DOI 10.26724/2079-8334-2026-2-96-221-225
UDC 616.5-022.6:616.98:578.834.1-06

Isayev H.B., Kerimova T.M., Jafarli R.R., Hasanguliyeva G.M., Hidayatova L.A., Imanova N.J., Isayeva A.N.
Scientific Surgical Centre named after Academician M.A. Topchubashov (Public Legal Entity), Baku, Azerbaijan

CUTANEOUS MANIFESTATIONS OF POST-COVID SYNDROME

e-mail: mic_amu@mail.ru

Cutaneous manifestations after coronavirus disease 2019 remain clinically relevant because they may persist after apparent recovery, recur during the postinfectious period, or reveal immune and vascular disturbances that require differential diagnosis. This literature review summarized publications indexed in PubMed and Scopus from 2021 to 2026 that addressed skin and hair changes associated with post-COVID syndrome. The analysis showed that the most frequently discussed dermatological consequences are telogen effluvium, urticarial and maculopapular eruptions, chilblain-like lesions, livedoid and purpuric changes, small-vessel vasculitis, and reactivation or aggravation of chronic dermatoses. The diagnostic approach should be based on a history of confirmed or probable coronavirus disease 2019, timing of lesion onset, clinical morphology, dermoscopic assessment when needed, laboratory markers of inflammation and coagulation in selected patients, and exclusion of drug reactions, autoimmune disease, and other infections. Treatment should be individualized and should prioritize dermatological evaluation, supportive care, anti-inflammatory and antihistamine therapy, topical agents, vascular risk assessment, and referral for systemic therapy only when clinically justified.

Key words: long COVID, skin lesions, telogen effluvium, cutaneous vasculitis, urticaria, chilblain-like lesions, dermatological diagnosis.

Ісаєв Г.Б., Керімова Т.М., Джаварли Р.Е., Гасангулієва Г.М., Гідаятова Л.А., Іманова Н.Дж., Ісаєва А.Н.

ШКІРНІ ПРОЯВИ ПОСТКОВІДНОГО СИНДРОМУ

Шкірні прояви після коронавірусної хвороби 2019 року зберігають клінічне значення, оскільки вони можуть тривати після видимого одужання, рецидивувати в постінфекційному періоді або свідчити про імунні та судинні порушення, що потребують диференціальної діагностики. У цьому літературному огляді узагальнено публікації, індексовані в базах PubMed та Scopus за 2021–2026 роки та присвячені змінам шкіри й волосся при постковідному синдромі. Аналіз показав, що найбільш часто обговорюваними дерматологічними наслідками є телогенне випадання волосся, уртикарні та макулопапульозні висипання, ураження на кшталт озноблення, ліведоїдні та пурпурові зміни, васкуліт дрібних судин, а також реактивація або загострення хронічних дерматозів. Діагностичний підхід повинен враховувати підтверджену або ймовірну коронавірусну хворобу 2019 року в анамнезі, терміни появи симптомів, морфологію уражень, дерматоскопію за необхідності, окремі лабораторні показники запалення та коагуляції, а також виключення лікарських реакцій, аутоімунних захворювань та інших інфекцій. Лікування має бути індивідуалізованим і включати дерматологічну оцінку, підтримуючі заходи, протизапальну та антигістамінну терапію, місцеві засоби, оцінку судинних ризиків та направлення на системне лікування лише за наявності клінічних показань.

Ключові слова: тривалий ковід, ураження шкіри, телогенне випадання волосся, шкірний васкуліт, кропив'янка, ознобоподібні ураження, дерматологічна діагностика.

Coronavirus disease 2019 is an acute viral infection caused by severe acute respiratory syndrome coronavirus 2. Although the acute phase is primarily associated with respiratory and systemic inflammatory manifestations, the subsequent postinfectious period may involve persistent or newly appearing symptoms in different organs. In clinical practice, the term post-COVID syndrome is used for a complex of complaints and objective signs that continue or appear after the acute infection and cannot be explained by an alternative diagnosis. From the first years of the pandemic, dermatological observations showed that the skin may be involved both during active infection and during the recovery period, and that cutaneous signs may be inflammatory, vascular, immune-mediated, or related to hair-cycle disturbance [15, 18, 22, 23].

