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Platelet indices as a predictor of mortality in critically ill children

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Abstract
In the current study, we aimed to elaborate the utility of platelet indices as biomarkers for predicting critical illness and mortality in critically ill children. Two main groups were included; group I (patient group): Two hundred (200) critically ill children, group II: Two hundred (200) healthy children with comparable age and sex, were enrolled as a control group. All subjects were evaluated clinically and by CBC including platelet indices (MPV, PDW, and PCT). Patient group I were evaluated with SOFA and PRISM scores and subjected to full lab and other radiological and invasive procedures as indicated. Among 200 critically ill patient 33% of them died and 67% survived and were discharged. Interestingly, It was found that Platelet count and PCT were significantly lower in patient group as compared to the control group with p-value (< 0.001). Moreover, the non survivors of patient group showed significantly lower platelet count and PCT values than the survivors in the same group with p-value (< 0.001). In contrast, MPV and PDW were found to be significantly higher in patient group as compared to the control group with p-value (< 0.001), while, the survivors of patient group showed significantly lower MPV and PDW with p-value (< 0.001) Worthy noting that PCT was inversely related to PRISM and SOFA score while, MPV and PDW were directly related to PRISM and SOFA score. PDW was the most sensitive parameter to discriminate between patient and control group with sensitivity 96% while, PCT was the most specific parameter with 99% specificity. In addition, PCT was the most sensitive parameter to predict mortality in patient group with sensitivity 86.57%. Finally, MPV and PDW were the most specific parameters to predict mortality in patient group with specificity 87.88%. In conclusion**,** this study proved that platelet count and platelet indices are valid predictors for assessment of critical illness and PICU mortality.

Keywords: Platelet indices, MPV, PDW, PCT, critically ill.

Introduction
Platelets, the smallest and highly reactive blood morphotic component, play crucial roles in fibrosis, hemostasis maintenance, and immune responses [1]. They secrete microbicidal proteins, antibacterial peptides, and facilitate leukocyte movement from the bloodstream to tissues [2, 3]. Platelet indices, such as plateletcrit (PCT), mean platelet volume (MPV), and platelet distribution width (PDW), serve as biomarkers for platelet activation. These indices, determined together in automatic CBC profiles, offer valuable diagnostic and prognostic insights across various clinical scenarios without additional costs [4, 5].
During activation, platelets undergo morphological changes, transitioning from biconcave discs to spherical shapes, with pronounced pseudopod formation leading to increased MPV. Plateletcrit represents the volume occupied by platelets as a percentage and is calculated using the formula PCT = platelet count × MPV / 10,000 [6, 7]. Simultaneous measurement of these platelet indices provides a reliable tool for assessing disease severity and understanding potential etiologies behind changes in platelet indices.
Numerous research groups have identified associations between alterations in platelet indices and the activation of the coagulation system, severe infection, trauma, systemic inflammatory reaction syndrome, and thrombotic diseases [8]. This study aims to explore the correlation between platelet indices, illness severity, and their predictive performance for mortality in critically ill children.

Subjects and Methods
In this prospective observational study, Two hundred (200) critically ill infants and children were enrolled in this study.

They were chosen from those admitted at the Pediatric intensive care units, Pediatric Department, Tanta University Hospital. and Two hundred (200) healthy infants and children who were the relatives of the patient group and with comparable age and sex. Subjects were chosen during the period of the study, from October 2021 to September 2022

Inclusion criteria
All infants and children from the age of 2 months till the age of 17 Years.

Exclusion criteria: Age lesser than 2months or more than 18 years.
1. Patient who died or transferred to other hospitals within 24 hours from admission.
2. Patients with primary platelet disease that affect the platelet indicies for example (Aplastic anemia, leukemias, MDS, ITP, Fancoi anemi, etc.).

All children in this study were subjected to complete history taking, thorough clinical examination, CBC and pediatric scoring systems (SOFA score and PRISM score) other laboratory investigations and invasive procedures when indicated for patient group.

CBC
CBC was the specific laboratory investigation: Two ml of venous blood were taken from each participants on 20 µL EDTA solution done by full automated blood cell counter (model PCE-210N, fully automated blood cell counter; ERMA Inc., Tokyo, Japan) and different count was done on Leishmn stained peripheral blood smear. The evaluation was done using coulter T660. The obtained parameters were: HB% and RBCs count, Total leucocytic count & its differentiation

Specific research laboratory investigations: (for patients and control group)
Platelets count and platelet indicies including (Mean platelet volume "MPV", plateletcrit "PCT", Platelet distribution width "PDW".

