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Original article

Evaluation of Severity and Prognosis of Transient Tachypnea of Newborn and its Relation to Mean Platelet Volume

Effat H. Assar, Hesham A. Elghyaty, Yassser M. Ismail, Raghda M. Arafa, Rasha A. Hassan

Department of Pediatric Benha faculty of medicine, Benha University, Egypt.

Correspondence to: Raghda M. Arafa, Department of pediatric, Benha faculty of medicine, Benha University, Egypt.

Email:

drraghdamohamed89@gmail.com

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Abstract

Background: Transient tachypnea of the newborn (TTN) is a common cause of respiratory distress in late preterm and term infants and is generally a benign disease treated with a brief course of oxygen. Platelets contribute to the basal barrier integrity of the alveolar capillaries, which selectively restricts the transfer of water, proteins, and red blood cells out of the vessels. This study aimed to evaluate the role of mean platelet volume (MPV) in predicting the severity of TTN and its outcome. **Methods:** This study included 60 neonates. They were divided into two groups; group 1 including 20 newborns with tachypnea for <48 h and group 2 including 40 newborns with tachypnea for >48 h. Group 2 was subdivided into 2 subgroups; group 2A including 20 newborns who needed only oxygen therapy and group 2B including 20 newborns who needed ventilator support. ROC analysis was done to assess the performance of laboratory investigations associated with tachypnea> 48 hours. **Results:** Regarding platelet count; AUC was 0.756 (95% confidence interval: 0.634-0.878, p=0.001). At a cutoff point <173 x10^3/l, the sensitivity was 80% and specificity was 57.5%. Regarding MPV; AUC was 0.613 (95% confidence interval: 0.458-0.768, p=0.156). Regarding platelets mass index (PMI); AUC was 0.794 (95% confidence interval: 0.678-0.911 , p<0.001). At a cutoff point <1750 fL/nL, the sensitivity was 75% and specificity was 62.5%. **Conclusion:** PMI is better than platelet count to predict tachypnea>48 h and need of ventilator. However, MPV couldn't predict any of them.

Key words: transient tachypnea - newborn - Mean platelet volume

Introduction:

Transient tachypnea of the newborn is a common cause of respiratory distress in late preterm and term infants and is usually a benign disease treated with a brief course of oxygen**.** Its diagnosis is mainly based on clinical course and typical findings on chest radiography as prominent peri- hilar vascular markings and fluid in the fissures [(1).]

Platelets contribute to the basal barrier integrity of the alveolar capillaries, which selectively restricts the transfer of water, proteins, and red blood cells out of the vessels. Platelets reduce lung fluid accumulation, lung edema (due to an unknown mechanism), bolster pulmonary vascular repair and contribute to hemostatic and inflammatory defense of the healthy lung [(2)]**.**

Two studies published in 1987 and 1990 demonstrated a direct relationship between thrombocytopenia and respiratory distress in preterm infants. Sharma and Thapar demonstrated that perinatal asphyxia and respiratory risk factors were significantly associated with thrombocytopenia [(3)]. Additionally, Boutaybi et al. showed that the rates of intubation in the delivery room and the length of ventilation days were higher in the thrombocytopenic group than in the non thrombocytopenic group in near term and term infants with perinatal asphyxia [(4)].

Mean platelet volume (MPV) is associated with platelet function and activation and is affected by several inflammatory conditions**.** Neonates with respiratory distress syndrome (RDS) and late onset pneumonia reportedly have higher MPV [(5)].

This study aimed to evaluate the role of Mean platelet volume (MPV) in predicting the severity of TTN and its outcome**.**

Patients and Methods

Subjects:

This prospective study was conducted on 60 full term neonates admitted in neonatal intensive care unit (NICU) at Benha University Hospital from May 2021 to April 2022.