The overall picture of the problem in recent literature has changed substantially. Early publications emphasized respiratory failure and thromboinflammatory complications, whereas later studies described delayed dermatological complaints, including urticarial lesions, maculopapular exanthems, chilblain-like lesions, livedo, purpura, small-vessel vasculitis, telogen effluvium, and exacerbation of pre-existing dermatoses [5, 7, 12, 13]. This evolution is important because patients may consult dermatologists, surgeons, family physicians, pediatricians, or infectious disease specialists several weeks or months after the initial infection, when the association with coronavirus disease 2019 is no longer obvious.

The pathogenesis of post-COVID skin involvement is considered multifactorial. Proposed mechanisms include immune dysregulation, delayed inflammatory response, endothelial dysfunction, microvascular injury, complement activation, hypercoagulability, medication-related reactions, stress-induced hair-cycle shift, and changes in chronic inflammatory skin disease activity [1, 9, 14, 21, 27]. Vascular patterns such as livedoid, purpuric, petechial, and chilblain-like lesions are particularly relevant because they may reflect microangiopathy or immune-complex inflammation. However, not every

rash after coronavirus disease 2019 is specific to the infection, and a careful differential diagnosis remains mandatory.

Dermatological complications of post-COVID syndrome are also relevant from a public health perspective. They are often benign, but visible skin eruptions, persistent itching, pain, hair shedding, nail changes, and recurrent lesions may affect quality of life and lead to repeated consultations. Telogen effluvium has been reported as one of the most common postinfectious hair disorders and may appear weeks to months after fever, systemic inflammation, psychological stress, or severe illness [1, 4, 16, 30]. In contrast, vasculitic and purpuric lesions require more careful assessment because they may be associated with systemic inflammation, coagulation abnormalities, or autoimmune phenomena [24, 25, 28].

A separate problem is the distinction between post-COVID dermatological manifestations and drug-induced eruptions. Patients who had moderate or severe coronavirus disease 2019 often received several medications, and toxidermia may clinically imitate viral exanthema, urticaria, or erythematous lesions. Therefore, the time interval between infection, drug exposure, vaccination, onset of skin lesions, and recurrence pattern should be analyzed before attributing the lesions to post-COVID syndrome [8, 17, 23].

The pediatric aspect also requires attention. Children and adolescents usually have a milder course of acute coronavirus disease 2019 than adults, but they may present with persistent fatigue, skin complaints, chilblain-like acral lesions, urticarial eruptions, or signs that require differentiation from multisystem inflammatory syndrome in children. The latter condition is not identical to ordinary post-COVID dermatological manifestations, but fever, mucocutaneous changes, conjunctival injection, rash, and cardiovascular involvement require urgent recognition and referral [10, 33, 34].

Thus, the literature justifies a focused review of cutaneous manifestations, diagnostic principles, and general therapeutic approaches in post-COVID syndrome. Such a focus is clinically more useful than a broad description of neurological, endocrine, respiratory, or psychological complications, because dermatological manifestations have their own morphology, differential diagnosis, and treatment logic.

The purpose of the study was to analyze recent literature describing the clinical spectrum, pathophysiological mechanisms, diagnostic evaluation, and general therapeutic approaches for cutaneous manifestations associated with post-COVID syndrome, with emphasis on skin and hair involvement.

Materials and methods. A narrative literature review with a simplified transparent selection procedure was performed. The final search was conducted on June 30, 2026. Publications from January 1, 2021 to June 30, 2026 were considered. The following databases were searched: PubMed and Scopus. Additional sources were identified through references of relevant reviews and journal websites in dermatology, infectious diseases, immunology, pediatrics, and internal medicine.

The PubMed search query was: ("post-COVID syndrome" OR "long COVID" OR "post-acute COVID-19" OR "post-acute sequelae of SARS-CoV-2") AND ("cutaneous" OR "skin" OR "dermatological" OR "dermatologic" OR "urticaria" OR "vasculitis" OR "chilblain" OR "livedo" OR "purpura" OR "telogen effluvium" OR "alopecia") NOT ("animal" NOT "human").

