



THE SAGA OF REACTIVE THROMBOCYTOSIS AND ITS RELATIONSHIP WITH HEMATOLOGICAL PARAMETERS, ACUTE PHASE REACTANT, C-REACTIVE PROTEIN IN DIFFERENT CLINICAL CONDITIONS-THREE YEAR STUDY IN NORTH EAST REGION OF INDIA.

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ABSTRACT

Background-Thrombocytosis is aptly defined as platelet count greater than a defined upper limit of normal that may vary between 350,000/ l to 550,000/ l, depending on the laboratory or medical reference. Elevated platelet counts are often an incidental or unexpected finding on a complete blood count conducted to evaluate an unrelated condition. The platelet parameters and reactive protein (CRP) are markers reflecting a systemic inflammatory response. Among those, CRP is one of the major proteins helpful in determination of severity/ activity of chronic spontaneous processes.

Aim: The measurements of platelet count, mean platelet volume (MPV), WBC are routinely available nowadays. The aim of the study was to know the association of reactive thrombocytosis in different underlying clinical conditions, age dependent aetiology, WBC count, ESR and C-REACTIVE PROTEIN in inflammatory disease and platelet volume.

Methods: This descriptive study was done on 500 patients with platelet count > 450,000/ μ l and the cause being reactive. Platelet count, WBC, MPV, ESR, and CRP were measured at the time of hospitalization. Results. No significant differences were found in MPV and PDW between CSU group and the healthy subjects. Most common cause of reactive thrombocytosis was found to be infection (28.8%), tissue damage (16.4%), iron deficiency anemia (16.2%), malignancy (9.6%), inflammation (non-tuberculosis) (9.4%), diabetes mellitus (6.4%), tuberculosis (6.0%) respectively. There was low degree of positive correlation between reactive thrombocytosis with WBC ($r = 0.337, P = 0.06$) and ESR ($r = .277, P = >0.05$). There was low degree of negative correlation between reactive thrombocytosis and CRP ($r = -.131, P = >0.05$). There was significant negative correlation between reactive thrombocytosis and MPV ($r = -.561, P = >0.001$). **Conclusion:** Thrombocytosis is associated with the increased number of circulating platelets in patients with more severe symptoms. This study demonstrated a higher level of platelet count and lower MPV in all the patients having reactive thrombocytosis. The changes in these parameters (platelets count, WBC, MPV, CRP and ESR) may reflect a reaction to the inflammatory condition.

KEYWORDS :

INTRODUCTION:

Thrombocytosis is generally defined as platelet count greater than a defined upper limit of normal that may vary between 350,000/ μ l to 600,000/ μ l, depending on the laboratory or medical reference. The most common cut off for normal is <450,000/ μ l. Elevated platelet counts are often an incidental or unexpected finding on a complete blood count conducted to evaluate an unrelated condition. The causes of thrombocytosis are separated into two categories: autonomous (primary) thrombocytosis and reactive (secondary) thrombocytosis. Autonomous thrombocytosis occurs as a result of myeloproliferative disorders or myelodysplastic disorders.¹ Reactive thrombocytosis is most often a normal physiologic response to coexistent chronic inflammatory conditions. Common conditions include surgery, infection, malignancy, asplenia, chronic inflammatory disorders, iron deficiency anemia and occult cancer.² C - reactive protein is an acute phase reactant whose level increases in response to a variety of inflammatory stimuli. An elevated serum level is seen after trauma, tissue necrosis, infection, surgery and myocardial infarction.³

AIMS AND OBJECTIVES:

The aim of the study was to know the association of reactive thrombocytosis in different underlying clinical conditions, age dependent aetiology, WBC count, ESR and C-REACTIVE PROTEIN in inflammatory disease and platelet volume.

MATERIALS AND METHODS:

The study is a descriptive analysis, done in a tertiary care centre in north east India for a period of one year from Feb 2019-Feb 2020. It is a descriptive study of 500 patients attending OPD and were subsequently admitted in hospital having reactive thrombocytosis (platelet count

>450,000/ μ l).

Exclusion Criteria:

Patients having platelet count more than 4.5 lakh/ μ l, but this was normal for their age as in paediatrics, Myeloproliferative disorders patients, and patient having thrombocytosis which is autonomous (primary) and not reactive (secondary). Haemoglobin, Total leukocyte count, Differential count, Platelet count, Mean platelet volume, Erythrocyte Sedimentation Rate, C-Reactive Protein were examined of these patients.

