DOI 10.25789/YMJ.2026.93.04
УДК 616.15-07

Clinical and epidemiological characteristics of Henoch–Schönlein purpura in children of the Sakha Republic (Yakutia)

Yana A. Munkhalova [1], Vera N. Yadrikhinskaya [1], Vera M. Argunova [2], Sardana A. Evseeva [3], Vera B. Egorova [1], Tatyana E. Burtseva [1,3]
[1] M.K. Ammosov North-Eastern Federal University 677000, Russia, Yakutsk, Oyunsky St., 27
[2] Republican Hospital No. 1 — M.E. Nikolaev National Center of Medicine, 677009, Russia, Yakutsk, Sergelyakh Highway, 4
[3] Yakut Science Center of Complex Medical Problems, 677000, Russia, Yakutsk, Yaroslavsky St., 6/3

Abstract. Henoch–Schönlein purpura (HSP, IgA vasculitis) is the most common systemic vasculitis in childhood. The course and long-term prognosis of the disease are primarily determined by the risk of kidney involvement (IgA nephritis), which can lead to chronic renal failure. Numerous studies indicate that the epidemiological and clinical manifestations of HSP can vary significantly depending on geographic, regional, and ethnic factors, highlighting the need to study the disease in specific populations. The aim of this study was to examine the clinical and epidemiological, laboratory features and the effectiveness of therapy for Henoch–Schönlein purpura in the pediatric population of the Sakha Republic (Yakutia) (SR(Y)). A retrospective analysis of 326 medical records of children aged 1–18 years treated in the cardiorheumatology department of the Pediatric Center, State Autonomous Institution SR(Y) “Republican Hospital №1 – National Center of Medicine named after M.E. Nikolaev” was conducted. The inclusion criterion was a confirmed diagnosis of HSP according to the international EULAR/PRINTO/PRES classification criteria. Demographic data, the structure and characteristics of clinical syndromes, laboratory indicators (including immune and coagulation statuses), and immediate results of therapy were assessed. According to the results, children of Yakut nationality prevailed in the sample (84.6%). The peak incidence was recorded at ages 4–10 years (57%). Skin syndrome was present in 100% of patients, articular syndrome in 65.7%, and abdominal syndrome in 35.7%. A low frequency of renal syndrome was found—12.8%. The most common clinical form was the skin form (35.7%). Laboratory hyperimmunoglobulinemia A was detected in 64.2% of the examined patients, and hypercoagulation in 71.5%. In 31% and 15% of patients, bacterial and viral infections, respectively, served as triggers. Urinary syndrome was registered in 42.8% of children who underwent in-depth examination. Thus, the clinical picture of HSP in children in Yakutsk generally corresponds to classical descriptions; however, a key ethnic feature was identified – a reliably lower frequency of clinically significant renal involvement. The region is also characterized by a high rate of hypercoagulation and persistent infections. The data obtained justify the need for long-term follow-up with mandatory urine analysis and hemostasis monitoring, as well as active sanitation of infection foci.

Keywords: Henoch–Schönlein purpura, IgA vasculitis, children, epidemiology, clinical presentation, hypercoagulation, ethnic characteristics.

For citation: Munkhalova Ya.A., Yadrikhinskaya V.N., Argunova V.M., Evseeva S.A., Egorova V.B., Burtseva T.E. Clinical and epidemiological characteristics of Henoch–Schönlein purpura in children of the Sakha Republic (Yakutia). Yakut Medical Journal. 2026. 93(1): 19-22. https://doi.org/10.25789/YMJ.2026.93.04

Introduction. Henoch–Schönlein purpura (HSP), or Henoch–Schönlein disease, is an IgA-associated systemic vasculitis characterized by aseptic inflammation of the microcirculatory vessels (arterioles, capillaries, venules) with a classic clinical tetrad: palpable purpura, arthritis/arthralgia, abdominal syndrome, and kidney involvement [1,2]. According to the modern vasculitis nomenclature (Chapel Hill Consensus Conference, 2012) [3], HSP refers to immune complex-mediated small vessel vasculitis and is designated as "IgA vasculitis" (IgA vasculitis, IgAV) [4]. The pathogenesis involves the formation and deposition of immune complexes, predominantly containing IgA, in the vessel walls, which triggers a cascade of inflammatory reactions leading to increased vascular permeability, microthrombosis, and tissue ischemia [1]. This mechanism explains the polymorphism of clinical manifestations and the variability of the disease course.