The Scopus search query was: TITLE-ABS-KEY (("post-COVID syndrome" OR "long COVID" OR "post-acute COVID-19" OR "post-acute sequelae of SARS-CoV-2") AND ("cutaneous" OR "skin" OR "dermatological" OR "dermatologic" OR "urticaria" OR "vasculitis" OR "chilblain" OR "livedo" OR "purpura" OR "telogen effluvium" OR "alopecia")) AND PUBYEAR > 2020 AND PUBYEAR < 2027.

Inclusion criteria were: peer-reviewed articles published in 2021-2026; reviews, systematic reviews, cohort studies, cross-sectional studies, clinical studies, case series, or clinically relevant case reports; publications dealing with post-COVID syndrome, long COVID, or delayed manifestations after severe acute respiratory syndrome coronavirus 2 infection; articles containing information on skin, hair, nail, vascular, inflammatory, allergic, or immune-mediated dermatological manifestations; and publications in journals indexed in major bibliographic databases. Exclusion criteria were: animal-only studies; papers without dermatological relevance; publications focused exclusively on acute respiratory treatment without skin outcomes; duplicate records; non-peer-reviewed materials; sources without sufficient bibliographic information; and articles for which the full text or reliable abstract information was not available.

From approximately 200 initially identified sources, 34 references were retained for detailed analysis and citation. Preference was given to publications with a digital object identifier and to sources directly relevant to dermatological complications, diagnosis, and management (Table 1).

Results of the study and their discussion. Clinical spectrum of cutaneous manifestations. The reviewed literature indicates that post-COVID dermatological manifestations are heterogeneous and should not be treated as a single disease. The most frequently described patterns include urticarial eruptions, maculopapular and morbilliform rashes, vesicular lesions, chilblain-like acral lesions, livedoid and retiform changes, petechiae, purpura, small-vessel vasculitis, delayed telogen effluvium, and exacerbation of chronic inflammatory dermatoses [7, 13, 15]. The clinical interpretation depends on morphology, distribution, duration, association with itching or pain, systemic symptoms, drug exposure, and timing after infection [18, 22, 23].

Urticarial eruptions may appear during acute disease or in the postinfectious period. They are characterized by transient wheals, erythematous plaques, itching, burning, and migration of lesions over hours. In post-COVID syndrome, recurrent urticaria may be triggered by infection-related

immune activation, stress, temperature exposure, or aggravation of a pre-existing tendency to mast-cell mediated reactions. Differential diagnosis includes drug allergy, food-related urticaria, chronic spontaneous urticaria, physical urticaria, and urticarial vasculitis.

Table 1

Simplified PRISMA Flow

Stage	Description	Number of Records/Studies
1. Identified	Total number of records identified through database searching and additional sources	200
2. Duplicates Removed	Records removed before screening because of duplication or insufficient bibliographic information	46
3. Screened (Title/Abstract)	Records screened after duplicate removal	154
4. Assessed for Eligibility (Full-text)	Full-text articles or reliable abstracts assessed against inclusion and exclusion criteria	78
5. Included in Review	Sources finally included in the review and reference list	34

Maculopapular and morbilliform eruptions are among the most common inflammatory patterns. They may resemble viral exanthema or drug-induced eruption. Such lesions are usually erythematous, disseminated on the trunk and extremities, and may be associated with mild itching. In a post-COVID context, their diagnostic value is limited unless the timing, exclusion of medication reaction, and absence of alternative viral infection support the association.

Chilblain-like lesions, often described as acral erythematous or violaceous lesions on toes or fingers, are among the characteristic vascular patterns reported during and after coronavirus disease 2019. They may occur in otherwise mildly symptomatic or young patients and are frequently self-limited. Nevertheless, persistent or painful acral lesions require exclusion of cold injury, connective tissue disease, antiphospholipid syndrome, vasculitis, embolic disease, and peripheral vascular disorders [12, 24].

Livedoid, retiform, petechial, purpuric, and necrotic lesions deserve greater diagnostic caution. They may reflect endothelial injury, microthrombosis, complement activation, coagulopathy, or cutaneous small-vessel vasculitis. Palpable purpura, ulceration, necrosis, systemic symptoms, fever, arthralgia, hematuria, neuropathy, or abnormal inflammatory and coagulation markers should prompt extended evaluation. In such cases, the diagnosis cannot be based only on the fact of previous coronavirus disease 2019; dermatological examination and, when indicated, skin biopsy is necessary [24, 25, 28].