Inclusion criteria

- Gestational age ≥37 ≤42 weeks
- Birth weight ≥2,000g
- No maternal medical problems

Exclusion criteria:

- Respiratory distress syndrome
- Sepsis or pneumonia

- Meconium aspiration syndrome
- Apparent congenital cardiac diseases
- Perinatal asphyxia,
- Congenital malformations
- Hypocalcemia
- Persistent hypoglycemia

The study was conducted on the following groups:

All cases were divided into two groups:

- **Group 1,** included 20 neonates with tachypnea for <48 h, who needed oxygen therapy<48h.
- **Group 2,** included 40 neonates with tachypnea >48 h, who needed oxygen therapy >48h. This group was subdivided into 2 subgroups;
  - **Group 2a,** included 20 newborns that needed only oxygen therapy.
  - **Group 2b,** included 20 newborn that needed ventilator support.

All groups were subjected to the following:

History taking: including

- Maternal history: age, sex, residence and socio-economic status.
- Prenatal history;

- Maternal risk factors during pregnancy as chronic medical illness, infection, drug abuse, polyhydramnios, premature rupture of membranes or trauma.
- Fetal risk factor e.g. multiple gestation, fetal distress erythroblastosis fetalis.
- Antenatal steroid either intramuscular dexamethasone or betamethasone. (total 24 mg in divided doses).

- Past history: History of similar conditions or other diseases as hypertensive disorders, infection or operations.
- Family history: History of previous NICU admission.

Clinical examination: including

- **General examination:** Vital signs, anthropometric measurements (weight, height and head circumference), neonatal reflexes (Moro, Suckling) and exclusion of congenital anomalies.
- **APGAR score** at 1 and 5 minutes [6]
- **Downs Respiratory Distress Syndrome (RDS) Scoring System** is an index designed to objectively assess the clinical severity of RDS. The score has therapeutic and prognostic significance but is not as reliable as blood gas

measurements. It is to be used as an adjunct to (not as a substitute for) blood gas determinations.

- Score <4: No respiratory distress
- Score 4-7: Respiratory distress
- Score >7: Impending respiratory failure

Ethical considerations:

Approval of the study protocol by ethical scientific committee of Benha Children Hospital was obtained & an informed consent was obtained from the parents before enrollment in the study.

Investigations:

1) **Complete blood picture (CBC)**

Two blood samples were carefully collected from peripheral veins, one in the first 6h of life and the second after remission of TTN,

The blood samples for complete blood count (CBC) were placed in tubes containing ethylene diamine tetra acetic acid. Platelet count and MPV were assessed ≤1h after collection. CBC was assessed using the CELL DYN Ruby Hematology Analyzer (Abbott Diagnostics, Lake Forest, IL, USA).

Platelet mass index (PMI) was calculated from the CBC of blood samples collected in the first 6h of life and after remission of TTN for routine patient care as the product of platelet count and MPV.

(PMI = platelet counts × MPV/103) (fL/nL).

2) **Quantitative C- reactive protein (CRP)**

One cm of blood was taken, collected in a plain test tube, left to clot, then centrifuged for 10 minutes at 1500 rpm. Serum was separated and analyzed using Turbox plus. Results were considered positive above > 6 mg mg/L

3) **Arterial blood gases (ABG)** was done every 12 h to detect PO2, PCo2, HCO3 & BE.

4) **Chest x ray: posterior-anterior and lateral views were done within 12 h after birth.**

Diagnosis of TTN was done according to the following clinical criteria:

- Onset of tachypnea (respiratory rate >60 beats/min) ≤6h after birth
- Persistence of tachypnea ≥12h; oxygen requirement >21%
- Chest X-ray indicative of at least one of the following: prominent central

vascular markings, widened interlobar fissures of the pleural fluid, symmetrical perihilar congestion, and hyperinflation as evidenced by the flattening and depression of the diaphragmatic domes or increased antero-posterior diameter or both.

Statistical analysis:

The data were coded, entered and processed on computer using SPSS (version 24). The results were represented in tabular and diagrammatic forms then interpreted. Mean, standard deviation, range, frequency, and percentage were use as descriptive statistics. The following test was done:

- **Chi-Square test X^2**, **one way** analysis of variance (**ANOVA**), **regression analysis, paired t-test**, **Spearman's correlation**

- -1 indicates a perfect negative correlation,
- +1 indicates a perfect positive correlation,
- 0 indicates no correlation.

