

Correlation between Platelet Indices and PELOD-2 Score as Prognostic Markers in Pediatric Sepsis at Dr. Zainoel Abidin Hospital

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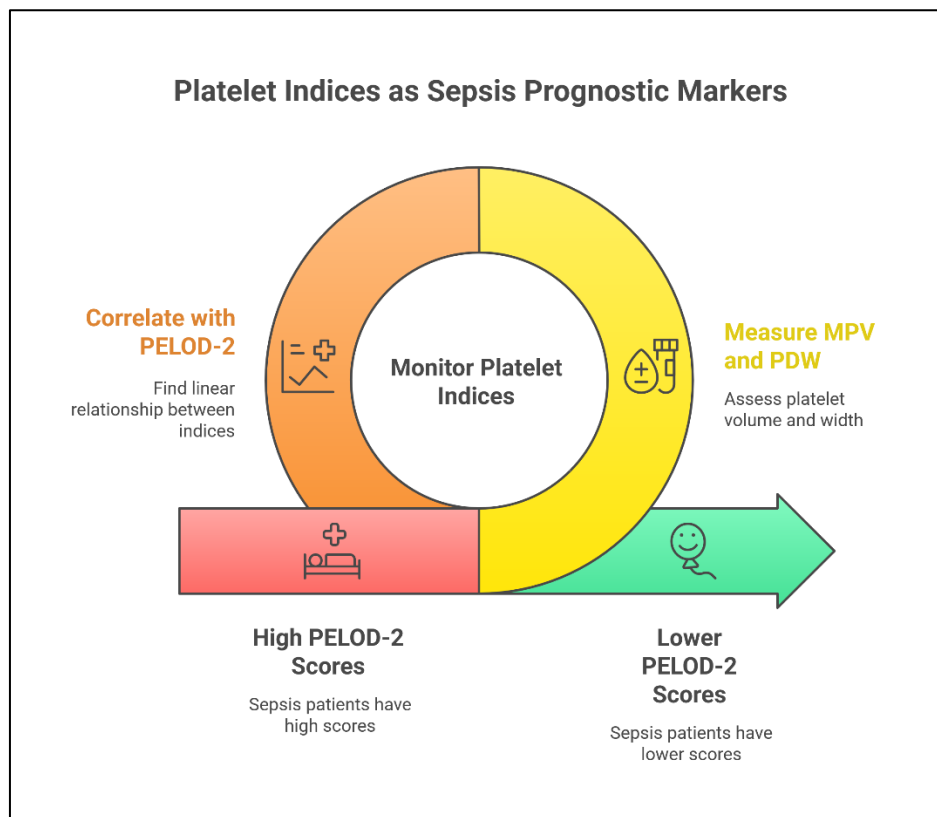
ABSTRACT

To determine the correlation between Mean Platelet Volume (MPV) and Platelet Distribution Width (PDW) with Pediatric Logistic Organ Dysfunction (PELOD-2) scores as prognostic markers in pediatric sepsis. This prospective cohort study included 44 pediatric sepsis patients admitted to the PICU at Dr. Zainoel Abidin Hospital from July to September 2024. PELOD-2 scores and blood indices were assessed on admission (Day 1) and Day 3. Pearson correlation was used to analyze the relationship between variables. The majority of patients were female (59.1%) and under one year old (31.8%). By Day 3, 68.2% of patients exhibited MPV levels exceeding 10.4 fL. Significant moderate correlations were found between Day 3 MPV and PELOD-2 ($r=0.410$; $p=0.006$), Day 3 PDW and PELOD-2 ($r=0.518$; $p=0.001$), and the changes (Δ) in PDW versus PELOD-2 scores ($r=0.471$; $p=0.005$). Increases in MPV and PDW are significantly correlated with PELOD-2 scores, suggesting their potential utility as accessible prognostic markers in pediatric sepsis management.