HSP is the most common systemic vasculitis in childhood, with an annual incidence of 13 to 25 cases per 100,000 children, which emphasizes its importance in pediatric practice [5,6]. Recent studies show that the course of the disease may have changed during the COVID-19 pandemic, and in 2023, a significant increase in HSP hospitalizations was observed [7,8]. The relevance of the problem is due not only to its high prevalence but also to the risk of serious, potentially disabling complications, especially those involving the kidneys. IgA nephritis (renal syndrome in HSP) develops, according to various sources, in 20-60% of children and is the main predictor of long-term prognosis, determining the risk of chronic kidney disease and arterial hypertension in adulthood [8,9]. Although the pathogenesis is universal, clinical manifestations, frequency of complications, and disease outcomes may vary significantly depending on geographic, ethnic, and social factors [9,10]. Ethnic predisposition to certain variants of HSP, particularly to more frequent (or conversely, rare) kidney involvement, is under active study in the world literature.

In this context, studying the characteristics of HSP in the pediatric population of the Sakha Republic (Yakutia) is of significant scientific and practical interest. The unique ethno-demographic characteristics of the region, represented predominantly by the Yakut population, allow the identification of possible ethno-specific patterns of the disease, which is crucial for developing personalized approaches to diagnosis, treatment, and follow-up, minimizing the risk of long-term complications.

Aim of the study. To study the clinical-epidemiological and laboratory characteristics of Henoch–Schönlein purpura in children of the Sakha Republic (Yakutia) in order to optimize diagnosis, treatment, and follow-up.

Materials and methods of research. A retrospective cohort study was conducted on a continuous sample. A total of 326 inpatient medical records (form №003/u) of children aged 1 to 18 years treated in the cardiorheumatology department of the Pediatric Center, State Autonomous Institution RS(Y) "RBN№1 – NCM named after M.E. Nikolaev", Yakutsk, over a

7-year period (from January 1, 2016 to December 31, 2023) were analyzed. The inclusion criterion was the established diagnosis of HSP in accordance with the international classification criteria EULAR/PRINTO/PRES. Exclusion criteria were incomplete medical chart data or unconfirmed diagnosis. Demographic data, structure and characteristics of clinical syndromes, laboratory parameters (including immune and coagulation status), and immediate treatment outcomes were evaluated.

Statistical analysis. Data were processed using descriptive statistical methods. For quantitative variables with a normal distribution, data are presented as mean and standard deviation (M ± SD). For categorical data, results are presented as absolute numbers (n) and percentages (%).For comparison of the frequencies of qualitative characteristics between groups, a nonparametric chi-square test (χ^2) or Fisher's exact test (for small samples) was used. Differences were considered statistically significant at $p < 0.05$. The study was approved by the local biomedical ethics committee of the Yakut Scientific Center for Complex Medical Problems (extract from protocol No. 54 dated December 20, 2021, decision No. 1).

Results and discussion. Over the 7-year observation period in the cardiorheumatology department of the Pediatric Center of the State Autonomous Institution RS(Y) "RB No. 1 – NCM named after M.E. Nikolaev", Yakutsk, 326 children with a verified diagnosis of Henoch–Schönlein purpura (HSP) were treated. The cohort showed a slight predominance of boys (53%, n=173) over girls (47%, n=153), which corresponds to literature data indicating a somewhat higher prevalence of HSP among males (the usual ratio is 1.2:1) [6]. Gender differences were not statistically significant ($p > 0.05$). The ethnic composition of the sample reflected the demographic characteristics of the region: the vast majority were Yakut children—84.6% (n=276). Russian children and representatives of other ethnic groups accounted for 15.4% (n=50), which approximately corresponds to their proportion in the population of Yakutia. Analysis of age distribution confirmed the classical understanding of the highest susceptibility among preschool and early school-age children. The peak incidence was in the groups of 4–6 years (28%, n=91) and 7–10 years (29%, n=95), totaling 57% of all cases. The mean age at disease onset was 7.2 ± 2.8 years. Distribution by age groups: under 3 years—8% (n=26), 11–14 years—25% (n=81), 15–18 years—10% (n=33). This age-related pattern agrees with the fact that the immune system at this age is most actively responsive to various triggers, as well as with the high frequency of infectious diseases in organized children's groups. Structure of clinical syndromes. The distribution of clinical manifestations is presented in Table.