- **ROC curve analysis**

ROC curve= receiver operator characteristic curve,

Sensitivity = ability of the test to detect the true +ve cases with minimal false negatives

Specificity = ability of the test to detect the true –ve cases with minimal false positives

AUC = area under the curve , the greater the area, the more accurate is the curve, Total area is 1.0, the black line is the reference line, it divides the area into 2 halves.

95% CI of AUC= confidence interval = it is an interval at which the investigator is 95% confident that the true AUC lies.

AUC <0.5 → bad

AUC: 0.5-0.69 → fair

AUC: 0.7-0.8 → good

AUC: 0.8- 0.9 → Very good

AUC >0.9 → excellent

The accepted level of significance was 0.05.

P value >0.05 is non significant

P<0.05 is significant

P≤0.001 is highly significant

Results:

There were significant differences (p<0.05) between studied groups regarding hemoglobin, WBC count, platelet count, and PMI. However, there were no significant differences (p>0.05) between the three groups

regarding hematocrite, MPV, or random blood sugar (**Table 1)**.

There were significant increases (p<0.05) regarding platelets, MPV, and PMI after remission of TTN when compared to admission results. There was no significant difference (p>0.05) in levels of hemoglobin, hematocrit, or WBCs (**Table 2)**.

This table shows that there was significant increase (p<0.05) of MPV, and PMI after remission of TTN when compared to admission results. There was no significant difference (p>0.05) regarding the levels of hemoglobin, hematocrit, WBCs or platelets (**Table 3)**.

There were significant increments (p<0.05) of MPV and PMI after remission of TTN when compared to admission results while there was no significant difference (p>0.05) in the levels of hemoglobin, hematocrit, WBCs or platelets (**Table 4)**.

There were significant increases (p<0.05) of platelets, MPV, and PMI and a significant decrease (p<0.05) of WBCs after remission of TTN when compared to admission results. There was no significant difference (p>0.05) in levels of hemoglobin, or hematocrit (**Table 5)**.

There were significant positive correlations (p<0.05) between PMI and both platelets and MPV and a significant negative correlation (p<0.05) between PMI and Downe score. There was no significant correlation (p>0.05) between PMI and gestational age, Apgar score, hemoglobin, hematocrit or WBCs. There was a significant negative correlation (p<0.05) between MPV and Downe score, while there was no significant correlation (p>0.05) between MPV and gestational age, Apgar score, hemoglobin level, hematocrit, WBCs or platelets (**Table 6)**.

ROC analysis was done to assess the performance of laboratory investigations that were associated with tachypnea > 48 hours. Regarding platelets; AUC was 0.756 (95% confidence interval: 0.634-0.878, p=0.001). At a cutoff point <173 $x10^3$/l, the sensitivity was 80% and specificity was 57.5%. Regarding MPV; AUC was 0.613 (95% confidence interval: 0.458-0.768, p=0.156). Regarding PMI; AUC was 0.794 (95% confidence interval: 0.678-0.911, p<0.001). At a cutoff point <1750 fL/nL, the sensitivity was 75% and specificity was 62.5% (**Table 7)**.

ROC analysis was done to assess the performance of laboratory investigations that were associated with need of ventilator.

Regarding platelets; AUC was 0.718 (95% confidence interval: 0.570-0.888, p=0.004). At a cutoff point <151 x10^3/l , the sensitivity was 60% and specificity was 65%. Regarding MPV; AUC was 0.579 (95% confidence interval: 0.447-0.749, p=0.224). Regarding PMI; AUC was 0.731 (95% confidence interval: 0.589-0.872, p=0.001). At a cutoff point <1510 fL/nL, the sensitivity was 60% and specificity was 70% (**Table 8)**.