Key Message:

- MPV and PDW values on day 3 of treatment show moderate correlation with PELOD-2 scores in pediatric sepsis
- Changes in PDW values correlate with changes in PELOD-2 score and may predict sepsis progression
- Platelet parameters offer an accessible and cost-effective prognostic marker for pediatric sepsis

GRAPHICAL ABSTRACT



INTRODUCTION

Sepsis is a life-threatening condition of organ failure due to the body's disordered immune response to infection (1). Young children, as well as those with comorbid conditions that impact the immune system, such as cancer, organ transplants, chronic diseases, and congenital heart defects, show a significantly higher incidence of sepsis. Both groups have a significantly increased risk of developing sepsis (2). The initial process in the course of sepsis starts with the entry of microorganisms into the body which then triggers an immunological response. As a defense mechanism, inflammation is a very important immunological process. The reaction of living tissues to traumatic or infectious events, which can occur in both acute and chronic states, is inflammation (3).

Acute inflammation begins rapidly, within minutes to hours, and is primarily mediated by neutrophils, which infiltrate the site of injury or infection to initiate immune responses. In contrast, chronic inflammation occurs with slow onset (days to months or even years in the general context, though in sepsis context it may be defined differently), with the cellular infiltrate being monocytes or macrophages, the tissue damage caused is generally severe, and in chronic inflammation, there is the formation of collagen tissue from fibroblast cells and scarring is formed(4).

Respiratory tract infections are the leading cause of sepsis in children, followed by non-respiratory tract-specific infections, bacteremia, urinary tract infections, gastrointestinal tract infections, central nervous system infections, and other diseases. There are several other potential causes of sepsis in children, including surgical site infections and soft tissue infections(5).

Sepsis is associated with varying mortality rates between children and adults in the United States (6). Comorbid disorders in patients, such as prematurity, congenital heart defects, malignancies, organ transplants, and other diseases, are one of several variables that impact this mortality rate (7). Pediatric sepsis mortality in Indonesia has shown significant regional variation, ranging from 23.9% to 65% between 2011 and 2020. Notably, mortality rates were 52% in Yogyakarta (2014), 45% in Medan (2017), and 35.6% in Manado (2020) (8).

The Pediatric Logistic Organ Dysfunction (PELOD-2) score is a validated tool for assessing multiple organ dysfunction and predicting mortality in pediatric intensive care settings (9). At the same time as the clinical and biochemical symptoms of infection appear, sepsis is closely related to the presence of infection. Blood tests (leukocytosis/leukopenia, thrombocytopenia/thrombocytosis, neutrophil-to-lymphocyte ratio, left shift), peripheral blood morphology (toxic granules, Dohle bodies, and vacuoles in the cytoplasm), C-reactive protein (CRP), and procalcitonin are some laboratory indicators that can be used to diagnose infection.

Mean platelet volume (MPV) is a measurement taken during a normal blood test. MPV reflects the average size of circulating platelets and serves as an indicator of platelet activation and production dynamics (10). High MPV levels have been associated with thromboembolic, cardiovascular, and cerebrovascular events. Previous studies have shown that evaluation on days 1 and 3 allows assessment of dynamic changes in platelet parameters as the sepsis progresses or responds to treatment (11,12).

PDW is a measurement that determines the difference in size of platelets circulating in the peripheral blood. There is a correlation between an increase in megakaryocyte percentage and an increase in MPV count (13). The aim of this study was to determine the correlation between platelet indices, namely Mean Platelet Volume (MPV) and Platelet Distribution Width (PDW), with the Pediatric Logistic Organ Dysfunction (PELOD-2) score as a prognostic marker in pediatric sepsis patients at Dr. Zainoel Abidin Hospital.

METHODS

This prospective cohort study was conducted between July and September 2024 and included patients under 18 years of age admitted to the PICU at Dr. Zainoel Abidin Hospital. The data was collected from medical records that measured PELOD-2 scoring and routine blood tests were performed on admission (Day 1) and repeated on Day 3 to get Mean Platelet Volume (MPV) and Platelet Distribution Width (PDW) values, following standard treatment protocols. The normal value of MPV is 7.4 - 10.2 fl, categorized as high if the MPV value is above 10.2 fl, while the normal value of PDW is 10.0 - 18.0 fl, and categorized as high if the value is above 18.0 fl. While the pelod-2 score must be more than or equal to 10 to confirm the diagnosis of pediatric patients with sepsis. Pearson correlation was used to assess the linear relationship between MPV, PDW, and PELOD-2 scores. Normality assumptions were verified prior to analysis/

Inclusion criteria included pediatric patients with sepsis aged 1 month to 18 years. Exclusion criteria included patients with malignancy, transfusion of blood products containing platelets, platelet dysfunction, and a history of exposure to chemotherapy, aspirin, heparin, or non-steroidal anti-inflammatory drugs.

