

Extreme leukocytosis is not associated with increased risk of serious bacterial infection in pediatric emergency patients

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Received : 29.03.2026, Accepted : 26.08.2026

DOI: 10.12956/TJPD.2026.1335

ABSTRACT

Objective: Extreme leukocytosis is often considered a warning sign of serious bacterial infection (SBI) in febrile children. However, its diagnostic value remains controversial, particularly in the post-vaccination era. This study aimed to evaluate whether extreme leukocytosis is associated with an increased risk of SBI compared with moderate leukocytosis in pediatric emergency patients.

Materials and Methods: This single-center, retrospective comparative study included children aged 1 month to 18 years who presented to a tertiary pediatric emergency department in Ankara, Türkiye, with a white blood cell (WBC) count $\geq 15.000/\text{mm}^3$. Patients were classified into moderate ($15.000\text{--}24.999/\text{mm}^3$) and extreme ($\geq 25.000/\text{mm}^3$) leukocytosis groups. SBI frequency, C-reactive protein (CRP) levels, and multivariable predictors of SBI were analyzed.

Results: A total of 955 patients were included (423 extreme, 532 moderate leukocytosis). SBI was identified in 26.0% of extreme and 22.7% of moderate leukocytosis patients ($p=0.243$). In multivariable analysis, extreme leukocytosis was not independently associated with SBI (OR 1.18, 95% CI 0.86–1.61, $p=0.308$), whereas CRP (OR 1.05, 95% CI 1.02–1.07, $p=0.001$) and fever (OR 2.21, 95% CI 1.54–3.16, $p<0.001$) were significant predictors. CRP showed moderate discriminatory ability (AUC 0.649), with improved performance in the extreme leukocytosis subgroup (AUC 0.705).

Conclusion: Extreme leukocytosis was not associated with increased SBI risk compared with moderate leukocytosis. CRP provided independent predictive value and may serve as a more useful biomarker for SBI risk stratification in pediatric emergency patients with leukocytosis.

Keywords: Bacterial infection, biomarker, C-reactive protein, leukocytosis, pediatric emergency medicine

Introduction

Fever is one of the most common reasons for pediatric emergency department visits, and distinguishing children with serious bacterial infections (SBI) from those with self-limited illnesses remains a major clinical challenge (1,2). SBI, including bacteremia, meningitis, pneumonia, and urinary tract infection, occurs in a variable proportion of febrile children depending on age and clinical setting. Recent studies have reported that respiratory symptoms and positive viral testing can influence SBI risk in febrile infants, while biomarker-guided approaches are increasingly utilized to improve diagnostic accuracy (3,4). Despite advances in vaccination and diagnostic tools, SBI continues to be associated with significant morbidity, making early and accurate risk assessment essential (5).

White blood cell (WBC) count has traditionally been used as a marker of bacterial infection, and extreme leukocytosis

(typically defined as $\text{WBC} \geq 25.000/\text{mm}^3$) is often considered a warning sign prompting further investigation (5,6). However, the clinical significance of extreme leukocytosis remains controversial. Shah et al. (7) reported an increased risk of occult bacteremia and pneumonia in febrile children with extreme leukocytosis, whereas Brauner et al. (8) found that the risk of SBI was not significantly higher in children with $\text{WBC} \geq 25.000/\text{mm}^3$ compared with lower thresholds. Kim et al. (9) studied 233 previously healthy febrile children aged 3 to 36 months with extreme leukocytosis ($\text{WBC} 25.000\text{--}49.999/\text{mm}^3$) and found an SBI rate of 32.3%, highlighting the heterogeneity in reported outcomes across different populations and settings.

These conflicting findings, along with changes in the epidemiology of pediatric infections in the post-vaccination era, have raised questions about the diagnostic value of leukocytosis alone (10,11). The widespread introduction of

conjugate pneumococcal vaccines has substantially reduced the incidence of invasive pneumococcal disease, which was historically a major driver of bacteremia in febrile children with leukocytosis (12). As a result, the positive predictive value of WBC-based criteria has decreased dramatically, and recent evidence indicates that WBC count provides limited diagnostic benefit compared with C-reactive protein (CRP) for predicting SBI (13,14).

