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Original Article

Incidence and risk factors of nephritis in childhood Henoch-Schönlein purpura

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Abstract

Background Henoch-Schönlein Purpura (HSP) is the most common systemic vasculitis disease in children. It is characterized by involvement of the skin, joints, gastrointestinal tract, and kidney. Kidney manifestations may progress to severe nephritis, even lead to end-stage kidney disease.

Objective To identify the incidence and risk factors of nephritis in childhood HSP.

Methods A retrospective cohort study was performed to evaluate clinical, demographic, laboratory, and therapeutic parameters of HSP patients aged 0-18 years between 2011-2019 at Dr. Cipto Mangunkusumo Hospital, Jakarta. Diagnoses of HSP were made according to the *2008 EULAR/PRES/PRINTO* criteria. We followed subjects' medical records for at least 3 months after disease onset to observe incidence and risk factors of Henoch-Schönlein nephritis (HSN).

Results There were 112 HSP patients (aged 2-17 years) included in this study. HSN was found in 40 out of 112 patients (35.7%). Nephritis developed within the first 4 weeks for a majority of cases. Multivariate analysis showed that persistent purpura (OR 3.306; 95%CI 1.315 to 8.315; P=0.011) and acute phase leukocytosis (OR 2.585; 95%CI 1.047 to 6.385; P=0.039) were significantly associated risk factors for HSN. We found that corticosteroid use did not reduce the risk of HSN. The accumulation of several risk factors was associated with the likelihood of developing HSN.

Conclusion Persistent purpura and acute phase leukocytosis are independent risk factors for HSN. Therefore, blood tests are needed to estimate the risk of HSN. Early corticosteroid therapy do not reduce the risk of kidney impairment. **[Paediatr Indones. 2023;63:304-14; DOI: https://doi.org/10.14238/pi63.4.2023.304-14**].

Keywords: *Henoch-Schönlein purpura; nephritis; childhood; risk factors*

Henoch-Schonlein purpura (HSP) is the most common vasculitis afflicting the pediatric population, predominantly in Asian and Caucasian people. The global incidence of HSP is 10-20 cases per 100,000 children.[1] It is marked by the presence of immunoglobulin A (IgA) deposits in small blood vessels. The main clinical feature of this disease is non-thrombocytopenic purpura, along with other systemic manifestations, such as arthritis, gastrointestinal disturbances, and nephritis. Although the underlying cause has not been elucidated, some studies noted abnormalities mediated by IgA-associated immune complex and IgA rheumatoid factor.[2] The gold standard test of HSP has not been defined to date. Diagnosis is made according to clinical criteria: the presence of purpura or petechiae with lower limb predominance plus one of four signs (abdominal pain, histopathology, arthritis/ arthralgia, or nephritis).[3] Other organ involvement has also been reported, but rarely, such as lungs, nervous system, and testicles.[4]

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The prognosis of the disease in children is quite favorable, with eventual symptom recovery. However, kidney manifestations can worsen the outcomes, increasing morbidity and mortality. Nephritis can present with mild features, such as hematuria and/or mild proteinuria, and thus, has a good prognosis. However, a severe manifestation such as nephrotic syndrome can lead to deterioration of kidney function.[2] Massive proteinuria is usually predictive of worse outcomes. The incidence of nephritis in HSP patients is quite varied in previous studies, ranging from 1-17% of patients.[5-8]

More than 50% of children with HSP developed nephritis in 4-6 weeks after its early onset. However, kidney impairment has also been reported to develop after 10 years.[2] The varied time range makes it difficult to determine the required period of observation and evaluation for HSP patients. Hence, the identification of kidney impairment risk factors is important to determine which patients require intensive follow-up. To the best of our knowledge, no study has addressed this issue in Indonesia, to date.