Table 1: Complete blood count of the studied groups on admission

CBC		**Tachypnea <48 h**	**Tachypnea>48 h Oxygen**	**Ventilator**	**F**	**P value**
		N= 20	**N=20**	**N=20**		
Hemoglobin (gm/dl)	**Mean ±SD**	17.2±2.2	14.7±2.6	14.6±3	F=5.9	**0.005 a,b**
	Range	14.2-22	8.3-18.1	9-19.3		
Hematocrite (%)	**Mean ±SD**	45.5±7	42.3±6.6	40.4±6.9	F=2.8	0.07
	Range	36-56	26-51.4	27.2-54		
WBCs (x109/l)	**Mean ±SD**	12.2±1.9	14.2±3.1	17.2±6.9	F=6.2	**0.004 b**
	Range	9.4-15.4	9.5-19.1	10.6-32.7		
Platelets (x1000/mm^3)	**Mean ±SD**	309.4±69.5	247.4±74	197.4±103.6	F=8.9	**0.001 a,b,c**
	Range	165-450	122-359	63-355		
MPV (fL)	**Mean ±SD**	9.2±0.6	9.06±0.6	8.8±0.7	F=2.4	0.08
	Range	8-10.3	8-9.9	7.6-9.8		
PMI (fL/nL)	**Mean ±SD**	2847.6±761.5	2108±688.6	1709±891	F=10.	**<0.001**
	Range	1540-4230	1100-3280	610-3170	9	**a,b**
Random blood sugar	**Mean ±SD**	76.5±5.6	74.6±6.2	75.9±6.7	F=0.6	0.73
	Range	60-105	65-98	66-110		

F: F value of one way ANOVA, MPV: mean platelet volume, PMI: platelets mass index, WBCs: white blood cells, a: significant difference between group tachypnea< 48 hrs, and tachypnea>48 hrs with oxygen therapy, b: significant difference between group tachypnea< 48 hrs, and tachypnea>48 hrs with ventilator, c: significant difference between group tachypnea>48 hrs with oxygen therapy and tachypnea>48 hrs with ventilator

Table 2: Laboratory investigations on admission and after remission of TTN

Laboratory investigations		**On admission**	**After remission**	**Test**	**P value**
		N= 60	**N=60**		
Hemoglobin (gm/dl)	**Mean ±SD**	15.6±2.8	15.3±2.3	Pt=1.1	0.29
Hematocrit (%)	**Mean ±SD**	42.7±7	40.6±6.2	Pt=0.48	0.63
WBCs(x10^9/l)	**Mean ±SD**	14.5±4.9	13.7±3.4	Pt=1.6	0.12
Platelets (x1000/m^3)	**Mean ±SD**	241.5±94.4	274.8±93	Pt=3.2	**0.002***
MPV (fL)	**Mean ±SD**	9.1±0.6	9.5±0.4	Pt=4.8	**<0.001***
PMI (fL/nL)	**Mean ±SD**	2221.7±901	2700±866	Pt=4.9	**<0.001***

Pt: Paired t-test, MPV: mean platelet volume, PMI: platelets mass index, WBCs: white blood cells, *: significant (p<0.05)

Table 3: Laboratory investigations of group 1 on admission and after remission of TTN

Laboratory investigations		**On admission N= 20**	**After remission N=20**	Test	**P value**
Hemoglobin (gm/dl)	**Mean ±SD**	17.2±2.2	15.7±2.1	Pt=1.8	0.08
Hematocrit (%)	**Mean ±SD**	45.5±7	44.3±5.9	Pt=1.7	0.11
WBCs(x10^9/l)	**Mean ±SD**	12.2±1.9	12.5±1.9	Pt=1.3	0.22
Platelets (x1000/m^3)	**Mean ±SD**	309.4±69.5	329.4±51.4	Pt=1.7	0.10
MPV (fL)	**Mean ±SD**	9.2±0.6	9.5±0.4	Pt=2.7	**0.014***
PMI (fL/nL)	**Mean ±SD**	2847.6±761.5	2971.6±705	Pt=1.7	**0.011***

Pt: Paired t-test, MPV: mean platelet volume, PMI: platelets mass index, WBCs: white blood cells,

*: significant (p<0.05)

Table 4: Laboratory investigations of group 2a on admission and after remission of TTN