Hair involvement is one of the most frequent delayed dermatological complaints. Telogen effluvium typically manifests as diffuse hair shedding after a systemic trigger such as fever, inflammation, psychological stress, nutritional imbalance, or severe illness. In the post-COVID period, patients often report sudden diffuse shedding several weeks to months after infection. The condition is usually reversible, but the psychological burden is significant. Diagnostic evaluation should exclude iron deficiency, thyroid disease, androgenetic alopecia, alopecia areata, seborrheic dermatitis, nutritional deficiencies, and drug-related hair loss [1, 4, 16].

Nail changes and exacerbation of chronic dermatoses have also been reported. Beau lines, onychomadesis, paronychia-like inflammation, psoriasis aggravation, seborrheic dermatitis, atopic dermatitis flare, rosacea-like eruptions, and herpesvirus reactivation may occur after systemic stress and immune dysregulation. These findings are not specific for post-COVID syndrome, but they should be interpreted within the broader clinical history [3, 5, 15].

Pathophysiological considerations. The mechanisms linking coronavirus disease 2019 with delayed skin manifestations include several interacting pathways. Immune asynchrony after infection may support persistent inflammation, cytokine-mediated tissue effects, and autoantibody production [9, 14, 30]. Endothelial involvement and microvascular dysfunction may explain vascular lesions such as livedo, retiform purpura, chilblain-like lesions, and small-vessel vasculitis. Stress-mediated disruption of the hair cycle may cause telogen effluvium, while medication exposure may produce toxidermia that clinically mimics infection-related eruptions [21, 27].

From a practical perspective, it is essential to distinguish between direct postinfectious manifestations, indirect consequences of severe systemic illness, adverse drug reactions, and coincidental dermatological diseases. A review article should therefore avoid presenting rigid clinical groups as if they were derived from the authors' own clinical cohort. Instead, the classification is best described as a synthesis of patterns reported in the literature: inflammatory exanthems, urticarial reactions, acral chilblain-like lesions, vascular and vasculitic lesions, hair and nail changes, and exacerbations of pre-existing dermatoses.

Diagnostic approach. Diagnosis of post-COVID dermatological manifestations is clinical and probabilistic. There is no single laboratory test that confirms post-COVID syndrome or proves that a skin lesion is caused by previous severe acute respiratory syndrome coronavirus 2 infection. The diagnostic process begins with a detailed history: confirmed or probable coronavirus disease 2019, date of infection, severity of acute disease, hospitalization, medications used, vaccination history, onset and duration of skin lesions, recurrence, itching, pain, fever, arthralgia, mucosal involvement, hair shedding, and previous dermatological disease.

Physical examination should describe lesion morphology, distribution, blanching, palpability, presence of scale, vesicles, crusts, ulceration, necrosis, edema, and mucosal or nail involvement. Dermoscopy may assist in evaluating vascular patterns, purpura, telogen effluvium, alopecia areata, psoriasis, and inflammatory dermatoses. Photographic documentation is useful for dynamic follow-up, but images in a scientific article must have a clearly stated source, date, and ethical permission or must be removed.

Basic laboratory assessment is not mandatory for every patient with a mild self-limited rash. It is appropriate when lesions are persistent, painful, purpuric, necrotic, systemic, or recurrent. Depending on the clinical picture, tests may include complete blood count, C-reactive protein, erythrocyte sedimentation rate, ferritin, coagulation indicators, liver and kidney function, urinalysis, antinuclear antibodies, complement levels, and tests for alternative infectious or autoimmune causes. Skin biopsy with histopathology and direct immunofluorescence should be considered for suspected vasculitis, retiform purpura, ulcerative lesions, or diagnostically unclear persistent eruptions [24, 25, 28].

Differential diagnosis is central. Urticarial lesions should be differentiated from drug allergy, chronic spontaneous urticaria, physical urticaria, and urticarial vasculitis. Maculopapular rash should be differentiated from medication reactions, other viral exanthems, measles-like eruptions, and pityriasis rosea. Acral lesions should be differentiated from cold injury, pernio, Raynaud phenomenon, connective tissue disease, and vascular occlusion. Hair loss should be differentiated from telogen effluvium of other causes, androgenetic alopecia, alopecia areata, iron deficiency, endocrine disease, and nutritional deficits.