Studies on HSN risk factors had differing results. A study in Japan reported that severe abdominal pain and age older than 4 years were risk factors of HSN.[9] In contrast, another study found age >10 years, persistent purpura and HSP relapse were associated with HSN.[10] In addition, a study found that severe abdominal pain, persistent purpura, and reduction in coagulation factor XIII activity significantly increases the risk of HSN, while corticosteroid therapy decreases this likelihood.[11]

There are many conflicting opinions regarding corticosteroid use to treat HSP and HSN. Indonesia has never established a consensus recommendation of corticosteroid prescription to prevent nephritis in HSP pediatric patients. Recommendations that have been dispatched are only for limited use in local health centers. Most studies reported its beneficial effect on abdominal pain, articular involvement, and subcutaneous edema. However, corticosteroid use was found ineffective in preventing nephritis, shortening the duration of disease, or suppressing HSP recurrence.[12-14]

Therefore, we conducted this study to find out the incidence and risk factors of nephritis in childhood HSP and to assess the role of corticosteroid therapy in reducing the risk. We also studied the length of time to develop nephritis in HSP. Answers to these questions are imperative to making further clinical recommendations for evaluating HSP patients.

Methods

There were 179 pediatric HSP patients ranging in age from 1 month to 18 years with Dr. Cipto Mangunkusumo Hospital, Jakarta, registry from January 2011 to December 2019. Data were collected in November 2019 - January 2020. In search for the medical records, 25 were found missing. Out of 154 discovered, 34 did not meet the diagnostic criteria used. Among 12 subjects with nephritis in their first visits, only 4 had complete early history and previous laboratory data in, hence 8 subjects with unclear disease history were excluded. Therefore, in the analysis we included 112 subjects.

In our retrospective cohort study, subjects were followed for a minimum of 3 consecutive months from their first visit, to observe the incidence of nephritis. We evaluated possible risk factors present in the acute phase of the disease - defined by 14 days since the first appearance of purpuric rash or petechiae. The diagnosis of HSP was made according to *2008 EULAR/PRES/PRINTO* criteria: the presence of purpura or petechiae with lower limb predominance, in addition to at least one of the following four: abdominal pain, histopathology, arthritis/arthralgia, and/or nephritis.5 Nephritis was diagnosed based on the presence of at least one of the manifestations described in **Table 1**.[15-17] Chronic kidney disease (CKD) was identified and classified according to *2012 Kidney Disease Improving Global Outcomes* (KDIGO).[18] CKD criteria included the presence of structural or functional kidney abnormality that occurred for more than 3 months, with adverse implications on health and well-being.[18]

Gender, age, and 7 clinical variables were analyzed as possible risk factors of nephritis: (1) persistent purpura (lasting for more than one month), (2) recurrent purpura (recurring after a one month HSP-symptom-free period), (3) presence of arthritis or arthralgia, (4) abdominal symptoms, (5) acute phase leukocytosis (normal range was determined according to age) (**Table 2**), (6) acute phase thrombocytosis (defined by platelets count

Table 1. Henoch-Schonlein nephritis criteria[15-17]

Kidney symptoms	Criteria
Hematuria	>5 red blood cells (RBC) per high-power-field (HPF) in urine, or positive dipstick test (+)
Proteinuria	The presence of urine protein 4-40 mg/m^2 HPF/hour, the presence of albumin in urine >30 mg/L or positive dipstick test
Hematuria and proteinuria	According to the above criteria
Nephrotic range proteinuria	Massive proteinuria (>40 mg/m^2 HPF/hour or 50 mg/kg.day or urinary protein/creatinine ratio >2 mg/mg or dipstick test reveals >2+), with or without hypoalbuminemia (albumin blood level <2.5 g/dL), clinical feature of edema, and may be accompanied with hypercholesterolemia (>200 mg/dL)
Nephrotic-nephritic syndrome	The presence of >200 RBC/HPF and 24-hour urinary protein quantification >40 mg/m^2/hour, accompanied with two of the following: oliguria, hypertension, and/or kidney dysfunction (defined by GFR <60 ml/min/1.73 m^2)