Statistical Analysis
The current study employed statistical presentation and analysis, utilizing measures such as mean, standard deviation, student t-test, Chi-square, Linear Correlation Coefficient, and Analysis of Variance (ANOVA) tests through SPSS V20.

Results
256 patients were admitted at Tanta pediatric intensive care units but 56 were excluded as 23 had primary platelet diseases that affect platelet indices, 18 died within the first 24 hours of admission 12 cases their guardians refused to share in the study and 3 cases transferred to another hospital within the first 24 hours of admission. figure1 the remaining 200 critically ill infants and children were the patient group with mean age of 6.22 years 140 males and 60 females, While the control group included 200 healthy infants and children with mean age of 7.04 years and there were 127 males and 73 females. There was no statistically significant difference between the studied groups as regards age and sex with male predominance in both groups.

As regarding to Hb, MCV, MCH and Lymphocytic count their results were significantly higher in Control group with p-value (< 0.001).
While TLC and Neutrophilic count were significantly higher in patient group with p-value (< 0.001). Platelet count was significantly lower in patient group with p-value (< 0.001). Table 1.
Platelet count and PCT (Plateletcrit) were significantly lower in patient group with p-value (< 0.001).
While MPV (Mean Platelet Volume) and PDW (Platelet Distribution Width) were significantly higher in patient group with p-value (< 0.001) table 2
Among 200 critically ill patient 33% of them died and 67% survived and were discharged. Hence the patient group was subdivided into a group of survivors 134 patients and a group of non survivors 66 patients. and the commonest causes of admission at our PICUS were Respiratory diseases (41.5) then Neurological causes (14.5%), Sepsis (11%), Endocrinological Causes (11%) and post Operative Causes (8.5%) and the least diagnosis were Genetic and metabolic diseases (2%) and Poisoning (2%). figure2
MPV (Mean Platelet Volume) and PDW (Platelet Distribution Width) were significantly higher in non survivors.
While PCT (Plateletcrit) was significantly lower in non survivors. Table 3 PCT (Platelcrit) was inversely related to PRISM and SOFA score while MPV (Mean Platelet Volume) and PDW (Platelet Distribution Width) were directly related to PRISM and SOFA score.
Platelet count significantly decreased with decreased PCT (plateletcrit) and Increased MPV (Mean Platelet Volume) and PDW (Platelet Distribution Width), Also RBS, Lymphocytic count, Serum albumin showed similar results. Whereas PH was significantly increased with increased PCT (Plateletcrit) with and showed no significant change with MPV (Mean Platelet Volume) and PDW (Platelet Distribution Width), While HCO3 showed significant increase with increased PCT (Plateletcrit) and significant decrease with increased MPV (Mean Platelet Volume).
Total Leukocytic Count (TLC) significantly increased with MPV (Mean Platelet Volume) and PDW (Platelet Distribution Width), while it is significantly decreased with PLC (Plateletcrit), Also Neutrophil count, CRP, ALT, AST and Urea showed similar results.
PDW (Platelet Distribution Width) was the most sensitive parameter to discriminate between patient and control group with sensitivity 96% and cut off value > 17, while PCT (Plateletcrit) was the most specific parameter with 99% specificity and cut off value ≤ 0.21 figure 3.
PCT (Plateletcrit) was the most sensitive parameter to predict mortality in patient group with sensitivity 86.57% and cut off value > 0.16. While MPV (Mean Platelet Volume) and PDW (Platelet Distribution Width) were the most specific with specific parameters to predict mortality in patient group with specificity 87.88% with cut off value ≤ 17 and ≤ 25.8 respectively (Figure-4).

Discussions
In the present study, as regarding to age there was no significant difference between the two main studied groups with (p-value = 0.058) with mean age about 7 years in both groups and range (0.17 to 17) years old.
In the present study as regarding to sex there was no significant difference between the two main studied groups

with (p-value=0.168) with male predominance in both groups.

