Original Research Article

Mortality and morbidity of children admitted with febrile thrombocytopenia in a tertiary care hospital

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ABSTRACT

Background: This study is conducted at Mahatma Gandhi memorial hospital, Trichy gains significance as there hasn't been any of its kind prior to this among children and in this geographical area. Aim and objectives of the study were to study the clinical profile of children presenting with febrile thrombocytopenia and possible etiology. The study correlates clinical features with the laboratory parameters and assessing the complications associated with fever and thrombocytopenia.
Methods: Prospective, descriptive study consist of 200 children aged 1 months to 12 years admitted with fever and thrombocytopenia as inpatients in the paediatric wards at Mahatma Gandhi memorial government hospital, Trichy during July 2017 to June 2018. Inclusion criteria included children aged 1 month to 12 years admitted in paediatric wards of MGM GH, Trichy, exclusion criteria excluded neonates <1 month and children >12 years, patients presenting with thrombocytopenia without fever, ITP, platelet dysfunction disorders, malignancy, patients on chemotherapy and immunosuppressive agents and on drugs causing thrombocytopenia.
Results: Dengue was the most common cause of febrile thrombocytopenia in our region accounting for 56% of cases, this is followed by enteric fever in 17%, undifferentiated fever in 16.5%, sepsis in 6.5%, scrub typhus in 3.5% and malaria in 0.5%. 5% of children with febrile thrombocytopenia were given platelet transfusion. 95% (n=190) of the children with febrile thrombocytopenia improved and were discharged. 1% (n=2) left against medical advice. The mortality rate in the study is 4% (n=8).
Conclusions: The risk of bleeding increases as the platelet count decreases. The mortality is not related to the severity of thrombocytopenia.

Keywords: Fever, Thrombocytopenia, Dengue, Platelet

INTRODUCTION

The World Health Organization and the society of critical care medicine and the infectious disease society of America (IDSA) and paediatric emergency medicine (PEM) section of academic college of emergency experts in India (ACEE-INDIA) in Delhi (October 2015) defined fever as an equivalent rectal temperature of $\geq 38^0$ C (100.4^0 F) or an axillary temperature of $\geq 37.5^0$ C (99.5^0 F).[1] Axillary temperature is 0.3-0.6^0 C lower than the rectal temperature. Various other invasive methods of

tempera-ture assessment like pulmonary artery catheter, oesophageal thermometry is identified but are not widely practised in our country.

A subnormal number of platelets in circulating blood is termed as thrombocytopenia. A Platelet count less than 1.5 lakhs/cu.mm is defined as thrombocytopenia. A platelet counts more than 5 lakhs/ cu.mm is termed as thrombocytosis. A single platelet count that is subnormal should always be confirmed by a second count. There are many causes of fever with thrombocytopenia. Important

bacterial causes are Overwhelming sepsis, miliary tuberculosis, enteric fever, scrub typhus, leptospirosis, meningococcaemia. Viral causes are dengue hemorrhagic fever, Adeno virus infection, herpes simplex infections, infectious mononucleosis, cytomegalovirus infection, entero viral infection, hepatitis B, C, hemorrhagic measles, other viral hemorrhagic fevers, TORCH infections, HIV infections. Protozoal causes are malaria, kala azar, disseminated fungal sepsis, disseminated intravascular coagulation (DIVC), infection associated hemophagocytic lympho-histiocytosis (HLH) syndrome. Immune mediated causes are vasculitis syndromes-e.g., HSP (Henoch Scholein purpura). Autoimmune disorders-systemic lupus erythematosus, antiphospholipid antibody syndrome, Immune thrombocytopenic purpura. Hemato oncological causes are leukaemia, lymphoma, aplastic anemia, neuroblastoma. Thrombotic microangiopathy causes are HUS, TTP.[2] Some of the common infectious diseases presenting as febrile thrombocytopenia have been discussed here.

Dengue infection is one of the common vectors borne viral disease presenting with thrombocytopenia. The increase in the incidence of dengue infection is worthwhile to note because there is no specific treatment available till date and a licensed vaccine which can be used in children for the prevention of the disease is not yet available in our country. Dengue fever is caused by a positive sense, single stranded RNA virus belonging to the family *Flaviviridae*. It consists of four serotypes. A 5th serotype has also been reported in 2013.[3] The serotypes commonly seen in India are DEN-1 and DEN-2. Among all the serotypes DEN-2 and DEN-3 cause severe disease and are the Asian serotypes. Its clinical manifestations may range from a self-limiting illness to a life-threatening dengue hemorrhagic fever or dengue shock syndrome. Shock in dengue is due to severe plasma leakage. The mortality rate of untreated patients with dengue shock syndrome (DSS) ranges between 10-20% but can go high up to 40%, if treated <1%.[4]