*Diagnosis of HSN was based on fulfilling 1 of 5 criteria

Table 2. Normal white blood cells (WBC) count in peripheral blood according to age

Age	Normal WBC count, x10^3/µL
1-23 months	6-14
2-9 years	4-12
10-17 years	4-10.5

>400x10^3/µL), and (7) corticosteroid consumption during the first 3 months. Arthritis was described as swelling of joint or painful sensation in the periarticular soft tissue, and classified as severe if the patient had gait disability associated with joint condition.[9] Gastrointestinal symptoms can be manifested as diffuse colic pain, vomiting, or gastrointestinal bleeding. Mild abdominal pain was classified as pain that resolved with paracetamol medication. Severe abdominal pain was defined as causing intake difficulties or if there was evidence of gastrointestinal bleeding.[9,15]

Data analysis was performed using *Statistical Package for the Social Sciences (SPSS) version 11.0* (*SPSS Inc*, USA) software. Univariate analysis was done using Fischer's exact and Chi-square tests to evaluate risk factors associated with nephritis in HSP patients. Multivariate analysis was performed using logistic regression. Results with P values ≤ 0.05 with 95% confidence interval (CI) were considered to be statistically significant. This study was approved by the Research Ethics Committee of Dr. Cipto Mangunkusumo Hospital.

Results

In total, 112 patients were included in the analysis (**Table 3**), ranging in age from 2-17 years.

In addition to purpura, the most frequent symptom found was abdominal pain (n=87), followed by arthritis (n=72). Nine subjects (8.9%) had both severe abdominal pain and arthritis.

Nephritis was identified in 40 of 112 (35.7%) subjects. Kidney involvement began to appear at weeks 1-144 (0-36 months) after HSP onset (week 14 on average). Nephritis was already observed in 23 subjects (57.5% of subjects with HSN) in the first 4 weeks after HSP onset. Among 40 patients who developed nephritis over time, the cumulative incidence of HSN cases was 80%, 85%, and eventually 90%, in the 2nd, 4th and 6th months, respectively (**Figure 1**). Among the subjects with nephritis, progression to CKD was documented in 30 children (75%). **Figure 2** illustrates classification of CKD stages.

The percentage of HSN cases increased according to the number of risk factors present (**Figure 3**). All patients with 7 risk factors eventually developed HSN, while only 9% of patients with 1 risk factor developed HSN. Corticosteroids were given to 101 patients (90.2%), with indications state in **Table 4**.

Univariate analysis revealed that persistent purpura (P=0.004) and acute phase leukocytosis (P=0.045) had significant associations with the occurrence of nephritis in pediatric HSP patients (**Table 5**). The other 5 variables were not associated with HSN. Dividing subjects into two age groups according to the median (<9 years and >9 years) also had no significant association to nephritis (P=0.110).

Table 3. Characteristics of subjects

Characteristics	(N=112)
Gender, n (%)	
Male	58 (51.8)
Female	54 (48.2)
Age of disease onset, n (%)	
0-2 years	0 (0)
>2-5 years	15 (13.4)
>6-12 years	75 (67)
>13-18 years	22 (19.6)
Mean age (SD), months	113 (46)
With nephritis	114 (46)
Without nephritis	112 (46)
Persistent purpura, n (%)	61 (58.9)
Recurrent HSP, n (%)	34 (30.4)
Abdominal pain, n (%)	87 (77.7)
Severe	48 (42.9)
Mild to moderate	40 (35.7)
Arthritis, n (%)	72 (64.3)
Severe arthritis	26 (23.2)
Mild to moderate arthritis	46 (41.1)
Henoch-Schonlein nephritis, n (%)	40 (35.7)
Hematuria	5 (12.5)
Proteinuria	1 (2.5)
Hematuria and proteinuria	24 (60)
Nephrotic-range proteinuria	2 (5)
Nephrotic - nephritic syndrome	8 (20)
Acute-phase leukocytosis, n (%) (n=93)	51 (45.5)
Acute-phase thrombocytosis, n (%) (n=92)	47 (42)
Received corticosteroid therapy, n (%)	101 (90.2)