Laboratory investigations		**On admission N= 20**	**After remission N=20**	**Test**	**P value**
Hemoglobin (gm/dl)	**Mean ±SD**	14.7±2.6	14.6±1.7	Pt=0.18	0.87
Hematocrit (%)	**Mean ±SD**	42.3±6.6	42.5±6.2	Pt=1	0.33
WBCs(x10^9/l)	**Mean ±SD**	14.2±3.1	14.5±2.8	Pt=1.1	0.31
Platelets (x1000/m^3)	**Mean ±SD**	247.4±74	287.5±49.3	Pt=1.7	0.11
MPV (fL)	**Mean ±SD**	9.06±0.6	9.4±0.4	Pt=2.4	**0.026***
PMI (fL/nL)	**Mean ±SD**	2108±688.6	2571±791	Pt=2.8	**0.011***

Pt: Paired t-test, MPV: mean platelet volume, PMI: platelets mass index, WBCs: white blood cells,

*: significant (p<0.05)

Table 5: Laboratory investigations of group 2b on admission and after remission of TTN

Laboratory investigations		**On admission N= 20**	**After remission N=20**	**Test**	**P value**
Hemoglobin (gm/dl)	**Mean ±SD**	14.6±3	14.8±2.6	Pt=0.14	0.88
Hematocrit (%)	**Mean ±SD**	40.4±6.9	40.9±6.3	Pt=1	0.33
WBCs(x10^9/l)	**Mean ±SD**	17.2±6.9	14.2±3.1	Pt=2.3	**0.034***
Platelets (x1000/m^3)	**Mean ±SD**	197.4±103.6	277.4±54.8	Pt=2	**0.045***
MPV (fL)	**Mean ±SD**	8.8±0.7	9.53±0.4	Pt=3.4	**0.003***
PMI (fL/nL)	**Mean ±SD**	1709±891	2557.8±970	Pt=3.9	**<0.001***

Pt: Paired t-test, MPV: mean platelet volume, PMI: platelets mass index, WBCs: white blood cells,

*: significant (p<0.05)

Table 6: Correlation between MPV and PMI and the clinical data.

Clinical data	MPV (fL)		PMI (fL/nL)	
	r	P value	r	P value
Gestational age	-0.124	0.345	0.158	0.087
Apgar score 1 min.	0.005	0.970	-0.02	0.881
Apgar score 5 min.	-0.149	0.256	-0.127	0.334
Downe score	-0.254	**0.041***	-0.493	**0.008***
Hemoglobin (gm/dl)	-0.096	0.465	0.133	0.311
Hematocrit (%)	0.007	0.957	0.226	0.082
WBCs ($x10^9$/l)	0.113	0.391	0.141	0.282
Platelets (x1000/mm3)	0.202	0.122	0.971	**<0.001***
PMI (fL/nL)	0.340	**0.008***	-	-

r: correlation coefficient, MPV: mean platelet volume, PMI: platelets mass index, WBCs: white blood cells, *: significant (p<0.05)

Table 7: Performance of laboratory investigations for predicting tachypnea >48 h'**s**

Variables	AUC	P value	95% CI		Cutoff value	Sensitivity	Specificity
			Lower	Upper			
Platelet($x10^3$/l)	0.756	0.001*	0.634	0.878	<173	80%	57.5%
MPV (fL)	0.613	0.156	0.458	0.768	--	--	--
PMI (fL/nL)	0.794	<0.001*	0.678	0.911	<1750	75%	62.5%

MPV: mean platelet volume, PMI: platelets mass index, *: significant (p<0.05)

Table 8: Performance of laboratory investigations for prediction of need of ventilator

Variables	AUC	P value	95% CI		Cutoff value	Sensitivity	Specificity
			Lower	Upper			
Platelet($x10^3$/l)	0.718	0.004*	0.570	0.866	<151	60%	65%
MPV (fL)	0.579	0.224	0.447	0.749	--	--	--
PMI (fL/nL)	0.731	0.001*	0.589	0.872	<1510	60%	70%

MPV: mean platelet volume, PMI: platelets mass index, *: significant (p<0.05)

Discussion

In the present study, hemoglobin and hematocrit values were significantly higher in the group with tachypnea for <48 h compared to the groups with tachypnea >48h receiving oxygen or ventilator. WBCs were significantly lower in the group with tachypnea <48h compared to the group with tachypnea >48h under oxygen or ventilator.