This aligns with the findings of Aliaa Mohammed Diab *et al*. [9], who conducted a prospective observational study on 99 critically ill children admitted to pediatric intensive care units (PICUs) at Benha University Hospital and Benha Children Hospital. The study, conducted between April 1, 2018, and September 30, 2018, revealed no statistically significant difference in sex (p-value 0.89).

Similarly, the results are consistent with the research by Samira Z. Sayed *et al*. [10], who conducted a cross-sectional hospital-based study on infants and children admitted to the PICU of Minia University Children and Maternity Hospital. The study, carried out from July 2018 to January 2019 on sixty critically ill children, indicated no statistically significant sex difference between the two studied groups (p-value > 0.05).

Furthermore, the findings are in concordance with the study conducted by Rehab Salah Taha *et al*. [11], a prospective cross-sectional study on 54 critically ill patients aged 18 to 65 years admitted to the Surgical Intensive Care Unit of Tanta University Hospitals. The study, conducted from May 2020 to May 2021, reported no significant difference in sex between both groups.

In the present study as regarding to CBC (Complete Blood Count) results other than platelet indices in both studied groups there was significant increase in Hb (Hemoglobin), MCV (Mean Corpscular Volume), MCH (Mean Corpscular Hemoglobin Concentration) and Lymphocytic count in Control group with (p-value < 0.001), While TLC and Neutrophilic count showed significant increase in patient group with (p-value < 0.001).

This aligns with the research conducted by Aliaa Mohammed Diab *et al*. [9], where they investigated the correlation between certain red blood cell (RBC) and platelet indices and the outcomes of critically ill children admitted to the Pediatric Intensive Care Units of Benha University Hospitals and Benha Children Hospital (BENCH). Their prospective observational study included 99 critically ill children of both sexes, categorized based on their outcomes into survivors and non-survivors.

As there was a statistically significant difference between both studied groups regarding RBCs indices for HB (Hemoglobin) (g/dl) with (p-value 0.056) MCV (Mean Corpscular Volume) (FL) with (p-value 0.029) MCH (Mean Corpscular Hemoglobin Concentration) (pg) with (p-value 0.112) and for TLC (*10 ^9/L) with (p-value 0.247).

Anemia in critically ill children could be explained by multifactorial etiology and includes diminished erythropoietin activity, poor iron use by the body, and blood loss (both iatrogenic and noniatrogenic).

Also the association between leukocytosis and critical illness can be explained by various mechanisms according to the primary diagnosis for example in septic patients one explanation could be the higher dose of infecting organisms.

In the present study as regarding to Platelet count and Platelet indicies there was significant decrease in both Platelet count and PCT (Plateletcrit) in patient group with (p-value < 0.001).

While MPV (Mean Platelet Volume) and PDW (Platelet distribution Width) showed significant increase in patient group with (p-value < 0.001).

The pathophysiology of thrombocytopenia in critical illness is characterized by hemodilution, heightened platelet consumption, compromised platelet production, increased platelet sequestration, and augmented platelet destruction. Plateletcrit (PCT) exhibits changes in the same direction as platelet count, given that PCT represents the volume occupied by platelets in the blood as a percentage. It is calculated using the formula PCT = platelet count × MPV / 10,000 [6, 7].

Furthermore, the elevation in platelet distribution width (PDW) and mean platelet volume (MPV) can be attributed to the production of new platelets. During activation, platelets undergo a transformation from biconcave discs to spherical shapes, accompanied by pronounced pseudopod formation, leading to an increase in MPV. The newly produced platelets exhibit variability in size, contributing to the rise in PDW.

In the present study as regarding to correlation between platelet indices and each others PDW (Platelet Distribution Width) and MPV (Mean Platelet volume) are directly related to each others and both are inversely related to PCT (Plateletcrit) and Platelet count.

This was similar to [9] Aliaa Mohammed Diab, *et al*. In their study in which they correlate Some RBCs and Platelets Indices with the outcome of critically ill children.

And also agreed by [10] Samira Z. Sayed, *et al*. 2020 on their study that examined the admission of platelet count and indices as predictors of outcome in children with severe Sepsis.

In the present study as regarding to mortality rate inside the Patient group 33% of them died and 67% survived and were discharged and the commonest causes of admission at our PICUS were Respiratory diseases (41.5) then Neurological causes (14.5%), Sepsis (11%), Endocrinological Causes (11%) and post Operative Causes (8.5%) and the least diagnosis were Genetic and metabolic diseases (2%) and Poisoning (2%).

