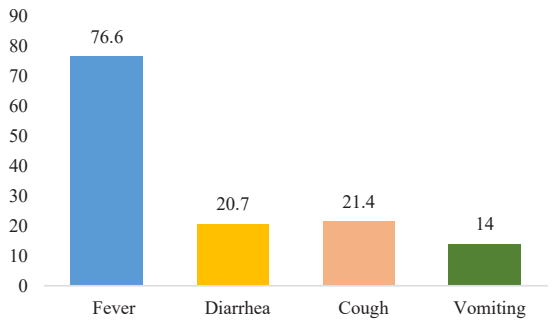

Figure 1. Symptom prevalence in children with suspected COVID-19

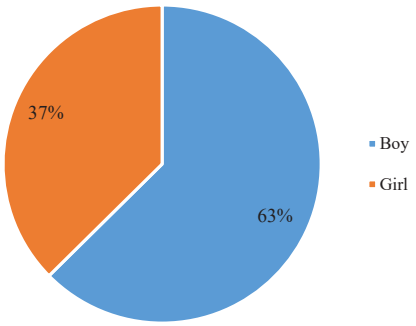

Figure 2. Sex distribution of pediatric patients

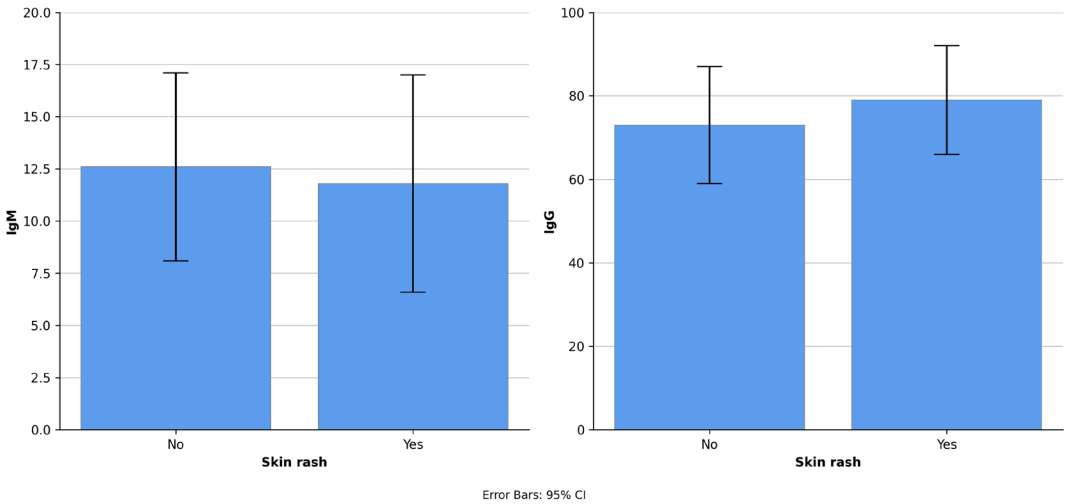

Figure 3. Mean and standard deviation of IgM and IgG in patients with and without rash

Italian study, the cumulative incidence of MIS-C was 3.27 per 100,000 residents aged 0 to 18, with a prevalence of 0.07% among children who had previously been infected with SARS-CoV-2. However, the incidence of MIS-C is decreasing over time (14). Although MIS-C remains rare, surveillance is critical, particularly in regions with high SARS-CoV-2 transmission, given its potential for rapid progression and severe outcomes.