RESULTS:

500 cases of Thrombocytosis

Table No.1: Table showing causes of Reactive Thrombocytosis

S.NO	Causes	No.of cases	Percentage %
1.	Infections	144	28.8
2.	Tissuedamage	42	8.4
	α)Trauma	16	3.2
	α)Postoperative	14	2.8
	α)Burns	10	2.0
3.	Anemia	81	16.2
	α)Iron deficiency anemia	1	0.2
	α)Megaloblasticanemia	1	0.2
4.	Neoplastic	48	9.6
	α)Malignant	2	0.4
	α)Benign	2	0.4
5.	Inflammation(non-tuberculosis)	47	9.4
6.	Diabetesmellitus	32	6.4
7.	Tuberculosis	30	6.0

8.	Poisoning	10	2.0
9.	Haemolyticanemia	7	1.4
	α)Thalassemiamajor		
	α)Sicklecellanemia	2	0.4
10.	Postsplenectomy	5	1.0
11.	Hemorrhage	4	0.8
12.	Myocardialinfarction	2	0.4
13.	CCF(ASOpositive)	1	0.2
14.	Lowbirthweight	1	0.2
15.	Drugreaction	1	0.2
Total	500	100.0	

TableNo2: Showing Comparison Of Causes Of Reactive Thrombocytosis In Paediatrics And Adults:

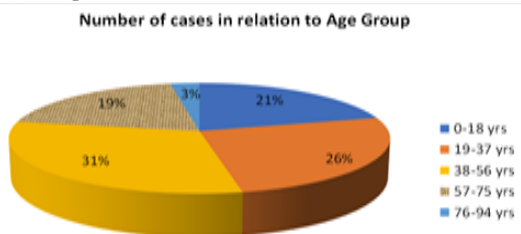


Table No.3 Showing Sex Distribution In Relation To Clinical Condition

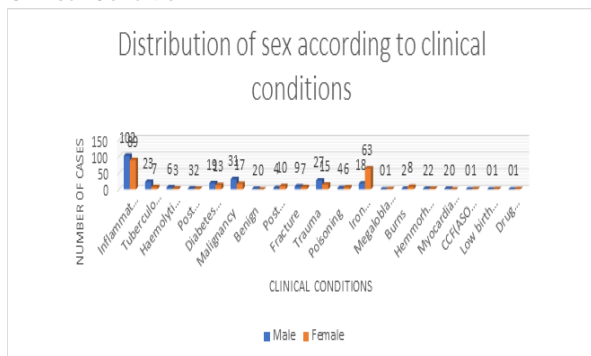


Table No. 4: Type Of Infection Related To Thrombocytosis:

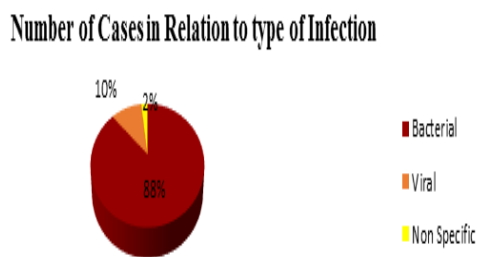
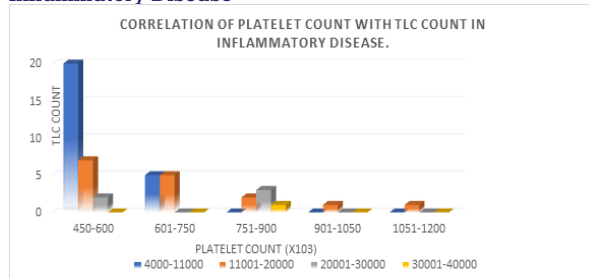


Table5: Types Of Malignant Lesion Causing Reactive Thrombocytosis

S.No	Disease	No.	Percentage %
1.	Carcinoma oral cavity	10	20.8
2.	Carcinoma breast	7	14.6
3.	Carcinoma lung	7	14.6
4.	Carcinoma cervix	2	4.1
5.	Carcinoma maxilla	2	4.1
6.	Carcinoma oesophagus	2	4.1
7.	Carcinoma of post cricoid region	2	4.1
8.	Hepatocellular carcinoma	1	2.1
9.	Adenocarcinoma of ampulla of vater	1	2.1
10.	Borderline metaplastic brenner tumor	1	2.1
11.	Carcinoma penis	1	2.1
12.	Carcinoma stomach	1	2.1