In [10] Samira Z. Sayed, *et al*. 2020 the mortality rate was 31% and all cases were diagnosed with severe sepsis.

This was close to (9) Aliaa Mohammed Diab, *et al*. Where the overall mortality rate was 37.7% and the commonest causes of admission in their PICUs were respiratory diseases (28.2%) followed by neurological insult (23.2%) and the least diagnosis were hepatic diseases and poisoning (2%).

Also It comes in agreement with [11] Rehab Salah Taha, *et al*. In their study the estimated mortality rate was 35% despite the difference in age groups and all patients were diagnosed with sepsis.

Slightly diverging from the findings of Gema Nazri *et al*. [12] in their prospective cohort study on critically ill children at the pediatric intensive care units (PICU) of Haji Adam Malik Hospital and Universitas Sumatera Utara Hospital, where they investigated the Platelet Profile as a Prognostic Factor in Critically Ill Children. In their study, mortality was observed in 19 (25%) patients, with sepsis being the most prevalent diagnostic category (52%).

This contrasts with the findings of Hayato Go *et al*. (13) in their retrospective cohort study, where they analyzed records from 2006 to 2017 at the neonatal intensive care unit (NICU) of Fukushima Medical University Hospital. The study focused on using platelet parameters to predict morbidity and mortality among preterm neonates. Out of 1,501 neonates admitted to the NICU, the study included a total of 305 preterm newborns categorized into two groups: Survivors and non-survivors, with 31 neonates constituting

10% of the non-survivor group.

The variation observed can be elucidated by the unique characteristics of the studied population concerning admission pathologies in pediatric intensive care units (PICUs), co-morbidities, healthcare systems, and age groups. In the current investigation, focusing on the relationship between mortality and platelet indices in the patient group, a noteworthy increase was noted in both Mean Platelet Volume (MPV) and Platelet Distribution Width (PDW) among non-survivors, with a significant p-value of less than 0.001. Conversely, there was a significant decrease in platelet count and Plateletcrit (PCT) in non-survivors, also with a p-value of less than 0.001.

These findings align with the results obtained by Aliaa Mohammed Diab *et al.* [9] in their investigation correlating certain red blood cell (RBC) and platelet indices with the outcomes of critically ill children in pediatric intensive care units. Their study identified significant associations, particularly with Platelet count (PLT) (*10^3 /ml) (p value = 0.002), Plateletcrit (PCT) (%) (p-value = 0.005), and Mean Platelet Volume (MPV) (FL) (p-value = 0.158).

Similarly, the conclusions are consistent with the research conducted by Samira Z. Sayed *et al.* [10], who explored the predictive value of platelet count and indices in children with severe sepsis. Their study revealed significantly lower Platelet count and Plateletcrit (PCT) in non-survivors compared to survivors (p-value < 0.001). Additionally, non-survivors exhibited a significantly larger Mean Platelet Volume (MPV) than survivors (p-value = 0.004).

The agreement extends to a retrospective study by Ye *et al.* [14], focusing on critically ill children on mechanical ventilation, which reported significant associations between Plateletcrit (PCT) and Platelet Distribution Width (PDW) with mortality. The studies demonstrated that patients with a low platelet count and high MPV and PDW had shorter survival times, proposing platelet indices as novel prognostic indicators in critically ill patients.

Furthermore, Aydemir *et al.* [15], in their retrospective cohort study involving patients with microbiologically proven nosocomial sepsis, found a statistically significant increase in MPV values associated with mortality.

These findings are consistent with the results reported by Rehab Salah Taha *et al.* [11] in their study, where Platelet count showed a statistically significant decrease in the non-survivor group compared to the survivor group. Additionally, Plateletcrit (PCT) was significantly lower in non-survivors, while Mean Platelet Volume (MPV) and Platelet Distribution Width (PDW) were significantly higher in the non-survivor group compared to the survivor group.

Similarly, Sheng Zhang *et al.* [8] found agreement in their study on critically ill patients, where Plateletcrit (PCT) was lower in deceased patients (p-value < 0.001), while Mean Platelet Volume (MPV) and Platelet Distribution Width (PDW) were higher in deceased patients (p-value = 0.011 and p-value < 0.001, respectively).