In children infected with COVID-19, fever and cough are the most frequently observed clinical symptoms, followed by several unspecific symptoms including fatigue, myalgia, nasal congestion, runny nose, sneezing, sore throat, headache, dizziness, vomiting, diarrhea, and abdominal pain (15). Some children may not develop a fever, showing symptoms like cough or diarrhea instead, and some can even be asymptomatic carriers. Some children and infants show unusual symptoms that appear in the form of vomiting, diarrhea, and other gastrointestinal symptoms or just asthma and shortness of breath (16, 17). In our study, cough, diarrhea, and vomiting were observed in 22.1%, 21.5%, and 14% of children, respectively. This supports the observation that children may present atypically, sometimes with gastrointestinal rather than respiratory symptoms. This emphasizes the need for clinicians to remain highly vigilant for potential COVID-19 cases even in the absence of fever or cough. Notably, some studies have reported severe pediatric cases initially presenting with gastrointestinal symptoms progressing to respiratory distress, underlining the heterogeneity of clinical presentations in children. The first severe case of childhood infection reported in Wuhan, China, began with gastrointestinal symptoms and no respiratory symptoms, but rapidly progressed to acute respiratory distress syndrome (16). In the study by Ding et al. fever and cough were the most important symptoms of coronavirus in children (3). In La Torre et al.'s cohort study in southeast Italy, gastrointestinal, mucocutaneous, and cardiac involvement were the most common clinical features. However, respiratory symptoms were among less frequent problems and rash occurred in 77% of cases (14). Examination of skin manifestations in our study showed that 16.8% of children had skin rash and 1.9% of children had itchy skin. In Dufort et al.'s study, up to May 10, 2020, a total of 191 possible cases were reported to the New York Department of Health, of which 95 patients were diagnosed with MIS-C, and 60% of these had skin rash (18). The first scientific report on the relationship between COVID-19 and rash was conducted in China, and two cases of skin involvement were observed (6). Lu et al. reported a case of COVID-19 with rash as the first skin manifestation on March 19, 2020 (19). In the studies of Recalcati et al. from Italy (8), Chen et al. from China (20), and Bouaziz et al. from France (21), 18, 7, and 14 cases with mucocutaneous manifestations were reported, respectively. In the study by Recalcati et al., there was little pruritus and all lesions disappeared in less than five days (8).

In Spain, Fernandez-Nieto et al. and Galván et al. carried out nationwide surveys, reporting 19 and 375 COVID-19 cases with skin manifestations, respectively (22, 24). Until May 30, 2020, a total of 507 cases of COVID-19 with skin manifestations were reported, and 488 of the 507 patients were from Europe (96.25%). In May 2020, in the study by Duramaz et al., three out of 20 hospitalized patients (15%) developed skin manifestations. Two patients developed skin involvement at baseline, and one patient developed it following hydroxychloroquine administration. Skin manifestations included maculopapular rash (2 patients) and erythematous eruptions (1 patient). Skin urticaria was observed following the administration of hydroxychloroquine in a 17-year-old patient (10). In general, they did not observe any kind of correlation between the exacerbation of urticaria and the severity of the disease. However, skin rashes may occur in children with COVID-19, regardless of whether they receive hydroxychloroquine. In March 2020, Hunt et al. reported a young patient with COVID-19 pneumonia with fever and widespread urticaria who required hospitalization. The urticaria was morbilliform, maculopapular, and non-pruritic and occurred concurrently with viral exanthema (9). Urticaria may be one of the rare symptoms of this disease. We previously reported two cases of staphylococcal scalded skin syndrome related to COVID-19 (24, 25). Sati and colleagues recently reviewed the cutaneous and histopathological features of COVID-19 patients (11). These cases underscore the importance of ongoing research into the skin manifestations of COVID-19 in children, which can support early diagnosis and timely treatment.

Although we found no relationship between serological identifying factors and cutaneous manifestations in this study, serology remains important for identifying late presentations, such as rheumatologic or post-infectious complications. However, as shown here and elsewhere, serologic testing has limited utility in acute diagnosis, reinforcing the reliance on molecular testing for early detection. Several studies have pointed to the importance of detecting SARS-CoV-2 infection using serology in both pediatric and adult populations, especially in late presentations such as rheumatologic complications (4, 26). However, serologic tests have limited utility for acute SARS-CoV-2 infection diagnosis, as seen in the present study.

A strength of our study was its focus on the cutaneous manifestations of COVID-19, which allowed us to identify cases of COVID-19 and MIS-C using molecular and serological testing. This makes our decision making and epidemiological data as accurate as possible. One limitation of our survey is the small sample size. The study is also limited by its short duration and by the lack of data on different SARS-CoV-2 sub-lineages.

In conclusion, skin rashes are a notable, though not predominant, manifestation of COVID-19 in children, often occurring independently of serologic markers or systemic laboratory abnormalities. Recognizing these manifestations can aid early diagnosis and management, particularly in mild or atypical pediatric cases. Future studies with larger cohorts and variant-specific analyses are warranted to further elucidate the clinical and immunologic correlates of cutaneous involvement in pediatric COVID-19.