This study used a correlation test between numerical variables with alpha (α) = 0.05, beta (β) = 10%, and a minimum correlation coefficient (r) = 0.5, resulting in a minimum sample size of 39 people. Sampling was conducted using the consecutive sampling method until the sample size was met. Data analysis was conducted using SPSS version 26.0, with a 95% confidence level and a significance level of $p < 0.05$.

HEALTH ETHICS CODE

This study was approved by the Ethics Committee of FK USK/RSUDZA Banda Aceh with letter number 137/ETIK-RSUDZA/2024.

RESULTS

A total of 55 patients were admitted to the PICU from July to September 2024, from which 11 were excluded from the study because they had a PELOD-2 score below 10 at the time of sepsis diagnosis. The other 44 patients met the inclusion criteria and were included in this study. In this particular study, patients ranged in age from one month to seventeen years, with the majority of them being female and suffering from malnutrition. Infections of the respiratory system were the most common primary infection, followed by infections of the central nervous system. Only 24% of the participants diagnosed with sepsis had

bacteria found in their blood cultures. A total of 23 out of 44 study subjects died.

Clinical Characteristics of Study Subjects

There were a total of 44 patients diagnosed with sepsis and had a PELOD-2 score equal to or greater than 10. Based on the gender group in this study, the female gender constituted the largest group experiencing sepsis, with 26 (59.1%) subjects. These results align with research by Pairunan et al,(9) where female sepsis patients numbered 22 (51.1%) subjects compared to 21 (48.8%) male subjects. In this study, the majority of subjects were in the age group of <1 year old with 14 (31.8%) subjects, followed by age 5-12 years with 13 (29.5%) subjects, age 13-17 years with 10 (22.7%) subjects, and age 1-4 years with 7 (15.9%) subjects.

In this study, subjects with poor nutritional status were found to be 14 (31.8%) subjects, undernourished with 14 (31.8%) subjects, well-nourished with 13 (29.5%) subjects, and over-nourished with 3 (6.8%) subjects. The mortality rate among study participants in this study was high at 52.3%.

In this study, the most common primary infection was respiratory with 12 subjects (27.3%), followed by central nervous system with 9 subjects (20.5%), kidney with 7 subjects (15.9%), postoperative with 5 subjects (11.4%), heart with 4 subjects (9.1%), hemato-oncology with 3 subjects (6.8%), tropical infection with 2 subjects (4.5%), gastrointestinal-hepatic with 1 subject (2.3%), and endocrine with 1 subject (2.3%).

Table 1. Clinical characteristics of study subjects Clinical characteristics of study subjects (n = 44 subjects)

Characteristics	n (%)
Gender	
Male	18 (40.9)
Female	26 (59.1)
Age	
<1 year	14 (31.8)
1-4 years	7 (15.9)
5-12 years	13 (29.5)
13-17 years	10 (22.7)
Nutrition Status	
Poor nutrition	14 (31.8)
Undernourished	14 (31.8)
Normal	13 (29.5)
Overweight	3 (6.8)
Outcome	
Survived	21 (47.7)
Died	23 (52.3)
Primary Infection	
Kidney	7 (15.9)
Respiratory	12 (27.3)
Post-surgery	5 (11.4)
Central nervous system	9 (20.5)
Gastro-hepatic tract	1 (2.3)
Tropical Infections	2 (4.5)
Heart	4 (9.1)
Endocrine	1 (2.3)

Laboratory Characteristics of Research Subjects

In this study, the percentage of subjects having hemoglobin levels of ≥ 10 g/dl was similar on day 1 and day 3 (54.5% and 52.3%, respectively). The majority of subjects had leukocyte values $> 10,500/\text{mm}^3$ on both days 1 and 3 (75% and 72.7% of subjects, respectively). Platelet counts $< 150,000/\text{mm}^3$ increased from 34.1% of subjects on day 1 to 43.2% on day 3.

PELOD-2 score ≥ 10 on day 1 was 100% of the subjects and on day 3 was 63.6% of the subjects.

The MPV value on day 1 was mostly in the range of 7.4-10.4 fl, which was 70.5% of subjects, while on day 3 > 10.4 fl was 68.2% of subjects. PDW values on day 1 and 3 were predominantly in the normal range of 10-18 fl, namely 59.1% and 61.4% of subjects.