In contrast, the study by Gema Nazri *et al.* [12] showed that only Platelet Distribution Width (PDW) was significantly associated with mortality (p-value = 0.018), with neither MPV nor PCT demonstrating any statistically significant association with mortality.

However, there is a discrepancy with the findings of Hayato Go *et al.* [13], whose study revealed no significant differences in Platelet count, Plateletcrit (PCT), and Platelet Distribution Width (PDW) between the two groups. Yet, Mean Platelet Volume (MPV) in non-survivors was significantly higher than in survivors (10.5 FL vs. 10.0 FL, with p-value = 0.001).

This disagreement might be explained by different devices and Kits used in laboratory analysis also might be related to the stage of disease process when sample was taken and different causes of admission, distinct population characteristics, different healthcare systems are other factors that affect the study results.

In this study, an examination of the correlation between Platelet indices and mortality scores (PRISM and SOFA) in the patient group revealed an inverse correlation between mortality scores and Plateletcrit (PCT) (p-value <0.001), while a direct correlation was observed between Mean Platelet Volume (MPV) and Platelet Distribution Width (PDW) and mortality scores (PRISM and SOFA), (p-value < 0.001).

This finding aligns with the results of Samira Z. Sayed *et al.* [10], who, in their correlation analysis with PRISM scores, observed a significant negative association between PRISM score and both platelet count (p-value = 0.001) and plateletcrit (p-value = 0.001). Additionally, a significant positive association was noted between PRISM score and MPV and PDW (p-value = 0.001).

The agreement extends to the study by Rehab Salah Taha *et al.* [11], where negative correlations were found between SOFA scores and Plateletcrit (PCT) in both survivors and non-survivors, along with a positive correlation with MPV and PDW in both studied groups.

Similarly, Sheng Zhang *et al.* [8] reported findings supporting the current study, indicating that patients with abnormally high MPV and PDW values had higher SOFA scores, suggesting a likely association with more severe illness and higher mortality.

However, a departure from these results is evident in the study by Gema Nazri *et al.* [12], where a different mortality score (PELOD-2) was employed. In their study, there was no correlation between platelet profile and PELOD-2 score, but a significant correlation was observed between the difference of MPV (ΔMPV) and the difference of PELOD-2 score (Δ PELOD-2) between examinations on day 1 and day 3 of admission.

Furthermore, in the present study, it was observed that Platelet count significantly decreased with reduced Plateletcrit (PCT) and increased MPV and PDW. Similar results were noted for Lymphocytic count and Serum albumin, all with a P-value of less than 0.001.

While Total Leukocyte Count (TLC) exhibited a notable increase with Mean Platelet Volume (MPV) and Platelet Distribution Width (PDW), there was a significant decrease observed in TLC when associated with Plateletcrit (PLC). Additionally, Neutrophil count, C-reactive protein (CRP), Alanine aminotransferase (ALT), Aspartate aminotransferase (AST) and Urea demonstrated comparable outcomes, all with a p-value less than 0.001.

This might be explained as Critical illness affects more than one system, Critically ill children suffer from comorbidities each of them is directly associated with mortality this goes with [16] Abdulkerim Yildiz, *et al.* as there was an association between hypoalbuminea and thrombocytopenia with higher morbidity and mortality in critically ill geriatric patients.

Similarly, non-survivors in the study by Aliaa Mohammed Diab *et al.* [9] displayed higher average Total Leukocyte

Count (TLC) values compared to survivors, although this difference lacked statistical significance. This aligns with the findings of Samira Z Sayed *et al*. [10], where C-reactive protein (CRP) levels were significantly elevated in non-survivors (p-value < 0.001). In contrast, the study by Sheng Zhang *et al*. [8] indicated higher TLC and serum urea in non-survivors, but these differences were not statistically significant.

In the present study, pH exhibited a significant increase with rising Plateletcrit (PCT) (p-value < 0.023), as corroborated by Aliaa Mohammed Diab *et al*. Additionally, there were no significant changes in pH with Mean Platelet Volume (MPV) and Platelet Distribution Width (PDW). Furthermore, Bicarbonate (HCO3) levels demonstrated a significant increase with elevated Plateletcrit (PCT) and a significant decrease with increased Mean Platelet Volume (MPV), (p-value = 0.018 and p-value 0.004, respectively).