Our results were in agreement with another study [(7)] who observed that hematocrit was significantly higher in a group with tachypnea < 72h (50.5%) compared to a group with tachypnea >72h (47.1%), p<0.05. Also, WBCs were significantly lower in group with tachypnea < 72h compared to group with tachypnea >72h, p<0.05. In contrast to a previous study [(8)]; they reported that there was

no significant difference between the two groups in terms of leukocyte count and hemoglobin level.

In the current study, platelet count was significantly higher in group with tachypnea <48h compared to group with tachypnea >48h with oxygen or ventilator. Also, platelets count was significantly higher in group with tachypnea >48h with oxygen compared to group with tachypnea >48h with ventilator.

Our results were comparable with another study **(9),** who reported that platelet count was significantly lower in the group with oxygen therapy for >48h than in that with oxygen therapy for ≤48h, significantly lower in the group with ventilatory support for >48h than in that with ventilatory support for ≤48h and significantly lower in the group with tachypnea for >48h than in the group with tachypnea for ≤48h.

However, Ekmen and Doğan **(8)** found no significant difference between the group with tachypnea for >48h and the group with tachypnea for ≤48h regarding platelet count. Patients with TTN had significantly lower platelet count compared with the control group. But when they divided the patients into two groups according to duration of tachypnea (≤48 h and >48 h), no significant difference was seen in platelet count **(10)**.

Clinical signs of TTN such as tachypnea, increased work of breathing and mild hypoxia are not specific and can be associated with pneumonia or sepsis. Therefore, distinguishing between TTN and these diseases is frequently challenging. In neonatal sepsis, thrombocytopenia is observed and young platelets are released into the circulation as a result of increased destruction and reduced production **(11).**

In the present study, there was no significant difference between the three groups regarding MPV. In consistent with the present study, Cosar et al. **(10)** found that patients with TTN had significantly lower MPV than the control group, but they did not report any association between MPV and TTN severity. In addition, another two studies **(8,9)** reported that there was no significant difference between the two groups (with tachypnea >48h or < 48h) in terms of MPV.

In the current study, PMI was significantly higher in the group with tachypnea <48h compared with the group with tachypnea>48 h with oxygen or with ventilator. Also, PMI was significantly higher in group with tachypnea >48h with oxygen compared to group with tachypnea >48h with ventilator.

Similarly, Ilhan and Bor **(9)** found that PMI in the group with more severe TTN was lower;

PMI was significantly lower in patients with oxygen therapy for >48h while maintaining ventilatory support compared with patients with only oxygen therapy for >48h (P = 0.001, respectively). No significant difference was noted in MPV between the groups. Low PMI reflects platelet function, which contributes to the initiation of inflammatory cascades.

Okur et al.,[12] reported that preterm infants with bronchopulmonary dysplasia, intraventricular hemorrhage, necrotizing enterocolitis, retinopathy of prematurity, and sepsis had lower PMI in the early period of life compared with preterm infants without these morbidities. They showed that PMI was significantly lower with these neonatal complications, although differences in MPV were not significant. Similarly, we found that PMI in the group with more severe TTN was lower; but no significant difference was noted in MPV between the groups. Low PMI reflects platelet function, which contributes to the initiation of inflammatory cascades.

In the present study, there was significant increase of platelets, MPV, and PMI after remission of TTN when compared to admission results. However, there was no significant difference in levels of hemoglobin, hematocrit, or WBCs. In group 1 (tachypnea <48 hrs), there was significant increase of MPV and PMI after remission of TTN when compared to admission results while there was no significant difference in levels of hemoglobin, hematocrit, WBCs or platelets. In group 2a (tachypnea >48hrs with oxygen therapy) , there was a significant increase of MPV and PMI after remission of TTN when compared to admission results while there was no significant difference in levels of hemoglobin, hematocrit, WBCs or platelets. In group 2b (tachypnea >48hrs with ventilator), there was a significant increase of platelets, MPV, and PMI and a significant decrease of WBCs after remission of TTN when compared to admission results. There was no significant difference in levels of hemoglobin, or hematocrit.

Our results agree with a previous study [9], who observed a significant increase in platelet count and PMI after remission of TTN in group with tachypnea < 48h or > 48h. However, there was no significant difference regarding MPV in both groups.