Table 2. Laboratory characteristics of study subjects (n = 44 subjects)

Characteristics	n (%)	
	Day 1	Day 3
Hemoglobin		
<10 g/dl	20 (45.5)	21 (47.7)
≥ 10 g/dl	24 (54.5)	23 (52.3)
Leukocytes		
< 4.500/mm ³	3 (6.8)	3 (6.8)
4.500 – 10.500/mm ³	8 (18.2)	9 (20.5)
> 10.500/mm ³	33 (75.0)	32 (72.7)
Platelets		
<150.000/mm ³	15 (34.1)	19 (43.2)
150.000 – 450.000/mm ³	21 (47.7)	18 (40.9)
>450.000/mm ³	8 (18.2)	7 (15.9)
PELOD-2 score		
< 10	0 (0.0)	16 (36.4)
≥10	44 (100)	28 (63.6)
MPV		
<7.4 fl	0 (0.0)	0 (0.0)
7.4 - 10.4 fl	31 (70.5)	14 (31.8)
> 10.4 fl	13 (29.5)	30 (68.2)
PDW		
<10 fl	17 (38.6)	13 (29.5)
10 - 18 fl	26 (59.1)	27 (61.4)
> 18 fl	1 (2.3)	4 (9.1)

Distribution of MPV, PDW and PELOD-2 Scores

The MPV on Day 1 (MPV1) had a mean of 10.0 (SD 1.18) fl within the normal range, contrasting with MPV on Day 3 (MPV3) with a median of 11.15 (range: 8.40-13.80) fl exceeding normal values. PDW values showed increased dispersion from Day 1 to Day 3, with medians rising from 11.0 fl (range: 6.70–19.60) to 12.85 fl (range: 8.40–22.40), suggesting worsening platelet activation. PELOD-2 score Day 1 (PELOD-21) has a median score of 10 (10.0 - 11.0) because PELOD-2 score ≥ 10 indicates patients with sepsis and is one of the study inclusion criteria while PELOD-2 score Day 3 (PELOD-23) has a median of 11.5 (7 - 13) with The PELOD-23 values varied widely due to heterogeneous patient responses, including both clinical improvement and deterioration by Day 3.

Table 3. Distribution of MPV, PDW and PELOD-2 scores

Variable	n = 44
MPV value (fl)	
– MPV ₍₁₎ Mean (SD)	10,0 (1.18)
– MPV ₍₃₎ Median (min-max)	11.15 (8.40 – 13.80)
PDW value (fl)	
– PDW ₍₁₎ Median (min-max)	11.0 (6,70 – 19.60)
– PDW ₍₃₎ Median (min-max)	12.85 (8.40 – 22.40)
PELOD-2 Score	
– PELOD-2 ₍₁₎ Median(min-max)	10.0 (10 - 11)
– PELOD-2 ₍₃₎ Median (min-max)	11.5 (7 - 13)

Correlation of MPV Value with PELOD-2 Score

In the correlation analysis of MPV values with PELOD-2 scores, a significant correlation was found between MPV3 values and PELOD-2 scores ($p = 0.006$) with a moderate correlation ($r = 0.41$). Based on the findings of the Pearson correlation test, there was a positive relationship between the two variables. This indicates that if the MPV score increases, the PELOD-2 score will also increase. The strongest correlation between MPV and PELOD-2 scores was found on Day 3 ($p = 0.006$, $r = 0.41$).

Table 4. Score Correlation between MPV Value (fl) and PELOD-2 Score

Variable	PELOD-2 SCORE	
	r	p
MPV ₁	0.07	0.662
MPV ₃	0.41	0.006
Δ MPV	0.21	0.168

Correlation between PDW Value and PELOD-2 Score

In the correlation analysis of PDW values with PELOD-2 scores, a significant correlation was found between Δ PDW values and PELOD-2 scores with a moderate correlation ($p = 0.004$ and $r = 0.42$). The PDW3 value is also moderately and significantly correlated with the PELOD-2 score ($p < 0.0001$ and $r = 0.52$).

Based on the findings of the Pearson correlation test, there was a positive relationship between the two variables. This indicates that if the PDW value increases, the PELOD-2 score will also increase, especially on day 3. The strongest correlation between PDW and PELOD-2 scores was found on Day 3 ($p < 0.0001$, $r = 0.52$).