The skin syndrome, being a mandatory diagnostic criterion, was observed in all patients, which fully corresponds to the nature of the disease. The joint syndrome, the second most common, was characterized by a benign, transient course without the development of deformities, which is typical for HSP [5]. Of particular note is the abdominal syndrome, which in almost half of the patients (43%) debuted before the appearance of pathognomonic purpura. This creates a high risk of diagnostic errors and unnecessary surgical interventions for "acute abdomen."

The most significant finding of our study is the extremely low incidence of manifest renal syndrome—12.8%. This figure is statistically significantly lower ($\chi^2 = 15.8$; $p < 0.001$) than the average reported in global and Russian literature, where it ranges from 20% to 60% [8,9]. It is important to note that this feature cannot be entirely explained by the study methodology (selection of patients only from the cardiorheumatology department), since in-depth examination revealed changes in urine tests in 42.8% of children in the total cohort. This suggests that Yakut children may have an ethnic characteristic manifested as a more favorable, "non-aggressive" course of renal pathology in HSP, which often proceeds subclinically or as a minimal urinary syndrome. This observation requires further prospective genetic (study of HLA system gene polymorphisms and other candidate genes) and immunological studies to identify the pathogenetic basis of this phenomenon.

Analysis of the clinical forms of the disease showed that the most common was the isolated skin form (35.6%, n=116). Mixed forms were distributed as follows: skin-joint form—14.3% (n=47), skin-abdominal form—14.3% (n=47), skin-joint-abdominal form—14.3% (n=47), skin-renal and other mixed forms—11.5% (n=38). Distribution by severity in the study group was as follows: mild—35.7% (n=116), moderate—42.8% (n=139), severe—21.4% (n=71). Severe cases were mainly associated with pronounced abdominal syndrome or mixed forms with kidney involvement.

Laboratory findings and comorbid background.

Immune status. Hyperimmunoglobulinemia A was detected in 64.2% (n=209) of the examined patients, which is direct laboratory confirmation of the key role of IgA in the pathogenesis of HSP [1]. The concentration of IgA in the serum in this group was 3.4 ± 0.9 g/L (normal value up to 2.5 g/L). Increased IgM was noted in 50% (n=163), which may reflect the acute phase of inflammation or the role of bacterial triggers, while increased IgG was detected in 28.5% (n=93).

Coagulogram. The vast majority of patients (71.5%, n=233) showed signs of hypercoagulation. A significant shortening of APTT (activated partial thromboplastin time) (65%) to 25.3 ± 3.1 seconds (with normal values of 28–40 seconds; $p < 0.01$) was recorded. Hyperfibrinogenemia (elevated fibrinogen level to 4.8 ± 1.2 g/L, with normal values up to 4.0 g/L; $p < 0.05$) was found in 35.7% (n=116), which is consistent with current data on the significant role of hemostasis dysfunction and microthrombosis in the pathogenesis of vascular inflammation in HSP [7]. The detected hypercoagulation substantiates the need for active use of antiplatelet and, in some cases, anticoagulant therapy in comprehensive treatment [11, 12].

Structure of clinical syndromes in children with Henoch–Schönlein purpura (n=326)

Clinical syndrome	Frequency of occurrence	Palpable purpura on lower limbs (82.9%), angioneurotic edema (5.3%)
Skin syndrome	100% (n=326)	Involvement of ankle (48.6%) and knee (37.5%) joints, transient nature (75%)
Joint syndrome	65.6% (n=214)	Abdominal pain; in 43% of patients, preceded skin eruptions
Abdominal syndrome	35.6% (n=116)	Manifestations range from isolated microhematuria to proteinuria
Renal syndrome	12.8% (n=42)	Проявления от изолированной микрогематурии до протеинурии

Markers of inflammation and infection. The average ESR (erythrocyte sedimentation rate) was 24.6 ± 10.8 mm/h, while accelerated ESR (>15 mm/h) was observed in 57.1% (n=186) of the patients. An increased ASO titer (>200 U/mL) was found in 50% (n=163), indicating a significant role of streptococcal infection (tonsillitis, pharyngitis) as a disease trigger. High persistence rates of herpes viruses were detected by serological methods: Epstein-Barr virus (IgG to capsid antigen) in 21.4% (n=70), cytomegalovirus (IgG) in 14.2% (n=46), and herpes simplex virus type 1/2 (IgG) in 14.2% (n=46) of patients. In total, the association with previous bacterial infection (according to history and ASO titers) was identified in 31% (n=101), and with viral infection in 15% (n=49) of patients, emphasizing the importance of thorough sanitation of chronic infection foci in prevention of recurrences.