Four variables with P values <0.250 were eligible for multivariate analysis (recurrent HSP, resistant purpura, leukocytosis, and age of onset >9 years). Logistic regression revealed that persistent purpura (OR 3.306; 95%CI 1.315 to 8.315; P=0.011) and acute phase leukocytosis (OR 2.585; 95%CI 1.047 to 6.385; P=0.039) were independent risk factors of nephritis in HSP patients.

Discussion

To the best of our knowledge, this study is the first in Indonesia to identify risk factors of kidney involvement in HSP patients. Characteristics of subjects may vary from one study to another, due to differing diagnostic criteria. *The 2008 EULAR/PRES/PRINTO* criteria used in our study has 100% sensitivity and 87% specificity.[3] Some studies used the *ACR 1990* criteria or modified ACR 1990,[3] and some were based on criteria stated in previous review publications.[9-11] Moreover, the criteria for determining kidney involvement in HSP has not been uniform.

The ratio of male and female HSP patients in our study was 1.1:1, similar to the previous studies.[3,10] Other publications revealed greater proportions of males than females (1.5–2:1).[7,19] Sex is postulated to influence immune system development. During pre-puberty, the cytokine inflammatory response is higher in males. The HSP mostly occurred in children <10 years, with a peak age at onset of 6-10 years.[20,21] Our study yielded similar results (**Table 1**), with an age range of 2-17 years, and none under 2 years. The tendency of occurrence in younger age might also be linked to sex and hormonal factors influencing the immune response.[21]

Generally, HSP has a favorable prognosis and the acute phase typically resolves spontaneously. Therefore, it is important to clarify to the patient and family members that while the therapy given is mostly symptomatic, to reduce abdominal pain and arthralgia. However, if any complications arise, including kidney impairment, the prognosis will worsen, and morbidity will increase.[8,12] We found that 35.7% of patients developed kidney involvement, mostly occurring in the fourth week (57.5%). This result was consistent with previous studies.[9] Kidney involvement has reportedly been found in 40-60% of patients, with 20-55% of them developing in the first to third month after HSP onset.[12,20,22] The incidence of nephritis was found to reduce after the third month.[21] Therefore, a minimum of 3-month regular monitoring is recommended, especially for those with risk factors of developing nephritis.[9] In our study, some cases showed nephritis in the third year after HSP onset (1.8%) (**Figure 1**).

We found no significant association between patient age and kidney impairment in children with HSP. The result was similar to that of Almeida *et al.*[15] However, a few other studies found that children >10 years of age may have greater probability to develop HSN,23 up to 3-fold more than younger children.[17,24] Age onset was also demonstrated as a risk factor for nephritis in a multivariate study with a cut-off of >4 years,[9] and another study with a cut-off of >6 years.[25]

The mean age of nephritis onset in our study was 9.5 (SD 3.6) years, with age 6-12 years the most common age range to develop HSN. The youngest