This findings had not been discussed in previous studies and needs further research and study to be validated and explained.

In the current study, concerning the sensitivity and specificity of platelet indices in predicting critical illness, Platelet Distribution Width (PDW) emerged as the most sensitive parameter, distinguishing between the patient and control groups with a sensitivity of 96% and a cutoff value greater than 17. On the other hand, Plateletcrit (PCT) exhibited the highest specificity at 99%, with a cutoff value less than or equal to 0.21. These findings have not been extensively discussed in previous studies and warrant further investigation for comparison and validation.

In terms of predicting mortality within the patient group, Plateletcrit (PCT) demonstrated the highest sensitivity at 86.57%, with a cutoff value greater than 0.16, while Mean Platelet Volume (MPV) and Platelet Distribution Width (PDW) were the most specific parameters with specificities of 87.88%, using cutoff values less than or equal to 17 and 25.8, respectively.

This aligns with the study by Samira Z. Sayed *et al*. [10], where PCT showed the highest sensitivity (94.74%) and specificity (78.05%) with a cutoff of ≤ 0.17%. In their study, a decrease in platelet count ranked second in sensitivity (89.47%). MPV, with a cutoff point ≥ 8.7 FL, was the second most specific marker after the PRISM score, with specificity at 86.29%. However, MPV was the least sensitive platelet parameter (78.95%).

Similar findings were observed in the study by Sheng Zhang *et al*. [8], where PCT was the most sensitive parameter (67.5%) with a cutoff of 0.18, while PDW and MPV were the most specific parameters (90.2% and 67.5% specificity, respectively) with cutoff values of 15.1 and 16.1, respectively.

Contrastingly, the study by Hayato Go *et al*. [13] found that MPV predicted prognosis in neonates with a sensitivity of 72.4% and specificity of 58.6%, using a cutoff value of ≥ 10.2. Additionally, the study by Rehab Salah Taha *et al*. [11] reported the highest sensitivity and specificity for MPV and PDW (84.21% and 78.95% sensitivity, 80% and 74.29% specificity, respectively) with cutoff values greater than 10.9 and 14, respectively.

Table 1: Complete blood count of the studied groups

		Group		T-Test	
		Patient Group 1 (N=200)	**Control Group 2 (N=200)**	**T**	**P-Value**
Hb (g/dl)	Range	6.6-14.5	10-12	-10.946	< 0.001*
	Mean ±SD	1.625	11.138±0.536		
MCV (fl)	Range	54-78	69-81	-19.483	< 0.001*
	Mean ±SD	6.279	77.835±1.828		
MCH (pg)	Range	17-34	21-34	-8.200	< 0.001*
	Mean ±SD	25.520±5.199	28.950±2.823		
	Range	40-354	178-416		
PLT (10^3/ul)	Mean ±SD	191.84±90.052	256.80±57.088	-8.615	< 0.001*
TLC (10^3/ul)	Range	1.3-60	4-14	12.758	< 0.001*
	Mean ±SD	22.470±15.221	8.621±2.000		
Neutrophil (%)	Range	29-87	30-70	3.835	< 0.001*
	Mean ±SD	57.780±14.991	53.070±8.770		
Lymphocyte (%)	Range	11-67	23-67	-4.494	< 0.001*
	Mean ±SD	35.540±15.482	41.090±8.086		

This table showed that as regarding to Hb, MCV, MCH and Lymphocytic count their results were significantly higher in Control group with p-value (< 0.001).

While TLC and Neutrophilic count were significantly higher in patient group with p-value (< 0.001). Platelet count was significantly lower in patient group with p-value (< 0.001).

Table 2: Platelet Count and Platelet Indices in both Studied Groups:

		Group		T-Test	
		Patient Group 1 (N=200)	**Control Group 2 (N=200)**	**T**	**P-Value**
PLT (10^3/ul)	Range	40-354	178-416	-8.615	< 0.001*
	Mean ±SD	191.848±90.052	256.800±57.088		
PCT (%)	Range	0.11-0.24	0.21-0.261	-18.200	< 0.001*
	Mean ±SD	0.180±0.036	0.236±0.025		
PDW (FL)	Range	12-33	8.1-18	37.886	< 0.001*
	Mean ±SD	24.706±4.166	12.014±2.257		
MPV (FL)	Range	8.7-22	8.2-15	19.544	< 0.001*
	Mean ±SD	16.048±3.380	10.905±1.557		

This table showed that Platelet count and PCT (Plateletcrit) were significantly lower in patient group with p-value (< 0.001). While MPV (Mean Platelet Volume) and PDW (Platelet Distribution Width) were significantly higher in patient group with p-value (< 0.001).