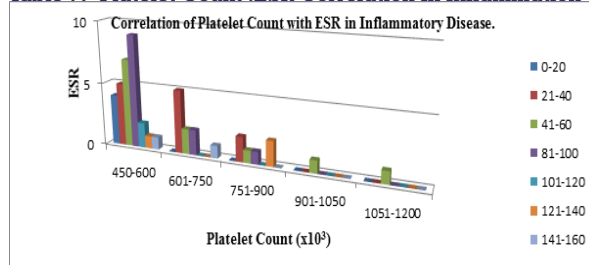
13.	Carcinoma testis	1	2.1
14.	Extraskelatal Ewing's sarcoma of left popliteal region	1	2.1
15.	Hodgkin's Lymphoma of right cervical lymph node	1	2.1
16.	Leiomyosarcoma	1	2.1
17.	Malignant small round cell tumor of chest wall	1	2.1
18.	Metastasis carcinoma to left level IIA lymph node	1	2.1
19.	Metastasis of poorly differentiated Carcinoma	1	2.1
20.	Metastasis of poorly differentiated SCC, in frontal lobe	1	2.1
21.	Squamous cell carcinoma of genital region	1	2.1
22.	Transitional cell carcinoma of bladder	1	2.1
23.	Unknown primary malignancy	1	2.1
Total		48	100

Table-6: Platelet Count And Tlc Count Correlation In Inflammatory Disease



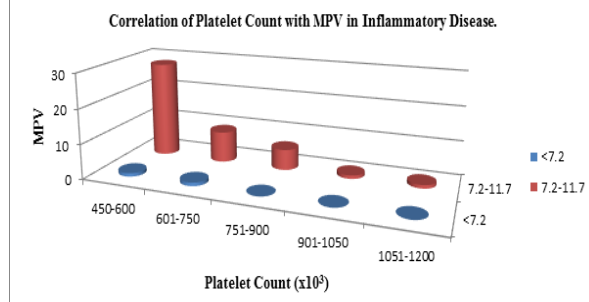
There was significant positive correlation between reactive thrombocytosis and WBC in Inflammatory disease $r = 0.483$, $P = 0.001$ (significant at the 0.01 level).

Table 7:- Platelet Count ,ESR Correlation In Inflammation



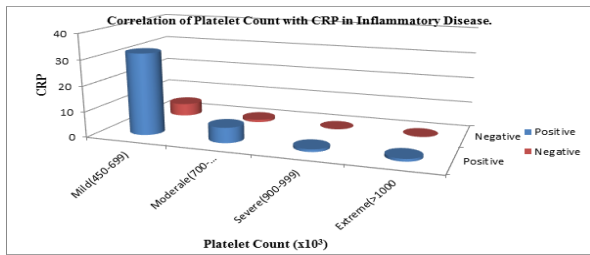
There was low degree of positive correlation between reactive thrombocytosis and ESR in Inflammatory disease $r = 0.003$, $P = >0.05$ (P value was not significant).

Table 8: Platelet Count With Mpv(mean Platelet Value) Correlation In Inflammation



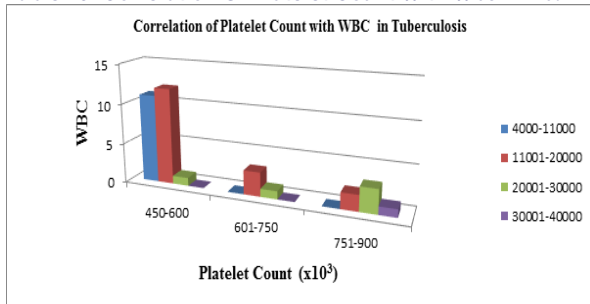
There was low degree of positive correlation between reactive thrombocytosis and MPV in Inflammatory disease $r = 0.026$, $P = >0.05$ (P value was not significant).

Table 9:Platelet count vs CRP correlation:



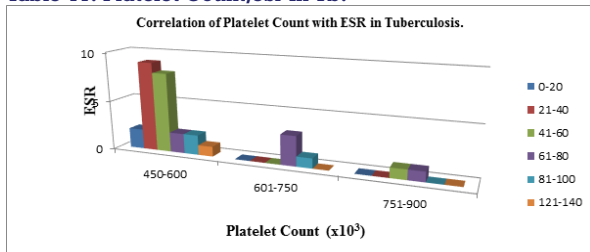
There was low degree of negative correlation $r = -.060$, $P = >0.05$ (P value was not significant).