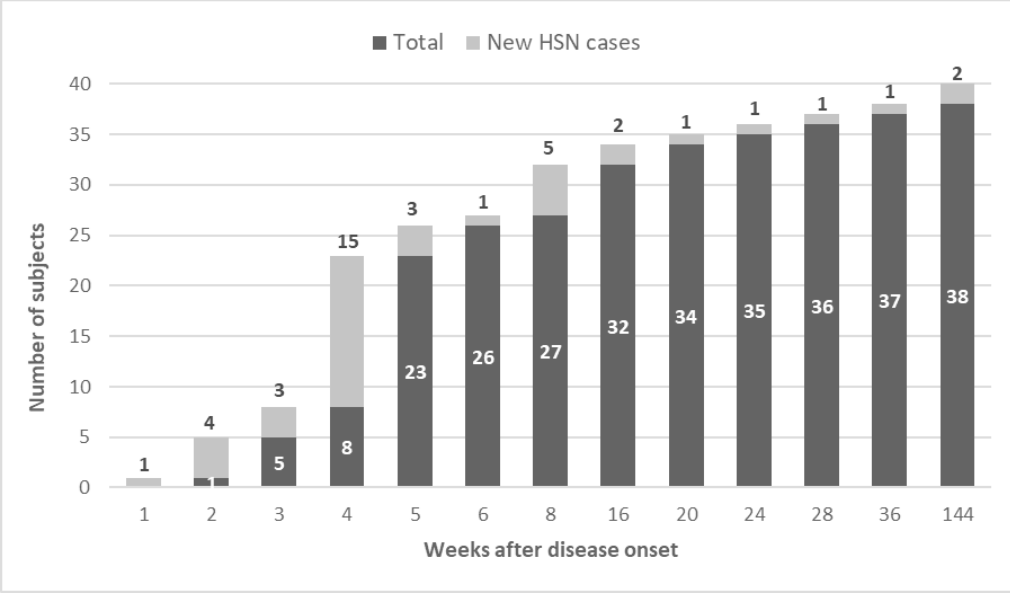

Figure 1. Time to develop nephritis in HSP

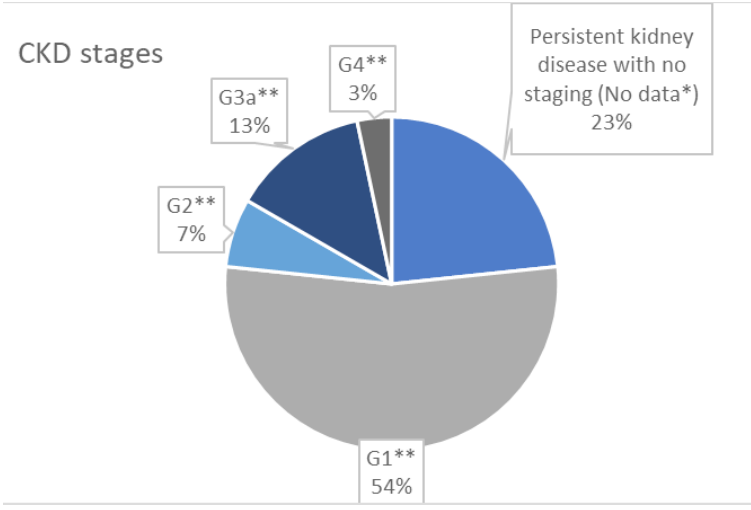

Figure 2. CKD incidence in HSN patients
*Urea and creatinine results not available
**GFR G1: >90 mL/min/1.73 m^2, G2: 60-89 mL/min/1.73 m^2, G3a: 45–59 mL/min/1.73 m^2, G3b: 30-44 mL/min/1.73 m^2, G4: 15-29 mL/min/1.73 m^2

Table 4. Corticosteroid types received by subjects with indications

Type of corticosteroids	HSP (n=112)	HSN (n=40)	Dose, mg/kgBW/ day	Duration of consumption, weeks	Indication
Methyl-prednisolone, n(%)	77 (76.2)	29 (37.6)	0.2-3	2-32	1. Mild to moderate abdominal pain (5) 2. Severe abdominal pain (11) 3. Gastrointestinal bleeding (3) 4. Mild to moderate arthralgia (4) 5. Severe arthralgia (5) 6. Purpura (46) 7. Edema anasarca (1) 8. Other (2)
Prednisone, n(%)	21 (20.7)	7 (22.3)	0.5-2	1-64	1.Mild to moderate abdominal pain (2) 2. Severe abdominal pain (1) 3. Gastrointestinal bleeding (1) 4. Mild to moderate arthralgia (2) 5. Purpura (15)
Dexamethasone, n(%)	2 (1.9)	1 (50)	1-2	2-24	Purpura (2)
Triamcinolone, n(%)	1 (0.01)	0 (0)	0.5	4	Purpura
With no steroids, n(%)	11 (9.82)	3 (7.5)	-	-	-