Table 3: Platelet indices in survivors and non survivors.

Patient	Survivors (N=134)	Non survivors (N=66)	T	T-Test P-Value
MPV	3.072 ±14.616	1.694 ±18.955	-10.691	< 0.001*
PDW	23.566 ± 3.345	4.701±27.02	-5.978	< 0.001*
PCT	0.026 ±0.196	0.025 ±0.145	13.015	< 0.001*

This table showed that **MPV** (Mean Platelet Volume) and **PDW** (Platelet Distribution Width) were significantly higher in non survivors. While **PCT** (Plateletcrit) was significantly lower in non survivors.

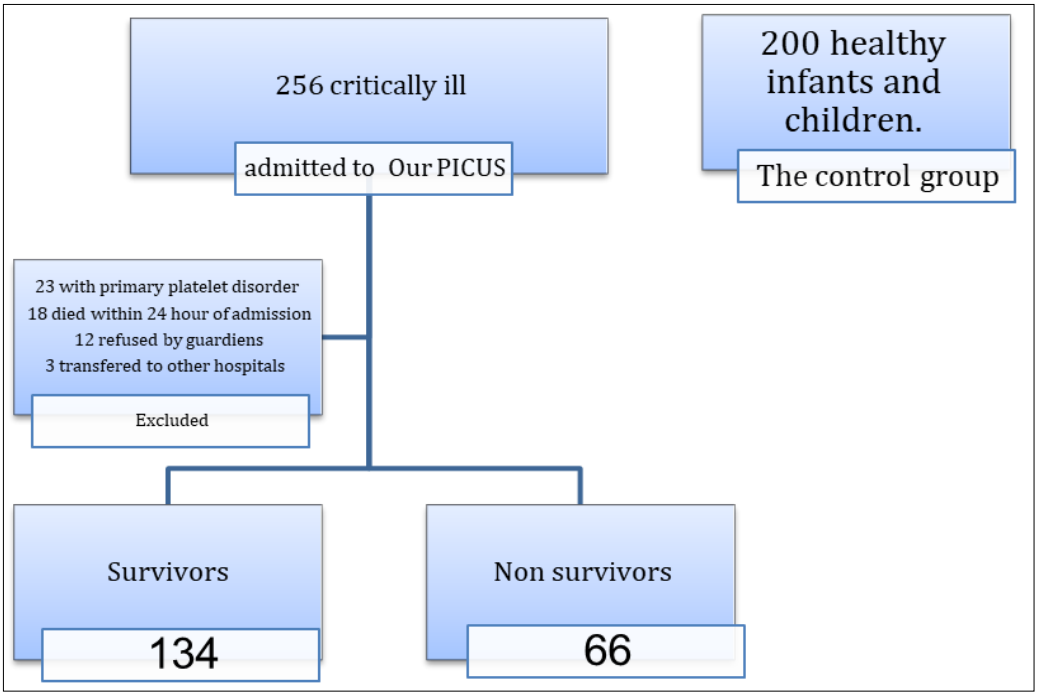