Table 5. Correlation of PDW Value (fl) with PELOD-2 Score

Variable	PELOD-2 SCORE	
	r	p
PDW1	-0.06	0.703
PDW3	0.52	0.0001
Δ PDW	0.42	0.004

Correlation of Changes in MPV and PDW Values to Changes in PELOD-2 Score

The correlation of changes in MPV1 and MPV3 (Δ MPV) and changes in PDW1 and PDW3 (ΔPDW) to changes in PELOD-21 scores and PELOD-23 scores (Δ PELOD-2 scores) showed a moderate and significant correlation in Δ PDW to Δ PELOD-2 scores ($p = 0.004$ and $r = 0.42$).

Table 6. Correlation of Change in MPV Value and Change in PDW Value to Change in PELOD-2 Score

Variable	Δ PELOD-2 SCORE	
	r	p
Δ MPV	0.21	0.168
Δ PDW	0.42	0.004

DISCUSSION

Clinical Characteristics of Study Subjects

This study successfully collected 44 pediatric subjects with sepsis who were admitted to the PICU of RSUD dr. Zainoel Abidin Banda Aceh from July 2024 to September 2024. Based on the gender group in this study, the female gender was the largest group who experienced sepsis, namely 26 (59.1%) subjects. These results are in line with the research of Pairunan et al, (2020), where female sepsis patients numbered 22 (51.1%) subjects compared to 21 (48.8%) male subjects (14). The gender distribution in our study may reflect differences in immune response or healthcare-seeking behavior patterns, though further investigation is needed to establish causality.

The high mortality rate (52.3%) correlates with the predominance of high-risk groups (infants, malnourished), aligning with previous studies reporting increased vulnerability. In accordance with the research of Yuniar, et al (2023), on 241 patients with sepsis in the PICU of RSCM from January 2015 - May 2020, 159 subjects (65.9%) died and 82 subjects (34%) survived, this study also connects the PELOD-2 score as a tool to predict death in patients with sepsis with a PELOD-2 score > 8.8 has a cut off point sensitivity of 81.2% and specificity of 72.9% (11). The high proportion of infants (<1 year: 31.8%) and malnourished patients (63.6% with poor or undernourished status) in our cohort represents important confounding factors that may have influenced the correlation between platelet indices and PELOD-2 scores.

In a retrospective study by Sovira et al, (2020), in the PICU of Dr. Zainoel Abidin General Hospital, Banda Aceh, 316 subjects with critical illness were reported, with 90 subjects (28.5%) having respiratory disease as the primary condition, followed by central nervous system disease in 62 subjects (19.6%) (12). These findings are in accordance with this study; namely, the most common main diagnosis is respiratory, with 12 subjects (27.3%) followed by the central nervous system with 9 subjects (20.5%). The predominance of respiratory infections may be related to local epidemiological patterns and seasonal variations, which could affect platelet response patterns.

Only 24% of participants had positive blood cultures, which is consistent with other pediatric sepsis studies reporting culture positivity rates of 20-30%. This low yield may be due to prior antibiotic administration, inadequate blood volume sampling in pediatric patients, or the presence of viral or fungal pathogens not detected by routine bacterial cultures.

In this study, the majority of subjects had normal hemoglobin levels. These results are not in line with the research of Pairunan, et al (2016), who found that hemoglobin values in patients were below normal according to gender and age, also associated with DIC conditions and hemolysis processes that caused hemoglobin to drop (14). This difference may suggest our patients were in earlier stages of sepsis or had received appropriate supportive care including transfusions.

Mean leukocyte levels in this study were slightly increased above 10,500/ μ L in line with research conducted by Pairunan, et al (2016) (14), with the average value of leukocytes in their sepsis study being 22,500/ μ L, which was twice as high as our findings. This difference could be due to variations in sepsis severity, timing of measurement, or differences in the predominant causative organisms. The lower leukocyte count in our study may also reflect the high proportion of very young infants, who may exhibit different inflammatory response patterns.