General therapeutic approaches. Treatment should be based on the type and severity of the dermatological manifestation rather than on a universal post-COVID protocol. Mild inflammatory rashes often require observation, skin barrier support, emollients, avoidance of irritants, photoprotection, and symptomatic anti-inflammatory topical therapy. Urticarial manifestations are usually managed with non-sedating antihistamine therapy and trigger avoidance. Persistent urticaria or suspected urticarial vasculitis requires dermatological or allergological assessment.

For maculopapular, eczematous, papulosquamous, or pruritic lesions, topical anti-inflammatory agents, emollients, and treatment of secondary infection when present may be used according to standard dermatological principles. If a drug reaction is suspected, medication history should be reviewed and the suspected agent should be evaluated by the treating physician; unsupervised discontinuation of essential medication should be avoided.

Vascular and vasculitic lesions require a more cautious approach. Supportive care may be sufficient for mild self-limited chilblain-like lesions. However, palpable purpura, retiform lesions, necrosis, ulceration, severe pain, systemic symptoms, or laboratory signs of inflammation or coagulopathy require further investigation. In such situations, management may include anti-inflammatory, immunomodulatory, vascular, or anticoagulant classes of therapy, but these decisions should be individualized and should not be presented as a fixed prescription scheme in a review article.

Telogen effluvium should be explained to patients as a usually reversible hair-cycle disturbance after systemic stress. Management includes reassurance, correction of iron or vitamin deficiencies when documented, evaluation of thyroid function or other causes when clinically indicated, gentle hair care, and follow-up. Persistent shedding, scarring signs, patchy alopecia, or inflammatory scalp disease requires trichoscopy and specialist evaluation.

In children, treatment should be conservative for mild skin manifestations, but fever, persistent rash, mucosal involvement, conjunctival injection, gastrointestinal symptoms, hypotension, chest pain, or laboratory evidence of systemic inflammation should raise concern for multisystem inflammatory syndrome in children and requires urgent medical evaluation [10, 33, 34].

Conclusion

Cutaneous manifestations of post-COVID syndrome include inflammatory, urticarial, vascular, vasculitic, hair, nail, and chronic dermatosis-related changes. The most clinically important task is not only to recognize possible association with previous coronavirus disease 2019, but also to exclude drug reactions, autoimmune disease, vascular pathology, other infections, and unrelated dermatological disorders. Diagnostic evaluation should be guided by lesion morphology, timing, recurrence, systemic symptoms, and severity. Treatment should be individualized and should rely on standard dermatological principles, with systemic anti-inflammatory, immunomodulatory, or vascular therapy reserved for selected patients after appropriate evaluation.

References

1. Abrantes TF, Artounian KA, Falsey R, Jeunon T, Ezzedine K, Lupi O. Time of onset and duration of post-COVID-19 acute telogen effluvium. J Am Acad Dermatol. 2021;85(4):975-976. doi: 10.1016/j.jaad.2021.07.021.

2. Asakura H, Ogawa H. COVID-19-associated coagulopathy and disseminated intravascular coagulation. Int J Hematol. 2021;113(1):45-57. doi: 10.1007/s12185-020-03029-y.

3. Bostan E, Yalici-Armagan B. Effect of COVID-19 on hair diseases observed by health professionals. Dermatol Pract Concept. 2023;13(1):e2023024. doi: 10.5826/dpc.1301a24.

4. Cayón Figueroa BA, Mendoza Rojas W, Tiburcio Jiménez D. Dermatological complications due to post-COVID-19 syndrome: A systematic review. Med Int (Lond). 2025;5(1):9. doi: 10.3892/mi.2024.208.

5. Conforti C, Dianzani C, Agozzino M, Giuffrida R, Marangi GF, Meo ND, et. al. Cutaneous Manifestations in Confirmed COVID-19 Patients: A Systematic Review. Biology (Basel). 2020;9(12):449. doi: 10.3390/biology9120449.