In contrast, inflammatory biomarkers such as CRP have shown more consistent associations with bacterial infections and are widely available and rapidly measurable (15,16). However, the role of CRP specifically in children with extreme leukocytosis remains insufficiently defined.

Given this uncertainty, the present study aimed to evaluate whether extreme leukocytosis is associated with an increased risk of SBI compared with moderate leukocytosis in pediatric emergency patients. As a secondary objective, we also investigated the association between CRP and SBI and explored its potential contribution to risk stratification in this specific population.

Materials and Methods

Study design and setting

This retrospective comparative study was conducted in the pediatric emergency department of a Ankara Child Health and Diseases Hematology Oncology Training and Research Hospital located in Türkiye. The pediatric emergency department receives approximately 100,000 visits annually.

Children aged 1 month to 18 years who presented to the pediatric emergency department between January 1, 2016 and December 31, 2016 and had leukocytosis on complete blood count testing were identified through the hospital electronic medical records. Patients with a white blood cell (WBC) count of at least 15,000/mm³ were included in the study. Fever was not an inclusion criterion; both febrile and afebrile children meeting the WBC threshold were eligible. Patients were classified into two groups according to admission WBC count: moderate leukocytosis (15,000–24,999/mm³) and extreme leukocytosis ($\geq 25,000$ /mm³). Patients with underlying chronic disease, immunodeficiency, hematologic malignancy, or incomplete medical records were excluded. Incomplete medical records were defined as those lacking sufficient information to determine the final diagnosis or to classify patients as having or not having SBI.

Definitions

Fever was defined as a body temperature of $\geq 38.0^{\circ}\text{C}$.

Serious bacterial infection (SBI) was defined as the presence of a clinically significant bacterial infection, including bacteremia, bacterial meningitis or encephalitis, pneumonia, urinary tract infection, septic arthritis, bacterial gastroenteritis, mastoiditis, osteomyelitis, or deep tissue abscess (4,5). Conditions without consistent microbiologic or radiologic confirmation of a bacterial etiology, such as isolated lymphadenitis, were not classified as SBI.

Bacteremia was defined as growth of a pathogenic organism in blood culture obtained in the emergency department. Bacterial meningitis was defined as growth of a pathogenic organism

in cerebrospinal fluid culture. Pneumonia was defined by compatible clinical findings together with radiographic evidence of consolidation or pleural effusion. Urinary tract infection was defined as growth of a single pathogenic organism in urine culture at $\geq 10^4$ CFU/mL in catheter specimens or $\geq 10^5$ CFU/mL in midstream urine specimens. Other SBI diagnoses were based on compatible clinical, microbiological, and imaging findings documented in the medical records.

Data collection

Demographic and clinical variables were extracted from the electronic medical records, including age, sex, body temperature, WBC count, C-reactive protein (CRP), absolute neutrophil count (ANC), urine analysis, culture results, chest radiography findings, hospitalization status, treatment, and final diagnosis. The final diagnosis was defined as the discharge diagnosis recorded in the medical record at the conclusion of the emergency department visit or hospitalization.

Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics version 25.0. Patients with extreme and moderate leukocytosis were compared with respect to SBI frequency and laboratory findings. Categorical variables were presented as number and percentage and compared using the chi-square test or Fisher's exact test, as appropriate. The normality of continuous variables was assessed using the Kolmogorov–Smirnov test together with visual inspection of histograms and Q–Q plots; as all continuous variables deviated significantly from a normal distribution, nonparametric methods were used. Continuous variables were summarized as median and interquartile range (IQR) and compared using the Mann–Whitney U test.