Research conducted by Sayed et al. (2020), on 60 patients admitted to the PICU of Minia University Mother and Child Hospital in Egypt from July 2018 - January 2019 and divided them into outcome criteria, namely alive and dead (13). The patients who died amounted to 19 patients and all of them had thrombocytopenia. In line with this study, thrombocytopenia was observed on day 3. This condition is associated with increased platelet consumption in DIC conditions that often occur in sepsis. The progressive decrease in platelet count from day 1 to day 3 (34.1% to 43.2% with counts <150,000/ mm^3) reflects ongoing consumption and may indicate worsening organ dysfunction.

MPV values that are higher than normal ranges indicate that the bone marrow increases platelet turnover in response to stress. Larger and younger platelets are more functional (15). The shift from predominantly normal MPV values on day 1 (70.5% within normal range) to elevated values on day 3 (68.2% above normal) suggests a compensatory response to ongoing platelet consumption and activation.

Correlation of PDW Value with PELOD-2 Score

The correlation of MPV3 values with PELOD-2 Score was found to be significant with a moderate correlation ($r = 0.41$), while MPV1 and Δ MPV were not significant. The stronger correlation on day 3 compared to day 1 suggests delayed platelet activation and ongoing inflammatory processes. This temporal pattern may reflect the evolution of sepsis from initial infection to established organ dysfunction. An increase in PELOD scores caused by organ failure is in line with an increase in MPV values, based on the findings of a retrospective study conducted by Isguder et al. (2016), who reported similar correlations in

pediatric sepsis patients, though their correlation coefficients were slightly higher ($r = 0.48-0.55$), possibly due to differences in patient populations or measurement timing (16).

In line with the study conducted by Sayed et al. (2020), which found that MPV levels were greater in patients who died from sepsis compared to those who survived, the MPV values in our study on day 3 were higher than normal range values (13). Endothelial damage and bone marrow suppression resulting from the progression of sepsis lead to the body producing large amounts of cytokines and inflammatory mediators. This cascade leads to increased production of younger, larger platelets from the bone marrow as a compensatory mechanism. The presence of these immature platelets, reflected in elevated MPV, indicates both ongoing consumption and active thrombopoiesis. Interestingly, adult sepsis studies have shown variable MPV patterns, with some reporting decreased MPV, suggesting age-related differences in platelet response to sepsis.

Correlation of PDW Value with PELOD-2 Score

PDW on Day 3 and changes in PDW (Δ PDW) showed moderate, significant correlations with PELOD-2 scores ($r = 0.52$ and 0.42 , respectively), while Day 1 PDW did not correlate significantly ($r = -0.06$). The negative correlation on Day 1 suggests that initial PDW values may not reflect sepsis severity, possibly because platelet heterogeneity develops progressively as the inflammatory response evolves. By Day 3, increased PDW reflects ongoing platelet activation, consumption, and the release of variably-sized platelets from the bone marrow. This finding is in contrast to the findings of Sayed et al. (2020), who found that changes in PDW values were not significant in relation to PELOD-2 scores, though their study used different timing for measurements (admission and day 7) which may explain the discrepancy (13).

PDW values were found to correlate with MPV and procalcitonin according to research by Miraza A et al. (2023), involving 86 patients in the PICU of Adam Malik Hospital Medan. They reported that PDW has similar prognostic value as MPV during the acute phase of severe infection. When platelet turnover accelerates and platelet counts decrease, PDW increases as an indicator of platelet size heterogeneity (17). A high PDW value indicates a large range of platelet sizes due to swelling, damage, and immaturity of platelets (18). The stronger correlation of PDW compared to MPV with PELOD-2 scores in our study ($r = 0.52$ vs 0.41) suggests PDW may be a more sensitive marker of ongoing organ dysfunction. This could be because PDW reflects both platelet consumption and production dynamics, while MPV primarily indicates platelet size.

Interestingly, recent research on neutrophil-to-lymphocyte ratio (NLR) in pediatric inflammatory conditions provides additional context for our findings. Amri et al. (2025), demonstrated that NLR values were significantly higher in children with dengue shock syndrome compared to dengue hemorrhagic fever, suggesting that inflammatory markers may serve as prognostic indicators across various pediatric inflammatory conditions (19). Similarly, in adult populations with liver disease, Putri et al. (2025) found NLR to be a superior predictor compared to CRP for detecting spontaneous bacterial peritonitis, with sensitivity of 81.8% and specificity of 68.2% at a cut-off of 6.8 (20). These findings parallel our observations that dynamic inflammatory markers like PDW may offer better prognostic value than static measurements in sepsis.