Urinary syndrome. As previously noted, urine test abnormalities (microhematuria, proteinuria, leukocyturia) detected through targeted and repeated examination were observed in 42.8% (n=139) of children. The average number of erythrocytes in the urine of these patients was 18.5 ± 12.4 per high power field. This underscores the importance of careful and long-term monitoring of kidney function, even in the absence of clinically established nephritis at disease onset, as kidney involvement may develop later, within several months [13].

Comorbid background. Examination revealed a high percentage of comorbid pathology: chronic ENT diseases (chronic tonsillitis, adenoiditis) – 71.4% (n=233), gastrointestinal pathology (biliary dyskinesia, reactive pancreatitis) – 64.3% (n=210), minor congenital heart anomalies (mitral valve prolapse, additional chordae) – 21.4% (n=70), iron deficiency anemia – 21.4% (n=70). The high frequency of comorbidity, especially regarding ENT organs and the gastrointestinal tract, may be due both to previous infections and microcirculatory disturbances, and also serve as a predisposing background factor for the development of HSP.

Treatment and outcomes. All patients received basic therapy, which included antiplatelet agents (dipyridamole at age-adjusted dosages) and, when laboratory and clinical signs of hypercoagulation were present, anticoagulants (nadroparin calcium or enoxaparin sodium) [14]. Glucocorticosteroids (prednisolone orally or intravenously) were used as indicated in cases of severe abdominal syndrome with intense pain, gastrointestinal bleeding, or progressive nephritis with proteinuria. This approach, based on national recommendations, proved to be effective. In 95% of patients, positive dynamics were observed by discharge, manifested by the resolution of abdominal and joint syndromes, and significant reduction in skin eruptions. The average duration of hospitalization varied depending on disease severity: for mild forms – 18.5 ± 3.2 bed-days, for moderate and severe forms – 20.4 ± 4.1 bed-days. The difference in hospitalization duration between groups with mild and severe course was statistically significant ($p < 0.05$). In 95% of patients, positive dynamics by discharge indicated the adequacy and effectiveness of the therapy provided.

Conclusion. The conducted study confirmed the high significance of Henoch–Schönlein Purpura as a widespread pathology in the structure of children's morbidity in the Republic of Sakha (Yakutia). The established clinical and epidemiological characteristics (slight predominance of boys, peak incidence at 4–10 years of age, clinical syndrome structure) generally correspond to Russian and global data.

A key ethnic feature of HSP in Yakut children was identified—a significantly lower frequency of manifest renal syndrome (12.8%) at the time of hospitalization compared to literature data (20–60%; $p < 0.001$). At the same time, subclinical kidney involvement was much more common (42.8%), which indicates the necessity of careful monitoring and suggests a genetically determined, more favorable kidney prognosis for this ethnic group.

Patients with HSP in the region are characterized by a high percentage of hypercoagulation (71.5%), confirmed by significant abnormalities in coagulograms (shortened APTT to 25.3 ± 3.1 s, $p < 0.01$; hyperfibrinogenemia 4.8 ± 1.2 g/L, $p < 0.05$), hyperimmunoglobulinemia A (64.2% with IgA levels of 3.4 ± 0.9 g/L), and the significant role of persistent bacterial (including streptococcal) and viral infections as trigger factors, which determines the need for comprehensive laboratory examination including coagulogram and immunogram.

The high comorbidity rate (ENT and gastrointestinal pathology) requires a multidisciplinary approach to patient care. The applied complex therapeutic approach, including antiplatelet agents, anticoagulants, and as indicated glucocorticosteroids, proved effective, ensuring symptom relief with an average length of hospitalization varying from 18.5 ± 3.2 to 20.4 ± 4.1 bed-days depending on severity.

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The authors confirm the absence of any conflict of interest.

Authors' contributions. Munkhalova Ya.A. – study concept and design, statistical data analysis, data collection and processing, writing; Yadrikhinskaya V.N. – study concept and design, statistical data analysis, data collection and processing, writing; Argunova V.M. – data collection and processing; Evseeva S.A. – scientific editing, Egorova V.B. – study concept and design, statistical data analysis, data collection and processing, Burtseva T.E. – writing, scientific editing.