A multivariable logistic regression model was constructed to assess factors independently associated with SBI. Candidate variables were first screened in univariable analyses; those associated with SBI at $p < 0.050$ (CRP level, fever, and age), together with the primary exposure of interest (leukocytosis group), were entered into the model. The continuous WBC count was not entered separately, as it was represented by the leukocytosis-group classification, to avoid collinearity. As a secondary analysis, CRP levels were also compared between SBI and non-SBI patients within the extreme leukocytosis subgroup. A two-sided p value of < 0.050 was considered statistically significant. As an exploratory secondary analysis, receiver operating characteristic (ROC) analysis was performed to evaluate the discriminatory performance of CRP for SBI in the overall cohort and within the extreme leukocytosis subgroup. An exploratory CRP cutoff was derived using the Youden index, and the corresponding sensitivity and specificity are reported for descriptive purposes only.

Results

A total of 955 pediatric patients with leukocytosis were included in the study. Among these, 423 patients (44.3%) had extreme leukocytosis ($\geq 25,000$ /mm³), and 532 patients (55.7%) had moderate leukocytosis (15,000–24,999/mm³). Baseline demographic and clinical characteristics of the study population are presented in Table I. Patients with extreme leukocytosis had a significantly higher rate of hospitalization

Table I: Baseline characteristics of patients with extreme and moderate leukocytosis

Variable	Extreme leukocytosis	Moderate leukocytosis	p
Total number of patients	423	532	
Age (months)*	44.4 (16.4–89.0)	51.0 (17.0–86.0)	0.950
Male sex†	255 (60.3%)	295 (55.5%)	0.110
Fever†	227 (53.7%)	275 (51.7%)	0.530
WBC ($\times 10^3/\text{mm}^3$)*	27.9 (26.1–31.4)	19.6 (17.0–22.0)	<0.001
CRP (mg/dL)*	1.4 (0.3–6.3)	1.9 (0.4–5.8)	0.080
Hospitalization†	227 (53.7%)	149 (28.0%)	<0.001

*: median (IQR) (Mann–Whitney U test), †: n(%) (Pearson chi-square test)

Table II: Clinical outcomes and distribution of serious bacterial infection according to leukocytosis severity

Outcome	Extreme leukocytosis*	Moderate leukocytosis*	p
Total number of patients	423	532	
SBI	110 (26.0)	121 (22.7)	0.243
Pneumonia	53 (48.2)	58 (47.9)	0.970
Urinary tract infection	32 (29.1)	59 (48.8)	–
Meningitis	8 (7.3)	0 (0)	–
Bacteremia	8 (7.3)	0 (0)	–
Septic arthritis	2 (1.8)	3 (2.5)	–
Deep tissue abscess	4 (3.6)	1 (0.8)	–
Encephalitis	1 (0.9)	0 (0)	–
Osteomyelitis	1 (0.9)	0 (0)	–
Mastoiditis	1 (0.9)	0 (0)	–

*: n(%) (Pearson chi-square test)

compared with those with moderate leukocytosis (53.7% vs 28.0%, $p < 0.001$), whereas other baseline characteristics were largely comparable between the groups (Table I).

The overall frequency of serious bacterial infection (SBI) was 24.2% ($n=231$). SBI was identified in 110 of 423 patients (26.0%) in the extreme leukocytosis group and in 121 of 532 patients (22.7%) in the moderate leukocytosis group, with no statistically significant difference between groups ($\chi^2=1.366$, $p=0.243$; absolute risk difference 3.3%, 95% CI -2.2% to 8.8%) (Table II). The distribution of specific SBI diagnoses varied across the individual subtypes. Pneumonia, the most common SBI, occurred in 48.2% of SBI cases in the extreme leukocytosis group and 47.9% in the moderate leukocytosis group, with no meaningful difference observed (Table II). In sensitivity analyses, the absence of an association between extreme and moderate leukocytosis was robust to the SBI definition: results were unchanged when lymphadenitis was included in a broader definition (29.3% vs 27.1%, $p=0.443$) and when a narrow definition restricted to bacteremia, meningitis, and urinary tract infection was applied (11.3% vs 11.1%, $p=0.982$).