age with HSN was 2 years and 6 months, while the eldest was 16 years and 6 months. Previous studies reported that kidney involvement in HSP patients was most commonly observed at age 4-10 years.[9,11,17,25] A study in Bandung, West Java, found that 93% of HSP patients with kidney impairment occurred at >5 years of age, and the highest incidence was at 11-15 years.[19] Older age at HSP onset requires more attention to anticipate nephritis. A meta-analysis of 13 studies found that boys were at higher risk to develop kidney impairment than girls.[23] However, our study found no association between male sex and HSN (P=0.910), similar to previous findings.[5,7,8,17]

The most common form of nephritis in our subjects was coexistence of both hematuria and proteinuria (60%), with 75% of HSN patients progressing to CKD. A previous study conducted at the same hospital, found reduction of GFR (<90 mL/m/1.73m^2) in 14.3% of HSN patients, proteinuria in 28.8%, and hematuria in 40.7%.[20] In addition, a cohort study in a tertiary health center with a 20-year follow-up reported that HSN progressed to CKD in 20% of children.[26]

Two of seven variables had significant associations with HSN incidence in HSP patients: persistent purpura and acute-phase leukocytosis. Multivariate analysis indicated that persistent purpura was an independent predictive factor of HSN (OR 3.306; P=0.11). A meta-analysis found an association between abnormal skin ma nifestations and HSN. This risk increased 1.22 to 13.25-fold in the presence of persistent purpura.[23] Other multivariate studies also found a significant association between HSN and persistent purpura.[10,11,27] The underlying mechanism might be related to a chronic condition of vasculitis, inducing a constant inflammatory response over a long period of time, leading to eventual disruption of kidney tissues which have abundant blood vessels.[23]

We found that recurrent HSP was not associated with kidney impairment (P=0.098). In contrast, a previous study found this variable to be one of the predictive factors of developing kidney impairment (OR=3.1; P=0.002).[17] This discrepancy might have been caused by differences in methods. Their study was a prospective 6-month cohort study; 87% of HSN occurred in the first month after HSP onset, while recurrence was most commonly observed after

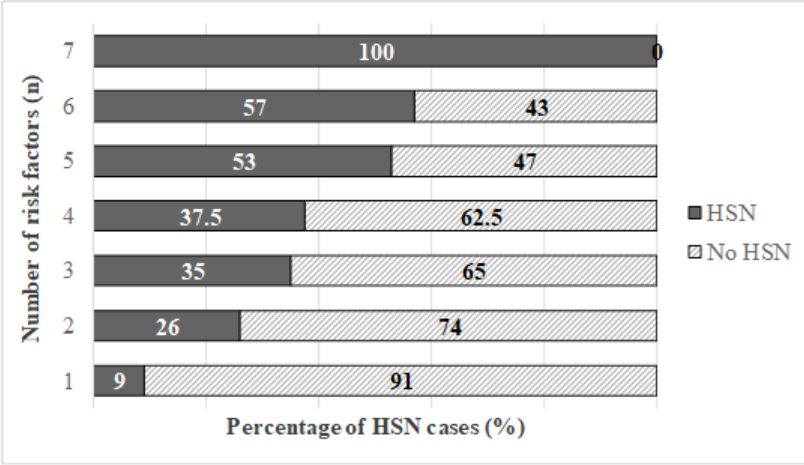

Figure 3. Predictive model for nephritis in HSP patients

4 months.[17] In our study, patients were followed only until nephritis occurred. The possibility of reverse cause-effect may still be considered, in which nephritis may have developed before HSP symptom relapse.