Malaria is another vector borne life threatening disease. It is preventable and curable. Under 5 children are particularly susceptible to malaria. Data released by WHO says that malaria claims the life of a child every 2 minutes. *Plasmodium vivax* and *Plasmodium falciparum* are the commonest ones in India. It is spread by the bite of the female anopheles mosquito. Infective form for man is the sporozoite. Infective form for the mosquito is the gametocyte.[5,6] Enteric fever is caused by the gram-negative bacilli, *Salmonella entericatyphi*. It includes both typhoid and paratyphoid fever. Causes for thrombocytopenia in enteric fever Decreased production by the bone marrow and increased destruction due to the enlarged spleen. Blood culture remains the gold standard for diagnosis.[7-9] Scrub typhus is one of the emerging infections. It is caused by the vasculotropic rickettsia organism *Orientia tsutsugamushi*. A new *Candidatus* species *Orientia chuto* has also been implicated of late. It is transmitted by the bite of the chigger which is the

larval stage of the trombiculid mite. It acts as both the vector and reservoir. Transovarian transmission occurs. Thrombocytopenia is seen in 67% of cases.[10-13] Leptospirosis, a zoonotic disease is caused by an aerobic, motile spirochete belonging to the genus *Leptospira*. The most common species causing disease in humans is *Leptospira interorggans*. Mode of transmission is by ingestion of water contaminated with urine or faeces containing *leptospira* from rats, dogs etc or entry through mucous membrane. The immune phase is characterized by jaundice, renal failure, and thrombocytopenia.[14]

In view of ongoing epidemic of infections which are present with febrile thrombocytopenia during 2017-2018 in our region we have started this study to analyse clinical profile, mortality and morbidity pattern of febrile thrombocytopenias in the hospitalised children.

Objectives of this study is to assess the clinical profile of children presenting with febrile thrombocytopenia and possible etiology. The study correlates clinical features with the laboratory parameters and assessing the morbidity and mortality associated with fever and thrombocytopenia.

METHODS

Study design

Prospective, descriptive study. Study population included children aged 1 months to 12 years admitted with fever and thrombocytopenia as inpatients in the paediatric wards. Study place: Mahatma Gandhi memorial government hospital, Trichy. Study period carried out from July 2017 to June 2018. Sample size were 200. Sample size was calculated with a prevalence of 7% and allowable error of 5% with 99% confidence interval the sample size was calculated around 200.

Inclusion criteria

Children aged 1 month to 12 years admitted in paediatric wards of MGM GH, Trichy. Fever to be defined as an AM temperature of >37.2^0 C (98.9^0 F) or a PM temperature of >37.7^0 C (99.9^0 F). Thrombocytopenia as platelet countless than 1.5 lakhs/cu.mm (documented twice).

Exclusion criteria

Neonates <1 month and children >12 years. Patient presenting with thrombocytopenia without fever. Those with previously diagnosed conditions like ITP, platelet dysfunction disorders. Patients already diagnosed to have haematological disorder/malignancy. Patients on treatment with chemotherapy and on other immunosuppressive agents. Patients on drugs causing thrombocytopenia. Patients with chronic disorders with thrombocytopenia.

Study manoeuvre

All children meeting the inclusion criteria were included in the study after getting informed written consent from their parents/guardian. Fever was documented. Thrombocytopenia was documented twice with a confirmation on a peripheral smear. Detailed history taking and clinical examination was done. Important clinical findings were documented. Investigations like complete blood count, renal function test, liver function test, prothrombin time, activated partial thromboplastin time, blood culture, chest X-ray and ultrasound abdomen were performed. CBC was analysed using automated cell counter (Sysmex KX-21N™ automated haematology analyser). Serial investigations were done depending on the patient's clinical condition. Serological investigations were done based on appropriate clinical findings. Dengue fever was confirmed by third generation ELISA. No rapid card tests were considered to be positive or negative. Scrub typhus was confirmed by ELISA.

Malaria was confirmed by Giemsa stain and QBC was done in selective patients during high suspicion but negative on smear. Enteric and non-enteric blood cultures were sent according to clinical presentations. The correlation between the severity of clinical presentations and laboratory parameters were assessed. The complications associated with it were assessed and prognostic ate. Attempts to establish possible etiology was made. Demographic characteristics were studied. Personal protective measures at the hospital level were provided. Notifiable diseases were notified. Statistical analysis was done using appropriate software and results interpreted statistically using the software SPSS, Version 20.0.

RESULTS

200 children admitted with febrile thrombocytopenia in the paediatric wards of Mahatma Gandhi memorial government hospital, Trichy were enrolled in this study.

Age wise distribution

8.5% of children were less than 1 year of age, 44.5% between 1 to 5 years and 47% above 5 years of age. Sex wise distribution 51.5% of male and 48.5% of female children were affected 3, mean day of fever presentation to hospital.

The mean day of presentation in enteric fever is 7.03 days, scrub typhus of 4.86 days, malaria of 5 days, dengue of 3.62 days, sepsis 2.5 days, and undifferentiated fever 4.2 days. Mean duration of hospital stay.

The mean duration of hospital stay in dengue is 5.82 days, enteric fever 7.41 days, malaria 8 days, sepsis 9.08 days, scrub typhus 6.86 days, undifferentiated fever 4.06 days. Distribution of clinical features vomiting was seen in 54%, abdominal pain in 66%, retroorbital pain in

19.5% and skin rash in 22% of patients. bleeding manifestation was seen in 29% of patients.