The extent of the diagnostic work-up differed between groups (Table III). Children with extreme leukocytosis more frequently underwent blood culture (19.6% vs 7.0%, $p < 0.001$), lumbar puncture for cerebrospinal fluid culture (3.5% vs 0.6%, $p=0.001$), and chest radiography (29.6% vs 22.7%, $p=0.017$), whereas urinalysis (55.1% vs 51.5%, $p=0.271$) and urine culture (44.9% vs 44.7%, $p=0.956$) were performed at comparable rates in both groups. Antibiotic use also differed between groups: any antibiotic administration was numerically less frequent in the extreme leukocytosis group (48.7% vs 54.7%, $p=0.065$),

Table III: Multivariable logistic regression analysis for predictors of SBI

Variable	Adjusted OR	95% CI	p
Extreme leukocytosis	1.18	0.86–1.61	0.308
CRP (per 1 mg/dL increase)	1.05	1.02–1.07	0.001
Fever	2.21	1.54–3.16	<0.001
Age (per month)	0.99	0.984–0.992	<0.001

whereas parenteral (intravenous or intramuscular) antibiotic use was significantly more common in this group (29.8% vs 16.7%, $p < 0.001$).

CRP levels were significantly higher in patients with SBI than in those without SBI (median 3.4 mg/dL (IQR 1.2–9.3) vs 1.4 mg/dL (IQR 0.2–4.9); $p < 0.001$). In univariable analysis, absolute neutrophil count did not differ significantly between patients with and without SBI (median $15.950/\text{mm}^3$ (IQR 11.400–21.000) vs $16.500/\text{mm}^3$ (IQR 12.900–21.900); $p=0.107$) and was therefore not entered into the multivariable model.

In multivariable logistic regression analysis, extreme leukocytosis was not independently associated with SBI (adjusted OR 1.18, 95% CI 0.86–1.61, $p=0.308$). In contrast, higher CRP levels were independently associated with an increased likelihood of SBI (adjusted OR 1.05, 95% CI 1.02–1.07, $p=0.001$). Fever was also independently associated with SBI (adjusted OR 2.21, 95% CI 1.54–3.16, $p < 0.001$), whereas increasing age was associated with a slightly lower likelihood of SBI (adjusted OR 0.99, 95% CI 0.984–0.992, $p < 0.001$) (Table IV). Among patients with extreme leukocytosis, CRP levels remained significantly higher in those with SBI compared to those without SBI ($p < 0.001$) (Table V).

Exploratory ROC analysis showed that CRP had moderate discriminatory ability for SBI in the overall cohort (AUC 0.649, 95% CI 0.607–0.692, $p < 0.001$). In the extreme leukocytosis subgroup, the discriminatory performance of CRP was higher (AUC 0.705, 95% CI 0.645–0.765, $p < 0.001$) (Figure 1). An exploratory cutoff of approximately 0.8 mg/dL, identified using the Youden index, yielded a sensitivity of 81.4% and specificity of 41.9% in the overall cohort (83.6% and 50.5%, respectively, within the extreme leukocytosis subgroup). Exploratory analysis suggested that the association between CRP and SBI was stronger in the extreme leukocytosis subgroup, consistent with its improved discriminatory performance in ROC analysis.

Discussion

In this study, extreme leukocytosis was not associated with a higher frequency of serious bacterial infection (SBI) compared with moderate leukocytosis in pediatric emergency patients. Despite a markedly higher hospitalization rate in the extreme leukocytosis group, the SBI frequency did not differ significantly between groups, suggesting that the clinical decision to hospitalize was driven by factors beyond the risk of bacterial infection per se. In multivariable analysis, extreme leukocytosis was not independently associated with SBI, whereas CRP, fever, and younger age emerged as significant independent predictors. CRP additionally demonstrated moderate discriminatory performance for SBI, which was further improved in the extreme leukocytosis subgroup.