Table 10- Correlation Of Platelet Count With Wbc In Tb:



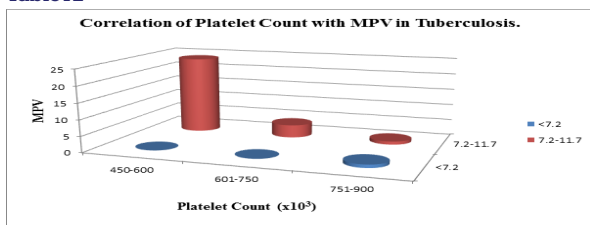
There was low degree of positive correlation between reactive thrombocytosis and WBC in tuberculosis $r = 0.337$, $P = 0.06$ (P value not significant).

Table 11: Platelet Count,esr In Tb:



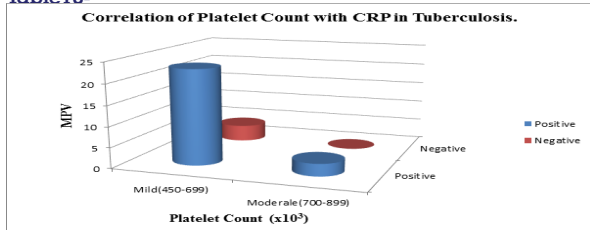
There was low degree of positive correlation between reactive thrombocytosis and ESR in tuberculosis $r = .277$, $P = >0.05$ (P value was not significant).

Table 12-



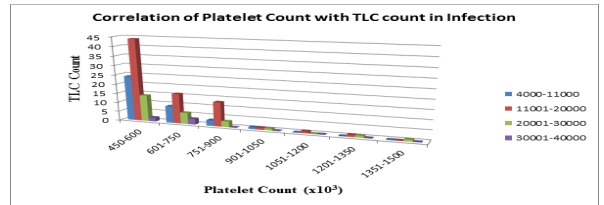
There was significant negative correlation between reactive thrombocytosis and MPV in tuberculosis $r = -.561$, $P = >0.001$ (P value significant at 0.01).

Table 13-



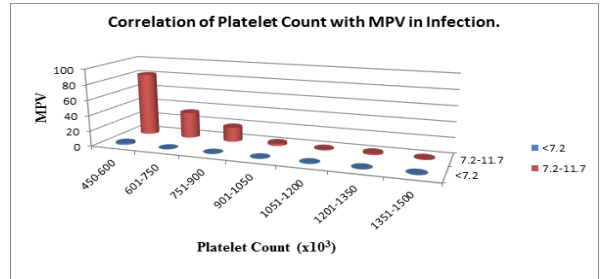
There was low degree of negative correlation $r = -.131$, $P = >0.05$ (P value was not significant).

Table 14:



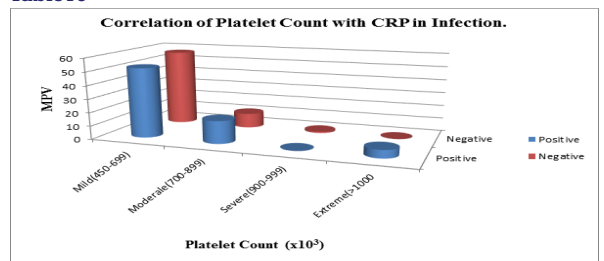
There was low degree of positive correlation between reactive thrombocytosis and WBC in Infections $r = 0.124$, $P >0.05$ (P value was not significant).

Table 15-



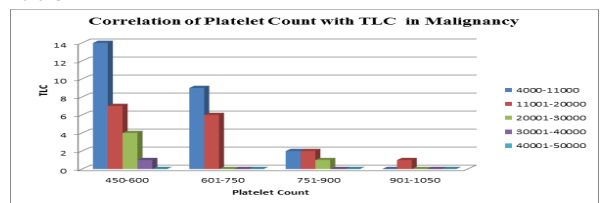
There was low degree of positive correlation between reactive thrombocytosis and MPV in infections $r = .077$, $P >0.05$ (P value significant at 0.01).

Table 16-



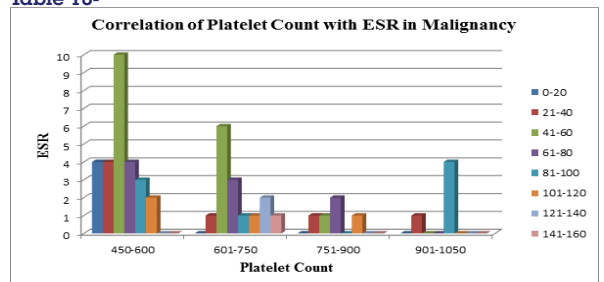
There was significant negative correlation between reactive thrombocytosis and CRP in infections $r = -.199$, $P = 0.017$ (P value significant at <0.05).