Sakurai et al.[13] reported that platelet counts from admission to 5 days after birth tended to increase in all groups (Pulmonary hemorrhage (Group P), P = 0.02, TTN with ventilator (Group T), P = 0.03 and TTN with O_2 (Group t), P < 0.01). Regarding MPV, in the P Group,

the MPV tended to remain high (P = 0.20). In the T Group, the MPV value increased significantly (P = 0.03) and in the t Group, although no obvious rise (P = 0.05) was observed, it tended to be elevated**.**

In the current study, there were significant positive correlations between PMI and both platelet count and MPV and a significant negative correlation between PMI and Downe score. While there was no significant correlation between PMI and gestational age, Apgar score, hemoglobin, hematocrit and WBCs. There was a significant negative correlation between MPV and Downe score, while there was no significant correlation between MPV and gestational age, Apgar score, hemoglobin, hematocrit, WBCs, or platelets.

Our results were matched with Sakurai et al.[13] **study,** who reported that no correlations were found between platelet count and MPV on admission indifferent studied groups as group with pulmonary hemorrhage (P), group with TTN with ventilator support (T) and group with and TTN with O_2 (t). Groups (P Group: P = 0.35, r = 0.16; T Group: P = 0.10, r = −0.24; and Group t: P = 0.44, r = −0.47).

In the current study, ROC analysis was done to assess the performance of laboratory investigations associated with tachypnea > 48 hours. Regarding platelets, AUC was 0.756 (95% confidence interval: 0.634-0.878, p=0.001). At a cutoff point <173 $x10^3$/l, the sensitivity was 80% and specificity was 57.5%. Regarding MPV, AUC was 0.613 (95% confidence interval: 0.458-0.768, p=0.156). Regarding PMI, AUC was 0.794 (95% confidence interval: 0.678-0.911, p<0.001). At a cutoff point <1750 fL/nL, the sensitivity was 75% and specificity was 62.5%. ROC analysis was done to assess the performance of laboratory investigations that were associated with need of ventilator. Regarding platelet count, AUC was 0.718 (95% confidence interval: 0.570-0.888, p=0.004). At a cutoff point <151 $x10^3$/l, the sensitivity was 60% and specificity was 65%. Regarding MPV, AUC was 0.579 (95% confidence interval: 0.447-0.749, p=0.224). Regarding PMI, AUC was 0.731 (95% confidence interval: 0.589-0.872, p=0.001). At a cutoff point <1510 fL/nL, the sensitivity was 60% and specificity was 70%.

Our results were in agreement with another study [9]**,** who reported that the optimal PMI cut-off to predict prolonged duration of oxygen therapy (>48 h) was 1,540 fL/nL, with a sensitivity of 68.1%, specificity of 74.1%, positive predictive value (PPV) of 69.5%, and negative predictive value (NPV) of 72.7% (AUC, 0.737 ± 0.049; 95%CI:

0.640–0.833, $P < 0.001$). The optimal PMI cut-off to predict prolonged duration of ventilatory support (>48 h) was 1,562 fL/nL, with a sensitivity of 70.6%, specificity of 62.7%, PPV 48.9%, and NPV 80.7% (AUC, 0.706 ± 0.055; 95%CI: 0.597–0.814, $P = 0.001$). The PMI cut-off of 1,562 fL/nL can predict prolonged duration of tachypnea (>48 h) with a sensitivity of 62.5%, specificity of 68.9%, PPV 71.4%, and NPV 59.6% (AUC, 0.682 ± 0.053; 95%CI: 0.578–0.786, $P = 0.002$). They calculated the optimal platelet count cut-off, sensitivity, specificity, PPV, NPV and AUC to predict prolonged duration of oxygen therapy, ventilatory support and tachypnea, and the AUC were statistically significant. The AUC for PMI, however, was higher than that calculated for platelet count.

Conclusion:

The mean platelet volume (MPV) couldn't predict the severity or the prognosis of TTN (tachypnea for >48h and the need of ventilator). However, PMI and platelet count are good predictors and PMI is better than platelet count in this issue.

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