The clinical significance of extreme leukocytosis in febrile children has been debated in the literature. Shah et al. (7)

Table IV: Univariable and multivariable logistic regression analyses of factors associated with serious bacterial infection

Variable	Univariable		Multivariable		
	OR (95% CI)	p	B	Adjusted OR (95% CI)	p
Extreme leukocytosis	1.19 (0.89–1.61)	0.243	0.164	1.18 (0.86–1.61)	0.308
CRP(per 1 mg/dL increase)	1.06 (1.04–1.09)	<0.001	0.045	1.05 (1.02–1.07)	0.001
Fever	3.38 (2.44–4.70)	<0.001	0.793	2.21 (1.54–3.16)	<0.001
Age (per month)	0.986 (0.982–0.990)	<0.001	–0.012	0.988 (0.984–0.992)	<0.001

The multivariable model was statistically significant, $\chi^2(4) = 107.92$, $p < 0.001$; Nagelkerke $R^2 = 0.16$, Hosmer–Lemeshow $p = 0.364$, overall correct classification = 76.4%. **OR**: odds ratio, **CI**: confidence interval, **B**: regression coefficient, **CRP**: C-reactive protein.

Table V: CRP levels in patients with extreme leukocytosis

Group	CRP (median, IQR)	p
SBI (n=110)	4.3 (1.3–10.0)	-
Non-SBI (n=313)	0.8 (0.2–4.1)	<0.001

Table VI: Diagnostic test utilization according to leukocytosis severity

Diagnostic test	Extreme*	Moderate*	p
Total number of patients	423	532	-
Blood culture	83 (19.6)	37 (7.0)	<0.001
Urine culture	190 (44.9)	238 (44.7)	0.956
Cerebrospinal fluid culture (lumbar puncture)	15 (3.5)	3 (0.6)	0.001
Urinalysis	233 (55.1)	274 (51.5)	0.271
Chest radiograph	125 (29.6)	121 (22.7)	0.017
Any antibiotic use	206 (48.7)	291 (54.7)	0.065
Parenteral (IV/IM) antibiotic use	126 (29.8)	89 (16.7)	<0.001

*: n(%)

reported an association between extreme leukocytosis and increased rates of occult bacteremia and pneumonia in febrile children. Brauner et al. (8) similarly evaluated febrile children with extreme leukocytosis and found variable results regarding SBI risk. In contrast, our SBI rate of 26.0% in the extreme leukocytosis group is comparable to the 32.3% reported by Kim et al. (9) in a study of 233 previously healthy febrile children aged 3 to 36 months with extreme leukocytosis. Importantly, in our study, this rate was not significantly different from the 22.7% observed in the moderate leukocytosis group, reinforcing the notion that the degree of leukocytosis alone does not reliably differentiate children at risk for SBI. Furthermore, the distribution of specific SBI diagnoses varied across the individual subtypes; pneumonia was the most common SBI in both groups (48.2% and 47.9% of SBI cases in the extreme and moderate leukocytosis groups, respectively), and its frequency did not differ significantly. This finding is noteworthy given that pneumonia has historically been cited as a primary driver of the association between leukocytosis and serious bacterial infection, particularly in the pre-vaccination era (7,12).

Our findings are further supported by the recent multicenter study by Kemps et al. (14), which included 17,082 children from 12 European emergency departments and concluded that WBC count does not provide meaningful diagnostic benefit compared with CRP for predicting SBI. In their study, WBC $>15,000/\text{mm}^3$ had a sensitivity of only 0.56 with a specificity of 0.74, whereas CRP $>20 \text{ mg/L}$ achieved a sensitivity of 0.87 with a specificity of 0.59 (14).

Leukocytosis is a nonspecific inflammatory response and may be influenced by a wide range of conditions, including viral