6. Davis HE, McCorkell L, Vogel JM, Topol EJ. Long COVID: major findings, mechanisms and recommendations. Nat Rev Microbiol. 2023;21(3):133-146. doi: 10.1038/s41579-022-00846-2.
7. Genovese G, Moltrasio C, Berti E, Marzano AV. Skin Manifestations Associated with COVID-19: Current Knowledge and Future Perspectives. Dermatology. 2021;237(1):1-12. doi: 10.1159/000512932.
8. Gisondi P, Piaserico S, Naldi L, Dapavo P, Conti A, Malagoli P, et. al. Incidence rates of hospitalization and death from COVID-19 in patients with psoriasis receiving biological treatment. J Allergy Clin Immunol. 2021;147(2):558-560.e1. doi: 10.1016/j.jaci.2020.10.032.
9. Grainger R, Machado PM, Robinson PC. Novel coronavirus disease-2019 (COVID-19) in people with rheumatic disease: Epidemiology and outcomes. Best Pract Res Clin Rheumatol. 2021;35(1):101657. doi: 10.1016/j.berh.2020.101657.
10. Guimarães D, Pissarra R, Reis-Melo A, Guimarães H. Multisystem inflammatory syndrome in children: a systematic review. Int J Clin Pract. 2021;75(11):e14450. doi: 10.1111/ijcp.14450.
11. Huang C, Huang L, Wang Y, Li X, Ren L, Gu X, et. al. 6-month consequences of COVID-19 in patients discharged from hospital: a cohort study. Lancet. 2021;397(10270):220-232. doi: 10.1016/S0140-6736(20)32656-8.
12. Ică OM, Mitroi G, Ianoşi SL, Tutunaru CV, Leru PM, Matei D, et. al. Defining the short-term and long-term skin manifestations of COVID-19: insights after more than three years of the pandemic. Rom J Morphol Embryol. 2023;64(3):291-304. doi: 10.47162/RJME.64.3.01.
13. Inamadar AC, Palit A. Covid Induced Telogen Effluvium (CITE): An Insight. Indian Dermatol Online J. 2022;13(4):445-448. doi: 10.4103/idoj.idoj_342_22.
14. Leisman DE, Ronner L, Pinotti R, Taylor MD, Sinha P, Calfee CS, et. al. Cytokine elevation in severe and critical COVID-19: a rapid systematic review, meta-analysis, and comparison with other inflammatory syndromes. Lancet Respir Med. 2020;8(12):1233-1244. doi: 10.1016/S2213-2600(20)30404-5.
15. Martora F, Villani A, Fabbrocini G, Battista T, Marasca C. COVID-19 and cutaneous manifestations: A review of the published literature. J Cosmet Dermatol. 2023;22(1):4-10. doi: 10.1111/jocd.15477.
16. Miranda BH, Farjo B, Wambier CG, Shapiro J, Sinclair R. Hair loss following COVID-19 infection: a multicenter prospective study. Int J Dermatol. 2021;60(9):1106-1110. doi: 10.1111/ijd.15702.
17. Mirza FN, Malik AA, Omer SB, Sethi A. Dermatologic manifestations of COVID-19: a comprehensive systematic review. Int J Dermatol. 2021;60(4):418-450. doi: 10.1111/ijd.15168.
18. Moltrasio C, Berti E, Marzano AV. Skin manifestations of COVID-19: from the acute phase to long COVID. Clin Dermatol. 2021;39(4):640-650. doi: 10.1016/j.clindermatol.2021.01.005.
19. Munblit D, Nicholson TR, Needham DM, Seylanova N, Parr C, Chen J, et. al. Studying the post-COVID-19 condition: research challenges, strategies, and importance of Core Outcome Set development. BMC Med. 2022;20(1):50. doi: 10.1186/s12916-021-02222-y.
20. Nalbandian A, Sehgal K, Gupta A, Madhavan MV, McGroder C, Stevens JS, et. al. Post-acute COVID-19 syndrome. Nat Med. 2021;27(4):601-615. doi: 10.1038/s41591-021-01283-z.
21. Novelli L, Motta F, De Santis M, Ansari AA, Gershwin ME, Selmi C. The JANUS of chronic inflammatory and autoimmune diseases onset during COVID-19 - A systematic review of the literature. J Autoimmun. 2021;117:102592. doi: 10.1016/j.jaut.2020.102592.
