

Incidence of Reactive Thrombocytosis in Febrile Young Infants with Serious Bacterial Infections

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(Received: June, 2015)

(Accepted: December, 2015)

ABSTRACT

The purpose of the present prospective study, conducted in a tertiary care paediatric unit during June 2013 to October 2014, was to estimate the incidence of reactive thrombocytosis among febrile young infants and assess the utility of platelet count as a potential predictor of serious bacterial infection (SBI). All infants 29 days to 1 year of age, admitted with rectal temperature $>38^{\circ}\text{C}$ were included in the study. Out of the 100 infants studied, 46 had serious bacterial infection. Platelet counts were significantly higher in infants with SBI (60.87%) compared to those without (non SBI), (14%). Majority of infants in SBI group with thrombocytosis had respiratory tract infections (69.57 %, 16/23). Reactive thrombocytosis was a frequent finding in young infants with SBI. Thrombocytosis $450,000\text{ cells/mm}^3$, in combination with leucocytosis and elevated CRP may help in early recognition of febrile young infants at risk for SBI.

KEY WORDS: fever, serious bacterial infection, thrombocytosis

INTRODUCTION:

Fever is one of the most common conditions requiring the attention of paediatrician. The evaluation of an infant with febrile illness and no obvious focus of infection is a challenging task and can be expensive, time consuming and invasive. The general condition of infant can be deceptive and does not assist reliably in clinical differentiation of a low risk versus high risk bacterial infection.^[1]

This is compounded by the fact that no single laboratory test has been shown to identify infants with serious bacterial infection. Lab markers which have been used to predict serious bacterial infection include raised white blood cell count (WBC), C - reactive protein (CRP), Procalcitonin (PCT) and even Interleukin-6 levels.^[2]

WBC count, though easily available and used widely as a predictor of serious bacterial infection, by itself, does not compare well with relatively most recent markers like CRP and PCT. Availability of automated haematology and analysers gives results of

platelet count as a part of routine haematology workups, with a dependable degree of accuracy. Thrombocytosis or increased platelet counts more than $400,000/\mu\text{l}$ has been documented in 3% to 15% of paediatric patients.^[3]

Thrombocytosis in this age group is invariably due to an underlying cause such as acute infection, chronic inflammation, childhood malignancies, iron deficiency anaemia and chronic haemolytic states. Primary or Essential thrombocythemia is extremely rare. Infections of the respiratory, urinary tract, gastro-intestinal tract, bones and meninges are most common causes of Reactive thrombocytosis.^[4] Reactive thrombocytosis is a common finding in infants that occurs in preponderance of cases secondary to an infection. To our knowledge very few studies have previously focused on the incidence and characteristics of reactive thrombocytosis in young infants with SBI.

The objective of the present study was to estimate the incidence of reactive thrombocytosis in febrile young infants, especially in those with bacterial infections, and assess the value of platelet count as a potential predictor of SBI.

MATERIALS AND METHODS:

We retrospectively reviewed the case records of infants aged 29 days to 1 year, admitted to

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paediatric unit of Department of Paediatrics, Maharani Laxmibai Medical College, Jhansi, Uttar Pradesh (India) between June 2013 and October 2014, for investigation of fever defined as rectal temperature $> 38^{\circ}\text{C}$. Infants who had fever for more than 72 hours, and had received antibiotics or vaccination within 48 hours of presentation, were excluded.

All patients had sepsis evaluation including WBC count, platelet counts, blood culture, urine microscopy and culture and CRP. Lumbar puncture for cerebrospinal fluid (CSF) analysis and culture, as well as stool culture and chest radiographs, were obtained at the discretion of the attending paediatrician.

Serious bacterial infection was defined as occult bacteraemia, urinary tract infection, bacterial meningitis, pneumonia, bacterial gastroenteritis and infection of soft tissue and bones. Isolates such as *Staphylococcus epidermidis* or *Streptococcus viridans* in the blood culture were considered contaminants unless they were isolated from more than two consecutive cultures. Occult bacteraemia was defined as the presence of potentially pathogenic microbes in the bloodstream of an individual who is in an apparently good clinical state and who presents fever without a known infectious process.^[5] Urinary tract infection was defined as single known pathogen growth in urine obtained by suprapubic needle aspiration or by urethral catheterization by aseptic measures. Bacterial Meningitis was defined on presence of neutrophilic pleocytosis in CSF and positive CSF cytochemical analysis or positive CSF culture. Pneumonia was defined as presence of airspace opacities, lobar consolidation or interstitial opacities on chest radiograph.

Results were tabulated orderly and were analysed using Graphpad software. For the comparison of means between different groups and means of two sets of readings within same group, unpaired and paired student's t-test were used, respectively. For comparison of categorical variables, Fischer's exact test was used. The study was approved by institutional ethics committee.