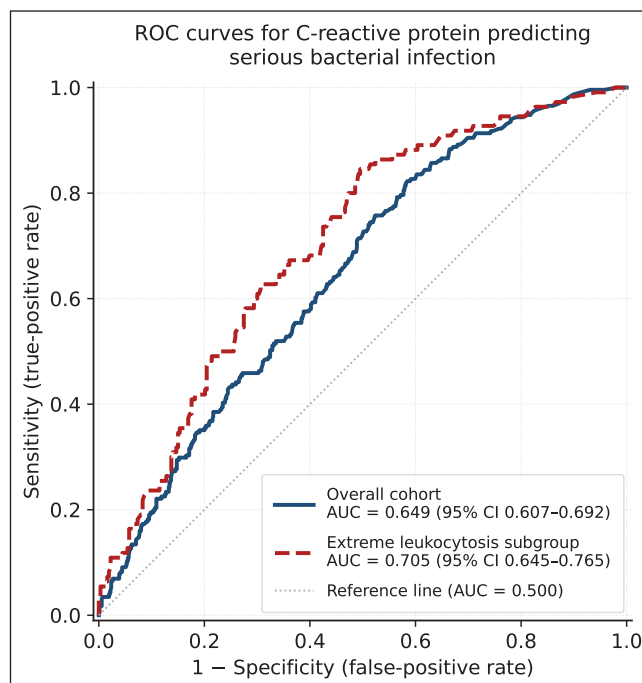


Figure 1: Receiver operating characteristic (ROC) curves of C-reactive protein (CRP) for predicting serious bacterial infection (SBI). CRP demonstrated moderate discriminatory ability in the overall cohort (AUC 0.649, 95% CI 0.607–0.692) and improved performance in the extreme leukocytosis subgroup (AUC 0.705, 95% CI 0.645–0.765).

infections, stress responses, and inflammatory states. In the current post-vaccination era, the epidemiology of pediatric infections has shifted substantially (10,11). The widespread implementation of conjugate pneumococcal vaccines has reduced the incidence of invasive pneumococcal disease, which historically was a major driver of bacteremia in febrile children with leukocytosis (12). Rutman et al. (12) demonstrated significant changes in the rate of radiographic pneumonia among young, highly febrile children with leukocytosis following universal conjugate pneumococcal vaccination. Similarly, Ogawa et al. (13) reported that the positive predictive value of WBC-based criteria for occult bacteremia decreased dramatically after the introduction of pneumococcal conjugate vaccine. This shift likely reduces the discriminatory value of extreme leukocytosis as a standalone marker of SBI in the current era.

In contrast to leukocytosis, CRP demonstrated a consistent and independent association with SBI in our study. This finding aligns with previous literature suggesting that inflammatory biomarkers provide better diagnostic performance than white blood cell count alone (14–16). Lacroix et al. (17) demonstrated

that CRP, either alone (AUC 0.807) or as part of combined biomarker scores such as the Labscore (AUC 0.854), shows promising discriminatory ability for detecting serious and invasive bacterial infections in febrile children. Chang et al. (18) similarly demonstrated that CRP was more accurate than complete blood count components for SBI prediction in infants aged 0 to 90 days. Hamiel et al. (19) reported that CRP and neutrophil markers outperformed WBC count in febrile infants aged 1 week to 3 months. Beyond CRP, fever was also an independent predictor of SBI in our cohort, consistent with its established role as a key clinical marker in the evaluation of febrile children (1,4). Notably, increasing age was independently associated with a lower likelihood of SBI, likely reflecting the greater vulnerability of younger children to bacteremia and other invasive infections, as well as the higher prevalence of viral etiologies accounting for leukocytosis in older children (3,5).

Importantly, our exploratory ROC analysis showed that CRP had moderate discriminatory ability overall (AUC 0.649, 95% CI 0.607–0.692) and improved performance in the extreme leukocytosis subgroup (AUC 0.705, 95% CI 0.645–0.765). This reflects numerically higher discriminatory performance in the extreme leukocytosis subgroup; the two AUCs were not formally compared statistically, and this difference should therefore be interpreted with caution. It nonetheless suggests that when WBC count is markedly elevated and provides little additional stratification value, CRP may serve as a more informative guide to clinical decision-making. The exploratory Youden-derived cutoff of approximately 0.8 mg/dL yielded high sensitivity (81.4%) but limited specificity (41.9%), indicating that CRP at low values may be particularly useful for identifying patients at lower risk for SBI a rule-out rather than a rule-in application. This interpretation is consistent with findings by Sutiman et al. (20), who identified low CRP thresholds as effective for ruling out SBI in young febrile children, and aligns with the broader literature supporting CRP as a sensitive early marker of bacterial infection (15,16). Emerging automated approaches, including machine-learning and large language model-based tools, are increasingly being investigated for the prediction of serious bacterial infection, although such tools require prospective validation before clinical use (21). Nonetheless, given the exploratory nature of our ROC analysis and the moderate AUC values, the identified cutoff should be considered hypothesis-generating and requires prospective validation before clinical implementation.