Table 17-



There was low degree of negative correlation between reactive thrombocytosis and WBC in malignancy $r = -.079$, $P >0.05$ (P value was not significant).

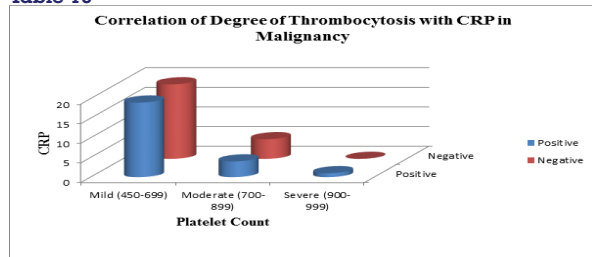
Table 18-



There was low degree of positive correlation between reactive thrombocytosis and ESR in malignancy $r = .157$,

P>0.05 (P value was not significant).

Table 19-



There was low degree of negative correlation between reactive thrombocytosis and CRP in malignancy $r = -.045$, $P > 0.05$ (P value significant at < 0.01).

Table 20: Correlation of Platelet Count with MPV in all causes of reactive thrombocytosis (irrespective of the aetiology)

		Plateletcount	MPV
Platelet count	Pearson Correlation	1	-.128**
	Sig.(2-tailed)		.004
	N	500	500
WBC	Pearson Correlation	-.128**	1
	Sig.(2-tailed)	.004	
	N	500	500

** .Correlation is significant at the 0.01 level (2-tailed).

This table shows significant inverse correlation between the platelet counts in the entire cases of reactive thrombocytosis studied and MPV ($r = -.128^{**}$, $P = 0.004$).

DISCUSSION:

Majority of our cases were in between the age group of 38-56 years. There were no prominent sex predilection, males 50.8% and females 49.2%. Among 500 cases the most common causes of reactive thrombocytosis were found to be Infections (28.8%), Tissue damage (16.4%), Iron deficiency anemia (16.2%), Malignancy (9.6%), Inflammation (9.4%), and Tuberculosis 6.0%. Among the infections, bacterial infection 87.5% was most common. We also saw, Among the malignant lesions, carcinoma oral cavity 20.8%, carcinoma breast 14.6% and carcinoma lung 14.6% were more commonly associated with reactive thrombocytosis which correlated with other studies.^{4,7} The causes of reactive thrombocytosis in children were similar to adults.⁸⁻¹⁰ Most common cause being infections and iron deficiency anemia in children.¹¹

Correlation of platelet count with WBC showed, that In Inflammatory disease (non-tuberculosis) there was significant positive correlation $r = 0.483$, $P = 0.001$ (P value significant at the 0.01). In tuberculosis and infections : There was low degree of positive correlation between them, P value was not significant. In malignancy as seen in some studies^{13,14}. There was low degree of negative correlation between them, P value was not significant. Correlation of platelet count with ESR- In inflammatory disease, tuberculosis, infections and malignancy showed, low degree of positive correlation, P value was not significant. In infections there was significant negative correlation $r = -.199$, $P = 0.017$ (P value significant at < 0.05). In inflammation, tuberculosis and malignancy there was low degree of negative correlation, P value was not significant. Correlation of platelet count with MPV- showed that In inflammatory , infections there was low degree of positive correlation, P value was not significant. In tuberculosis there was significant negative correlation $r = -.561$, $P = > 0.001$ (P value significant at 0.01). Correlating of

Platelet Count with MPV in all causes of reactive thrombocytosis (irrespective of the aetiology) showed a significant negative correlation $r = -0.128$, $P = 0.004$ (p value significant at 0.01). Nagai T et al¹⁵ reported a case of IDA with marked thrombocytosis (platelet $> 100,000/cmm$). Levine S P et al¹⁶⁻¹⁷ which showed that malignancy of lung and breast was more frequently associated with reactive thrombocytosis. Bayness RD et al have mentioned reactive thrombocytosis was common occurrence due to TB, while according to MC Donald¹⁸ and Omar et al¹⁹ TB was an uncommon occurrence. The causes of reactive thrombocytosis in paediatrics were studied by the following authors Yohannan et al, Heng et al, Vora et al, Chan et al, and Mantadakis et al^{20,21,22} and were found to be similar. Baynes RD et al and few more studies²³⁻²⁸ found significant positive correlation between reactive thrombocytosis and ESR, CRP and MPV in tuberculosis. Van der Lelie et al and Von dem Borne et al.^{29,30} They found an inverse relation between platelet count and mean platelet volume.

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