Fig 1: The study population

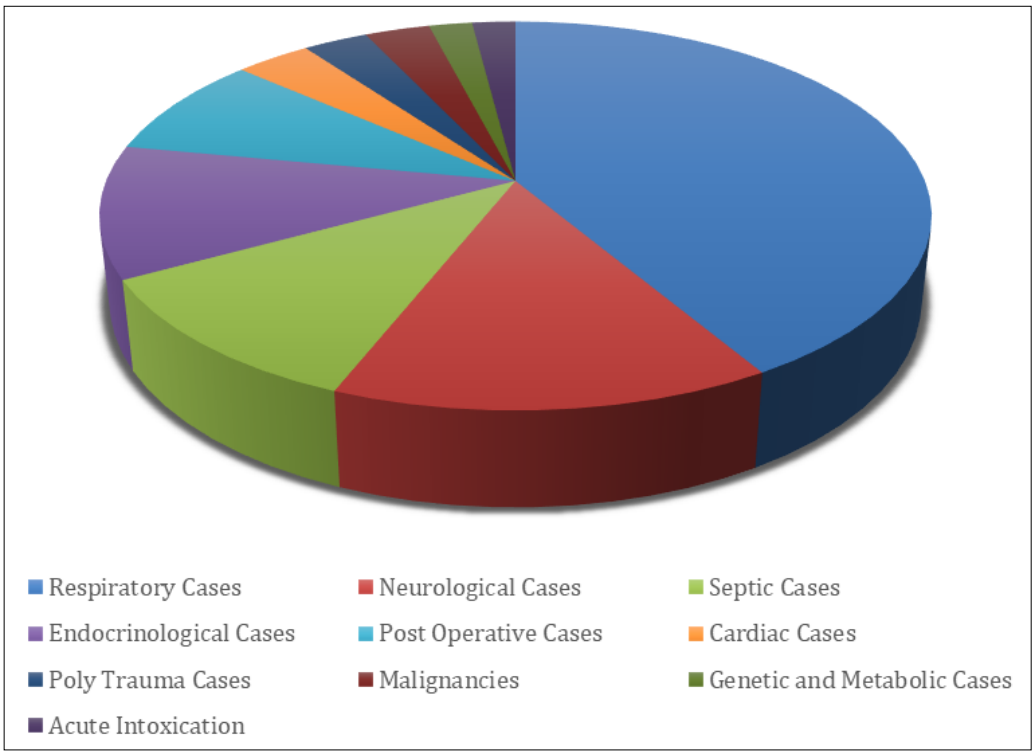

Fig 2: Primary diagnosis's of patient group

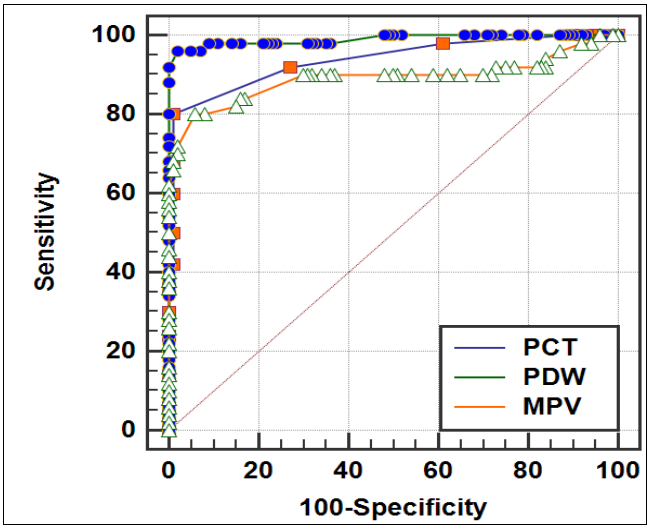

Fig 3: Accuracy of platelet indicies in diagnosing critical illness

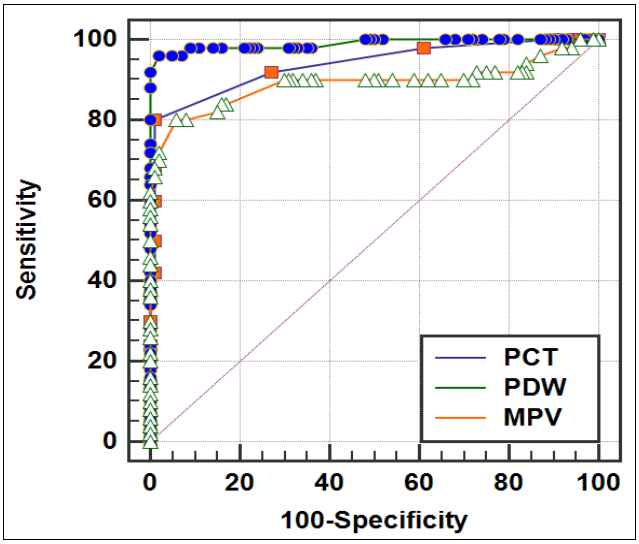

Fig 3: Accuracy of platelet indices in predicting mortality

Conclusion: Platelet count and Platelet indices were good predictors for assessment of critical illness and also predictors of PICU mortality.

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