Clinical implications

These findings have direct implications for clinical practice. The significantly higher hospitalization rate in the extreme leukocytosis group (53.7% vs 28.0%) in the absence of a corresponding increase in SBI frequency suggests that factors other than bacterial infection risk such as the degree of leukocytosis itself, clinician concern, or the need for observation may have influenced admission decisions; whether these admissions were avoidable cannot be determined from our data. The presence of extreme leukocytosis alone should not by itself prompt extensive diagnostic work-up or empirical antibiotic therapy in the absence of other clinical or laboratory findings suggestive of SBI. Instead, CRP may serve as a complementary biomarker to improve risk stratification. In particular, in patients with extreme leukocytosis, a low CRP value may help identify those at lower risk for SBI, potentially reducing unnecessary

diagnostic testing, antibiotic use, and hospital admissions. Conversely, the combination of extreme leukocytosis, fever, younger age, and elevated CRP may identify a higher-risk subgroup warranting more thorough evaluation. Clinicians should adopt a more nuanced approach that integrates multiple clinical and laboratory parameters rather than relying on WBC count thresholds alone. This approach is consistent with the growing body of evidence supporting biomarker-guided decision-making in the evaluation of febrile children (4,14,15).

Limitations

This study also has several limitations. First, its retrospective design may introduce selection bias and limit control over data completeness and measurement timing. Furthermore, because cases were identified retrospectively on the basis of leukocytosis, the total number of emergency department visits during the study period, the number of patients in whom a complete blood count was performed, and a step-by-step account of exclusions could not be fully reconstructed, and a complete patient-flow diagram could therefore not be provided. Second, the study was conducted at a single tertiary care center, which may affect generalizability to other settings, including primary care and community emergency departments. Third, CRP measurements were not standardized in terms of timing relative to symptom onset, which may influence its diagnostic performance, as CRP typically rises 6–12 hours after infection onset. Fourth, procalcitonin was not available for analysis, which limits our ability to compare the diagnostic performance of CRP against other promising biomarkers. Fifth, the data were collected in 2016; subsequent changes in vaccination coverage, circulating pathogens, viral testing practices, and emergency department workflows may limit the generalizability of these findings to the current era. Sixth, diagnostic testing was not standardized and was performed more frequently in the extreme leukocytosis group; this differential ascertainment may have favored the detection of invasive infections such as bacteremia and meningitis in that group, and the resulting verification bias should be considered when interpreting the distribution of specific SBI subtypes. Seventh, the multivariable model adjusted for a limited set of covariates. Absolute neutrophil count was not significantly associated with SBI and was therefore not included in the model; other potential confounders including illness severity and triage acuity, duration of fever, prior antibiotic use, vaccination status, clinical appearance, and viral co-testing were not available, and residual confounding cannot be excluded. Eighth, our cohort was defined by leukocytosis rather than fever, and approximately half of the patients were afebrile; this distinguishes our population from the febrile-child cohorts in much of the prior literature and should be considered when comparing findings. Finally, although ROC analysis was performed, the identified cutoff values should be interpreted cautiously and require external validation before clinical implementation.

Conclusion

Extreme leukocytosis was not associated with an increased risk of serious bacterial infection in pediatric emergency patients. In contrast, CRP was independently associated with SBI and demonstrated moderate discriminatory ability,

particularly in the extreme leukocytosis subgroup. These findings suggest that CRP may provide additional clinical value in risk stratification, whereas leukocytosis alone should not be used as a determinant of SBI risk.

Ethics committee approval

This study was conducted in accordance with the Helsinki Declaration Principles. The study was approved by Ankara Children's Hematology and Oncology Training and Research Hospital (04.05.2018, reference number: 2018-079).

Contribution of the authors

Study conception and design: AZB, EDM, HiY; data collection: AZB, ST, SHK, FK; analysis and interpretation of results: AZB, EDM; draft manuscript preparation: AZB, EDM. All authors reviewed the results and approved the final version of the article.

Source of funding

The authors declare the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest.

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