Leukocytosis in HSP cases might result from active formation of IgA immune complexes that trigger activation of complement in endothelial and mesangial cells in peripheral blood vessels.[4] Vigorous complement activation increases Th17, which then induces IL-17 production.[28] Interleukin-17 is a proinflammatory cytokine, which potently induces chemokine expression and inflammatory cytokines, including IL-1, other inflammatory factors, and adhesion molecules. These are marked by neutrophil accumulation in HSP disease.[28,29] The release of cytokines, complement, and other inflammatory factors can damage capillary membranes and cause glomerular capillary destruction.[4]

Our study revealed that acute phase leukocytosis was an associated risk factor for HSN (OR 2.58; 95%CI 1.047 to 6.385). A meta-analysis indicated that leukocytosis was a predictive factor related to development of nephritis in HSP patients.[23] However, few studies have addressed the issue, hence, there are not much data to compare. Anoter study found no association between leukocytosis and nephritis. In their study, leukocytosis was defined as leukocyte count >15x10^9/L,[10] while a study in Korea noted median leukocyte count in HSN patients to be 12.17x10^9/L.[30] In our study, we used normal range of white blood cells according to age. Moreover, our study did not consider other precipitating factors that might contribute to high levels of leukocytes, such as viral or bacterial infection.

The release of inflammatory mediators also leads to thrombocytosis in HSP patients.[31,32] Interleukin-6 proinflammatory cytokine is known to induce reactive thrombocytosis by increasing thrombopoietin (TPO) production.[32] Thrombocytosis has an important role in triggering vasculitis through activation of IL-1β.[33] Moreover, thrombocytosis can also be seen in cases of hemorrhage, including gastrointestinal bleeding which sometimes can also be found in HSP.[34] Furthermore, a study demonstrated that thrombocytosis was a significant risk factor to kidney impairment in HSP patients (P=0.024),[31] contrary to our findings. Other authors stated that thrombocytosis was a common abnormal finding and postulated it to be closely related to abdominal pain and gastrointestinal bleeding, but not with HSN.[20] Thrombocytosis frequently occurred in the acute phase of HSP. However, due to uptake and destruction by megakaryocytes and platelets, TPO will subsequently decrease and diminish thrombocyte production.[32,35] Platelets are estimated to have a lifespan of 8-10 days, so any discrepancy in the timing of blood specimen draws will influence the platelet count.

The HSP inflammation in intestinal vasculature could lead to bleeding from either the upper or lower gastrointestinal system. Edema as the result

Table 5. Univariate analysis of possible nephritis risk factors

Variables	Nephritis		OR (95%CI)	P value
	Yes (n=40)	No (n=72)		
Gender, n(%)				
Male	21 (36.2)	37 (63.8)	1.046 (0.482 to 2.267)	0.910
Female	19 (35.2)	35 (64.8)		
Age at onset, (%)				
>9 years	20 (42.6)	27 (57.4)	1.667 (0.762 to 3.644)	0.119#
<9 years	20 (30.8)	45 (69.2)		
Abdominal pain, n (%)				
Severe	19 (44.1)	24 (55.8)	1.571 (0.774 to 3.219)	0.259
Mild-moderate	14 (31.8)	30 (68.2)	1.136 (0.529 to 2.437)	0.742
No	7 (28.0)	18 (72.0)	Standard	
Arthralgia, n (%)				
Severe	11 (42.3)	15 (57.7)	1.441 (0.588 to 3.536)	0.423
Mild-moderate	15 (32.6)	31 (67.4)	1.297 (0.704 to 2.392)	0.404
No	14 (35)	26 (65)	Standard	
Persisten purpura, n(%)				
Yes	29 (45.3)	32 (54.7)	3.295 (1.429 to 7.598)	0.004#
No	11 (22.9)	40 (77.1)		
Recurrent HSP, n(%)				
Yes	16 (47.1)	18 (52.9)	2.0 (0.874 to 4.575)	0.098#
No	24 (30.8)	54 (69.2)		
Acute onset leukocytosis				
Yes	25 (49)	26 (51)	2.404 (1.011 to 5.714)	0.045#
No	12 (28.6)	30 (71.4)		
Acute onset thrombocytosis, n(%)				
Yes	20 (42.6)	27 (57.4)	1.343 (0.579 to 3.112)	0.492
No	16 (35.6)	29 (64.4)		
Corticosteroid therapy				
No	3 (27.3)	8 (72.7)	1.542 (0.385 to 6.173)	0.743*
Yes	37 (36.6)	64 (63.4)		