Conclusion

This study showed that skin rashes occurred in 16.8% of PCR-positive children with COVID-19, indicating that although uncommon, cutaneous manifestations represent a relevant clinical feature in the pediatric population. No significant association was found between rash and SARS-CoV-2 IgM/IgG levels or other laboratory parameters. A small proportion of patients developed MIS-C, underscoring the need for careful monitoring of systemic inflammation. Overall, these findings highlight that skin involvement, while not frequent, should be considered a potential early or accompanying sign of COVID-19 in children, which warrants further investigation through larger studies.

Acknowledgements

The authors thank the staff of the hospitals and the participants of this study for their contribution.

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Competing Interests

The authors declare that they do not have any conflict of interest.

Ethical Approval

After the researchers provided full explanations about how the research would be conducted, the parents of the patients provided written informed consent. All regulations of the national code of ethics in research and international regulations (Helsinki and Nuremberg) were observed in this study. This study was approved by the Ethics Committee of Kerman University of Medical Sciences (code: IR.KMU.AH.REC.1400.013).

Data Availability statement

All data generated or analyzed during this study are included in the published article.

Funding

No financial or non-financial benefits have been received or will be received from any party related directly or indirectly to the subject of this article.

References

1. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel coronavirus from patients with pneumonia in China, 2019. N Engl J Med 2020;382(8):727-33. doi:10.1056/NEJMoa2001017
2. Sinaei R, Pezeshki S, Asadipour A, Shiari R, Sinaei R, Sinaei A. Anti-rheumatic drugs as potential anti-inflammatory, immunomodulatory agents against COVID-19: a systematic review. Pharm Sci 2021;27(Suppl 1):S13-28. doi:10.34172/ps.2021.40
3. Ding Y, Yan H, Guo W. Clinical characteristics of children with COVID-19: a meta-analysis. Front Pediatr 2020;8:431. doi:10.3389/fped.2020.00431
4. Sinaei R, Iranmanesh K, Pezeshki S, Hasannejad M, Hosseininasab A, Parvaresh S, et al. Utility of the presence of anti-SARS-CoV-2 antibodies in detecting COVID-19 in symptomatic children and adolescents: an analytical cross-sectional study. Curr Respir Med Rev 2024;20(1):38-46. doi:10.2174/011573398x267876231017072820
5. Sinaei R, Pezeshki S, Parvaresh S, Sinaei R, Shiari R, Hassas Yeganeh M, et al. Post SARS-CoV-2 infection reactive arthritis: a brief report of two pediatric cases. Pediatr Rheumatol Online J 2021;19(1):89. doi:10.1186/s12969-021-00555-9
6. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, et al. Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med 2020;382(18):1708-20. doi:10.1056/NEJMoa2002032
7. Amzar MM, Ross S. Common rashes in children. In: Nantha YS, ed. Screen, Diagnose, Manage and Monitor: A GP Primer to Common Clinical Conditions. Singapore: Springer; 2025. p. 1025-36. doi:10.1007/978-981-97-7640-5_116
8. Recalcati S. Cutaneous manifestations in COVID-19: a first perspective. J Eur Acad Dermatol Venereol 2020;34(5):e212-3. doi:10.1111/jdv.16387
9. Hunt M, Koziatek C. A case of COVID-19 pneumonia in a young male with full body rash as a presenting symptom. Clin Pract Cases Emerg Med 2020;4(2):219-21. doi:10.5811/cpcem.2020.3.47349
10. Bursal Duramaz B, Yozgat CY, Yozgat Y, Turel O. Appearance of skin rash in pediatric patients with COVID-19: three case presentations. Dermatol Ther 2020;33(4):e13594. doi:10.1111/dth.13594