RESULTS:

During the study period, a total of 109 cases met the inclusion criteria. Out of these, 100 patients were included in the study and the rest 9 were not included because of several practical reasons like Sundays, referral to other centres, patient's

absconded or not willing for investigations. Hence, in actuality, a total of 100 infants were analysed.

Out of total 100 cases, 46 were included in the S.B.I Group and 56 were included in the non-S.B.I Group. Of the 46 patients included in SBI group, 50.0% were of respiratory tract infections (23), 23.9% were of G.I.T related infections (11), 17.4% were of urinary tract infections (8), 6.5% were of CNS related infections (3) and 2.1% others.

Clinical and laboratory characteristics along with platelet counts of the non SBI and SBI groups are also depicted herein (Table 1). In the present study, the incidence of thrombocytosis was found to be 60.87% (28/46) in SBI group compared to 14% (8/56) in the non- SBI group.

Among the cases included in SBI group, 69.57% of respiratory tract infections (16/23), 54.55% of G.I.T related infections (6/11), 37.5% of urinary tract infections (3/8) and 66.6% of CNS related infections (2/3) had thrombocytosis. Although it shows that 66.6% CNS related cases had thrombocytosis, it may be so as a result of less number of cases in this group (n=3).

DISCUSSION:

In this study, platelet count was significantly higher in febrile infants with documented bacterial infection, particularly respiratory tract infections followed by gastrointestinal infections. However, due to a substantial overlap, it was difficult to identify a threshold value that could clearly differentiate infants with SBI from other febrile infants. The prevalence of SBI in our population (46%) was quite high. This study was conducted in a tertiary care paediatric unit that represents one of the referral centres for southern UP.

Results of studies conducted by Yadav et al^[6], Mastubara et al^[7], O'Shea et al^[8], coincides with the results obtained from our study (Table2). In all these studies, respiratory tract infections play a major role in thrombocytosis. Whereas in the study conducted by Chan et al^[9], out of 25 thrombocytosis cases, 32% were of R.T.I, 20% were of G.I related, 4% of U.T.I and 36% cases of CNS related infections. The variations in the results are so because of small sample size and the fact that the study included a majority of patients with CNS related infections. The fact that platelets can behave like an acute phase reactant is well recognized.^[4-8]

From this study, we can conclude that incidence of reactive thrombocytosis was higher in febrile infants with serious bacterial infections, particularly those with respiratory tract infections.

Table 1: Clinical and Laboratory characteristics of the Non-SBI and SBI Groups.

	Non-SBI (n=305)	SBI (n=103)	p value
Age (d)	130 (95 -204)	163 (109 -224)	0.417
Sex (male/female)	35/19	27/19	0.543
Fever on admission (°C)	40.02 (39.6 -40.3)	40.25 (39.7 -40.9)	0.054
Haemoglobin (g/dl)	11.65 (10.5 -12.4)	11.26 (10.5 -11.6)	0.113
WBC ($10^3/\text{mm}^3$)	9.32 (6.5 -11.4)	19.65 (14.4 -24.7)	0.001
Platelet ($10^3/\text{mm}^3$)	343.7(150-241.7)	442.5(388.5-653)	0.0018

Data are expressed as mean (interquartile range); all comparisons by unpaired t test except for sex difference by Fischer's probability test; SBI: serious Bacterial Infection; WBC: white blood count; CRP: C-reactive protein.

Table 2: Comparative findings with other studies for reactive thrombocytosis during infections.

	Cases with thrombo - cytosis	R.T.I (n)(%)	G.I.T (n)(%)	U.T.I (n)(%)	C.N.S (n)(%)	Others (n)(%)
Present study	35	20 (57.14)	9 (25.71)	4 (11.42)	2 (5.7)	0
Yadav et al ^[6] (2010)	86	43 (50.0)	17 (19.8)	5 (5.8)	9 (10.5)	7 (8.1)
Mastubara et al ^[7] (2004)	308	182 (59.1)	55 (17.85)	21 (6.8)	4 (1.3)	57 (18.5)
O'shea et al ^[8] (2005)	57	17 (29.8)	14 (24.6)	6 (10.5)	4 (7)	16 (28.0)
Chan et al ^[9] (1989)	25	8 (32)	5 (20)	1 (4)	9 (36)	2 (8)

CONCLUSION:

The present study concludes that incidence of reactive thrombocytosis was higher in febrile infants with serious bacterial infections, particularly those with respiratory tract infections. Thrombocytosis $4,50,000 \text{ cells}/\text{mm}^3$, in combination with leucocytosis and elevated CRP may help in early recognition of febrile young infants at risk for serious bacterial infection.

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Cite this article as: Sadawarti B, Sethi RS, Chaurasiya, Sethi A: Incidence of Reactive Thrombocytosis in Febrile Young Infants with Serious Bacterial Infections PJSR;2016;9(1):44-47.
Source of Support : Nil, **Conflict of Interest:** None declared.