*Chi-square test; #Fisher's exact test; results with P<0.25 were included in multivariate analysis

of inflammation could also cause intussusception that occurs in 0.6-3.5% of HSP patients.[2] Numerous publications showed that severe abdominal pain was an important HSN predictive factor by univariate analysis.[9,11,15,27] However, multivariate analysis failed to demonstrate a significant association between the two.[27] Our study also yielded similar results: no difference in severe, mild to moderate, and no pain groups with the development of kidney impairment. This discrepancy might be caused by inconsistencies between studies in defining, interpreting, and classifying the types of abdominal pain.[9,11,15] Most publications available today were also retrospective studies, relying on medical records.

Arthritis was found in 80% of all subjects. Joint involvement in HSP is characterized by symmetrical, non-migratory, non-permanent polyarthritis with lower extremity predominance. Afflicting large joints, HSP arthritis can cause swelling, severe pain, limitations in range of motion (ROM), and gait difficulty.[2,12] Despite most subjects in our study experiencing arthritis, statistical analysis did not reveal either mild or severe pain to be related to HSN, consistent with other previous studies.[9,11,15]

The underlying pathophysiology of HSP disease is autoimmune, so the rationale for corticosteroid use has been widely accepted to suppress inflammation. Early administration of corticosteroids is expected to fulfill the goal of HSP therapy. Two studies showed that consumption of corticosteroids could speed up resolution of abdominal complications. Arthralgia, arthritis, or periarticular swelling should be treated with non-steroidal anti-inflammatory drugs (NSAIDs).[6,18] Almost all subjects in our study received early corticosteroid therapy. However, corticosteroid prescription for HSP patients is still

not widely accepted, especially in terms of preventing HSN.[6,12-14]

Two randomized controlled trials showed that corticosteroid therapy was not effective in preventing nephritis.[36,37] A blinded clinical trial discovered similar results.[14] In contrast, a systematic review stated that corticosteroids could reduce the likelihood of developing nephritis (OR 0.43). However, the study did not describe further whether corticosteroids were used in new or relapsed cases. The durations of follow-up in the review also varied from one subject group to another.[13] A previous study concluded that patients with risk factors of kidney impairment must be given steroids as early as possible, since they are considered kidney protective, with hazard ratio of 0.36.[11] We found no significant difference in HSN incidence between children with and without corticosteroid therapy.

No consensus or guideline has been made on indications and regimens of corticosteroid use in HSP children worldwide. The available recommendations at present are only to be used in limited locations. Our center, Dr. Cipto Mangunkusumo Hospital, recommends steroid prescription if one of five conditions is present: severe abdominal pain, gastrointestinal bleeding, severe edema, kidney impairment, or evidence of involvement of another organ system, such as lungs and central nervous system (Hospital guideline - unpublished). The purpose of the therapy is to reduce excruciating symptoms and to resolve the acute phase of HSP. Prospective studies are required to elucidate this issue.

Most of the existing studies to date, including this one, used data collected retrospectively, so the clinical parameters depend on the clinicians on duty providing detailed information on medical records. Moreover, there has not been any established recommendation for clinical evaluation in HSP children. In the future, prospective cohort studies are needed to illuminate the predictive factors of kidney impairment in HSP patients.

In conclusion, persistent purpura and acute phase leukocytosis are independent risk factors for HSN. Corticosteroid therapy is not found to reduce risk of kidney impairment. Therefore, routine early therapy using corticosteroids in uncomplicated HSP is not recommended.

Conflict of interest

None declared.

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