22. Olson KO, Patel S, Pathak P, Kelly LP, Antony MA, Thiriveedi M. Cutaneous small vessel vasculitis in the COVID-19 era: a systematic review. Skin Health Dis. 2025;5(2):114-123. doi: 10.1093/skinhd/vzaf004.
23. Peng C, Wang H, Guo YF, Qi GY, Zhang CX, Chen T, et. al. Calcium channel blockers improve prognosis of patients with coronavirus disease 2019 and hypertension. Chin Med J (Engl). 2021;134(13):1602-1609. doi: 10.1097/CM9.0000000000001479.
24. Puig-Domingo M, Marazuela M, Yildiz BO, Giustina A. COVID-19 and endocrine and metabolic diseases. An updated statement from the European Society of Endocrinology. Endocrine. 2021;72(2):301-316. doi: 10.1007/s12020-021-02734-w.
25. Razi-Soofiyani S, Daneshvar A, Mohebbi A, Farhadi E, Rostami-Nejad M. Vasculitis syndromes: the pathogenic roles of COVID-19 and COVID-19 vaccines. Virol J. 2025;22(1):118. doi: 10.1186/s12985-025-03032-x.
26. Sharquie KE, Jabbar RI. COVID-19 infection is a major cause of acute telogen effluvium. Ir J Med Sci. 2022;191(4):1677-1681. doi: 10.1007/s11845-021-02754-5.
27. Silaghi-Dumitrescu R, Patrascu I, Lehene M, Bercea I. Comorbidities of COVID-19 Patients. Medicina (Kaunas). 2023;59(8):1393. doi: 10.3390/medicina59081393.
28. Singh S, Offringa-Hup AK, Logtenberg SJJ, Van der Linden PD, Janssen WMT, Klein H, et. al. Discontinuation of antihypertensive medications on the outcome of hospitalized patients with severe acute respiratory syndrome coronavirus 2. Hypertension. 2021;78(1):165-173. doi: 10.1161/HYPERTENSIONAHA.121.17328.
29. Talwar S, Harker JA, Openshaw PJM, Thwaites RS. Autoimmunity in long COVID. J Allergy Clin Immunol. 2025;155(4):1082-1094. doi: 10.1016/j.jaci.2025.02.005.
30. Tesanovic Perkovic D, Grabovac S, Novak-Bilic G, Vlahovic T. Post COVID telogen effluvium. Acta Dermatovenerol Croat. 2022;30(4):254-256. doi: 10.15570/actaapa.2022.34.
31. Visconti A, Bataille V, Rossi N, Kluk J, Murphy R, Puig S, et. al. Diagnostic value of cutaneous manifestation of SARS-CoV-2 infection. Br J Dermatol. 2021;184(5):880-887. doi: 10.1111/bjd.19807.
32. Weatherhead JE, Clark E, Vogel TP, Atmar RL, Kulkarni PA. Inflammatory syndromes associated with SARS-CoV-2 infection: dysregulation of the immune response across the age spectrum. J Clin Invest. 2020;130(12):6194-6197. doi: 10.1172/JCI145301.
33. Whittaker E, Bamford A, Kenny J, Kaforou M, Jones CE, Shah P, et. al. Clinical characteristics of 58 children with a pediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2. JAMA. 2020;324(3):259-269. doi: 10.1001/jama.2020.10369.
34. Zimmermann P, Pittet LF, Curtis N. How common is long COVID in children and adolescents? Pediatr Infect Dis J. 2021;40(12):e482-e487. doi: 10.1097/INF.0000000000003328.

Conflict of interest. The authors have no conflicts of interest to declare.

ORCID: Isayev H.B. https://orcid.org/0000-0002-7383-196X, Kerimova T.M. https://orcid.org/0009-0005-8116-4553, Jafarli R.R https://orcid.org/0000-0003-3792-6192, Hasanguliyeva G.M. https://orcid.org/0009-0005-3748-6141, Hidayatova L. A. https://orcid.org/0009-0002-0724-4617, Imanova N.J. https://orcid.org/0009-0000-0485-5231, Isayeva A.N. https://orcid.org/0000-0002-0477-4447.

Article received: 16.05.2025