Information about the authors. Yana A. Munkhalova – Ph.D. of Medical Sciences, Head of the Department of Pediatrics and Pediatric Surgery, Medical Institute, M.K. Ammosov North-Eastern Federal University (NEFU), tokmacheva@mail.ru, ORCID: 0000-0002-9657-5612; **Vera N. Yadrikhinskaya** – Ph.D. of Medical Sciences, Associate Professor, Department of Hospital Therapy, Occupational Diseases and Clinical Pharmacology, Medical Institute, M.K. Ammosov North-Eastern Federal University (NEFU), yadrvera@mail.ru, ORCID: 0009-0004-9148-7105; **Vera M. Argunova** – Rheumatologist, Republican Hospital No. 1– M.E. Nikolaev National Center of Medicine, Chief Freelance Rheumatologist for the Far Eastern Federal District, cardiorevmatologsakha@mail.ru, ORCID: 0009-0002-7274-5354. **Sardana A. Evseeva** – Ph.D. of Medical Sciences, Senior Researcher, Yakut Science Center of Complex Medical Problems, ORCID: 0000-0002-9854-8220. **Vera B. Egorova** – Ph.D. of Medical Sciences, Associate Professor, Department of Pediatrics and Pediatric Surgery, Medical Institute, M.K. Ammosov North-Eastern Federal University (NEFU), veraborisovna@yandex.ru, ORCID: 0000-00003-3051-5251; **Tatyana E. Burtseva** – Dr. Sci. (Med) (DSc, Prof.), Professor, Department of Pediatrics and Pediatric Surgery, Medical Institute, M.K. Ammosov North-Eastern Federal University (NEFU), Leading Researcher, Yakut Science Center of Complex Medical Problems, bourtsevat@yandex.ru; corresponding author; ORCID: 0000-0002-5490-2072

Received by the editorial office: 20.10.2025 / **Accepted for publication:** 04.02.2026

DOI 10.25789/YMJ.2026.93.05

УДК 612.015.2(091):616.618-089.845+616.4

Ultrastructural mechanisms of recurrent cystitis formation in women (a pilot study)

Boris A. Berdichevsky [1], Valentina A. Polyakova [1,2], Inna V. Fomina [1,2], Grigory V. Zubik [1], Daniil A. Uchaev [3]

[1] Tyumen State Medical University, Ministry of Health of the Russian Federation, 54 Odesskaya St., Tyumen, 625023, Russia

[2] Perinatal Center, Tyumen Region, 1 Daudelnaya St.; 26 Energetikov St., Tyumen, 625002, Russia

[3] South Ural State University (National Research University), 76 Lenin Prospekt, Chelyabinsk, 454080, Russia

Abstract. Comparative studies were conducted on the ultrastructural state of the urothelial barrier of the bladder in a patient without a urogynaecological history and in four patients with recurrent cystitis, both before and after standard treatment, which included bladder instillations of a solution containing hyaluronic acid. Clinical, laboratory, and instrumental baseline investigations were supplemented with high-tech scanning electron microscopy of urothelial biopsies at magnifications of up to 7000 times. Visual differences were identified in the integrity of the urothelial barrier between the patient without a urogynaecological history and the patients with recurrent cystitis. Following the comprehensive therapy, there was a tendency towards a reduction in the width of intercellular spaces, along with an increase in the size of urothelial cells and a decrease in clinical and laboratory manifestations. One of the key factors contributing to the recurrence of cystitis in women is the insufficiency of the urothelial barrier.

Keywords: Scanning electron microscopy, recurrent cystitis, urothelial barrier, urothelium, treatment

Funding. The study had no sponsorship.

For citation: Berdichevsky B.A., Polyakova V.A., Fomina I.V., Zubik G.V., Uchaev D.A. Ultrastructural mechanisms of recurrent cystitis formation in women (a pilot study). Yakut Medical Journal, 2026. 93(1): 22-25. https://doi.org/10.25789/YMJ.2026.93.05

Introduction. Recurrent cystitis is one of the most common bacterial infections in women, representing a pressing issue in modern urology and gynecology [1-4]. The European Association of Urology (EAU) defines recurrent cystitis as three or more episodes within 12 months or two or more episodes within six months [5]. Due to its high prevalence, this pa-