Correlation of Changes in MPV and PDW Values with Changes in PELOD-2 Score

In this study, a low correlation was found in Δ MPV ($r = 0.21$) and a moderate correlation in Δ PDW ($r = 0.42$). The stronger correlation with PDW changes suggests that dynamic changes in platelet heterogeneity better reflect the evolution of organ dysfunction than changes in mean platelet size alone. When compared with MPV values at the beginning of treatment and after 72 hours, the strongest correlation was detected in changes in MPV after 72 hours (Δ MPV) according to Isguder et al. (2016) (16). This finding is in contrast to the findings of Sayed et al. (2020), who found that changes in PDW values were not significant in relation to PELOD-2 scores (13). However, an increase in PDW values was found to be significant in sepsis patients who died.

When there is an increase in the number of platelet pseudopodia as well as their size, the platelet distribution width (PDW) increases (21). Platelets undergo morphological modifications as a result of

platelet activation, which include structural changes and pseudopodia formation. Platelet specific gravity (PDW) readings will be affected by platelets that have an increased number and size of pseudopodia of varying sizes. Previous studies have shown PDW to be much greater in patients with platelet activation compared to healthy people (22).

From the results of this study, MPV3, PDW3 and Δ PDW values had significant correlations with PELOD-2 scores ($p < 0.05$) and moderate correlation ($r = 0.40 - 0.599$). However, no other studies have examined changes in PDW and MPV values in relation to PELOD-2 scores in children with sepsis, making this study a novel contribution to the literature.

Clinical Implications

The moderate correlations found in this study ($r = 0.40-0.52$) suggest that while MPV and PDW cannot replace comprehensive organ dysfunction scoring, they may serve as useful adjunct markers for monitoring sepsis progression. The accessibility and low cost of these parameters, available from routine complete blood counts, make them particularly valuable in resource-limited settings. The stronger correlations on Day 3 suggest that serial monitoring rather than single measurements may be more informative for prognostication.

The nutritional status of our cohort, with 63.6% having a poor or undernourished status, represents a significant consideration. Malnutrition can affect both immune response and platelet function, potentially influencing the observed correlations. Future studies should consider stratifying analyses by nutritional status to better understand these relationships. Research by Nabilah et al. (2024) on stunting in toddlers highlights the complex interplay between nutritional status, food security, and health outcomes, demonstrating that household food security significantly affects child health outcomes ($OR=1.630$; 95% $CI=1.381-1.923$) (23). This parallel finding suggests that nutritional factors may similarly influence the relationship between platelet parameters and sepsis severity in our pediatric population.

The comparison with other inflammatory markers in different pediatric conditions provides valuable perspective. While our study focused on platelet indices, the work by Putri et al. (2025) on NLR in spontaneous bacterial peritonitis (20), and Amri et al. (2025) on NLR in dengue infection demonstrates that various inflammatory markers may have complementary roles in assessing disease severity (19). The consistent finding across these studies is that Day 3 measurements provide better prognostic value than admission values, suggesting a common pattern in the evolution of inflammatory responses in pediatric infections.

Limitations of the Study

This study has several limitations that should be acknowledged, particularly concerning its design and the generalizability of the findings. Methodologically, this prospective study only used serial assessment at two time points (Day 1 and Day 3), which may not fully capture the dynamic changes in platelet parameters throughout the course of sepsis, and it did not include other parameters such as procalcitonin (PCT) or immature platelet fraction (IPF) which could provide additional prognostic information. The generalizability of the findings is also limited by the small sample size (44 patients) and the single-center design in a tertiary referral hospital, which may affect its applicability in other healthcare settings. Furthermore, several confounding factors could have influenced the observed correlations, including the heterogeneity of the study population (age, primary infection sites, nutritional status), a low blood culture positivity rate (24%), and the lack of control for interventions such as fluid resuscitation, vasopressor use, or platelet transfusions that could have affected platelet parameters.

CONCLUSIONS

Day 3 MPV and PDW values, as well as changes in PDW, were moderately correlated with PELOD-2 scores and may have potential as accessible adjunct markers for prognosis in pediatric sepsis. MPV and PDW may serve as accessible, adjunct prognostic markers in pediatric sepsis, especially when measured on the third day of admission. Further research is needed to confirm these results.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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