11. Sati H, Alzraikat N, Milan M, Saliba M, Fawaz A, Boueri M, et al. Skin manifestations in children with MIS-C and COVID-19: a narrative review. Int J Dermatol 2024;63(1):32-40. doi:10.1111/ijd.16912
12. COVID-19 One-Step RT-PCR-Pishtazteb Diagnostics. 2021. Available from: http://pishtazteb.com/en/products/molecular-kits/covid-19-one-step-rt-pcr/.
13. Sinaei R, Pezeshki S, Parvaresh S, Sinaei R. Why COVID-19 is less frequent and severe in children: a narrative review. World J Pediatr 2021;17(1):10-20. doi:10.1007/s12519-020-00392-y
14. La Torre F, Elicio MP, Monno VA, Chironna M, Moramarco F, Campanozzi A, et al. Incidence and prevalence of multisystem inflammatory syndrome in children (MIS-C) in southern Italy. Children (Basel) 2023;10(5):766. doi:10.3390/children10050766
15. Manti S, Licari A, Montagna L, Votto M, Leonardi S, Brambilla I, et al. SARS-CoV-2 infection in pediatric population. Acta Biomed 2020;91(11-S):e2020003. doi:10.23750/abm.v91i11-S.10298
16. Lifen Y, Zhenyuan D, Mengqi D, Yang Z, Wanqiu D, Li P, et al. Suggestions for medical staff from department of pediatrics during the treatment of 2019-nCoV infection/pneumonia. J New Med 2020;51(2):77-84. doi:10.3969/j.issn.0253-9802.2020.02.001
17. Hu T, Fang L, Junling W, Hu T, Hu T. Clinical characteristics of 2019 novel coronavirus (2019-nCoV) infection in children and family prevention and control. Med J Wuhan Univ 2020;10:12-20.
18. Dufort EM, Koumans EH, Chow EJ, Rosenthal EM, Muse A, Rowlands J, et al. Multisystem inflammatory syndrome in children in New York state. N Engl J Med 2020;383(4):347-58. doi:10.1056/NEJMoa2021756
19. Lu S, Lin J, Zhang Z, Xiao L, Jiang Z, Chen J, et al. Alert for non-respiratory symptoms of coronavirus disease 2019 patients in epidemic period: a case report of familial cluster with three asymptomatic COVID-19 patients. J Med Virol 2021;93(1):518-21. doi:10.1002/jmv.25776
20. Chen F, Liu ZS, Zhang FR, Xiong RH, Chen Y, Cheng XF, et al. [First case of severe childhood novel coronavirus pneumonia in China]. Zhonghua Er Ke Za Zhi 2020;58(3):179-82. doi:10.3760/cma.j.issn.0578-1310.2020.03.003
21. Bouaziz JD, Duong TA, Jachiet M, Velter C, Lestang P, Cassius C, et al. Vascular skin symptoms in COVID-19: a French observational study. J Eur Acad Dermatol Venereol 2020;34(9):e451-2. doi:10.1111/jdv.16544
22. Fernandez-Nieto D, Jimenez-Cauhe J, Suarez-Valle A, Moreno-Arrones OM, Saceda-Corralo D, Arana-Raja A, et al. Characterization of acute acral skin lesions in nonhospitalized patients: a case series of 132 patients during the COVID-19 outbreak. J Am Acad Dermatol 2020;83(1):e61-3. doi:10.1016/j.jaad.2020.04.093
23. Galván Casas C, Català A, Carretero Hernández G, Rodríguez-Jiménez P, Fernández-Nieto D, Rodríguez-Villa Lario A, et al. Classification of the cutaneous manifestations of COVID-19: a rapid prospective nationwide consensus study in Spain with 375 cases. Br J Dermatol 2020;183(1):71-7. doi:10.1111/bjd.19163
24. Hoseininasab A, Sinaei R, Jafari M, Abbaslu P. Staphylococcal scalded skin syndrome superinfection in a child with COVID-19: a brief case report. J Kerman Univ Med Sci 2022;29(6):565-7. doi:10.34172/jkmu.2022.70
25. Hosseininasab A, Sinaei R, Ebrahimi S, Parvaresh S, Jafari M. Cutaneous manifestations of novel coronavirus disease (COVID-19): a case with staphylococcal scalded skin syndrome (SSSS). Curr Respir Med Rev 2022;18(3):228-30. doi:10.2174/1573398X18666220411121046
26. Fox T, Geppert J, Dinnes J, Scandrett K, Bigio J, Sulis G, et al. Antibody tests for identification of current and past infection with SARS-CoV-2. Cochrane Database Syst Rev 2022;11(11):CD013652. doi:10.1002/14651858.CD013652.pub2