Malena was the most common form of bleeding manifestations seen in 19.5% of children followed by skin bleeds in 18.5%. cns bleed was the least form of bleeding manifestation seen in 0.5% of subjects.
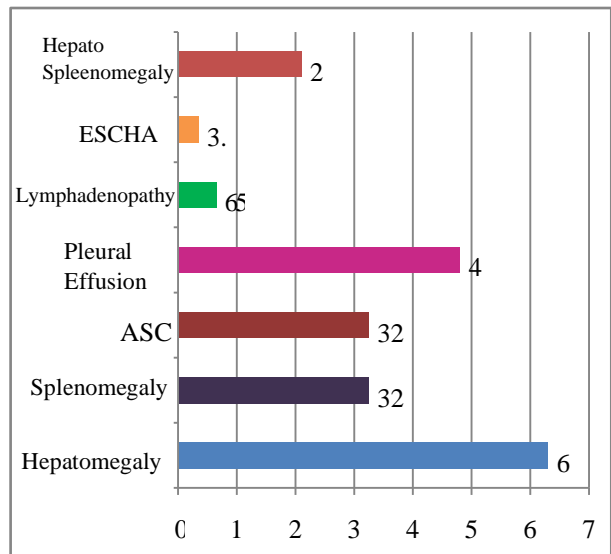

Figure 1: Clinical features of febrile thrombocytopenia in this study.

The bar diagram shows that hepatomegaly was seen in 63%, splenomegaly in 32.5%, hepatosplenomegaly in 21%, ascites in 32.5%, pleural effusion in 48%, lymphadenopathy in 6.5% and eschar in 3.5% of children. Among 200 children 42.5% of them presented with shock. Out of 85 children who presented with shock 70.5% (60) of children had compensated shock and 29.5% (25) presented with decompensated shock.
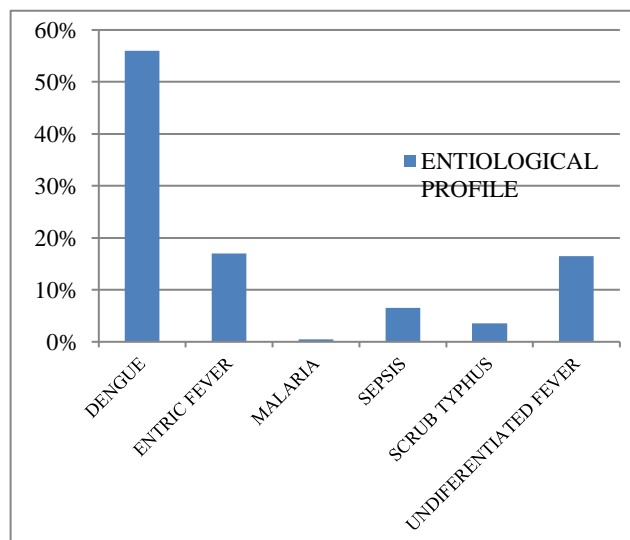

Figure 2: Etiology of febrile thrombocytopenia in this study.

The above bar diagram shows that dengue was the most common cause of febrile thrombocytopenia in our region accounting for 56% of cases, this is followed by enteric fever in 17%, undifferentiated fever in 16.5%, sepsis in 6.5%, scrub typhus in 3.5% and malaria in 0.5%. 5% of children with febrile thrombocytopenia were given platelet transfusion.
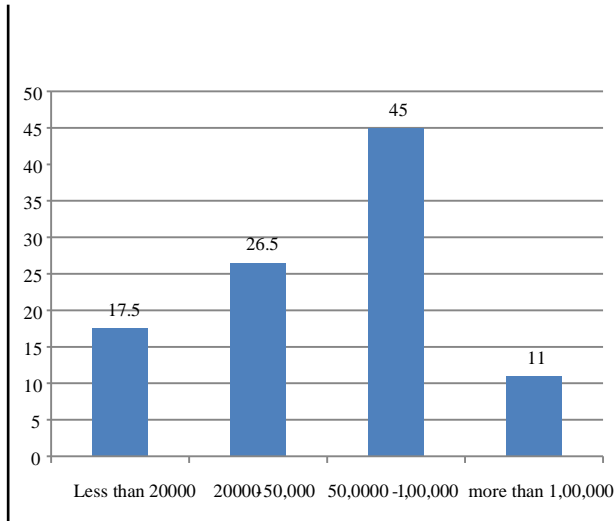

Figure 3: Severity of thrombocytopenia in this study.

The above bar diagram shows that 17.5% of children had platelet count less than 20,000. 26.5% had platelet count between 20,000 and 50,000. 45% of children had platelet count between 50,000 and 1,00,000. 11% had platelet count between 1,00,000 and 1,50,000.

The Table 1 signifies that bleeding manifestations increase with decreasing platelet counts and it is statistically significant ($p<0.05$).
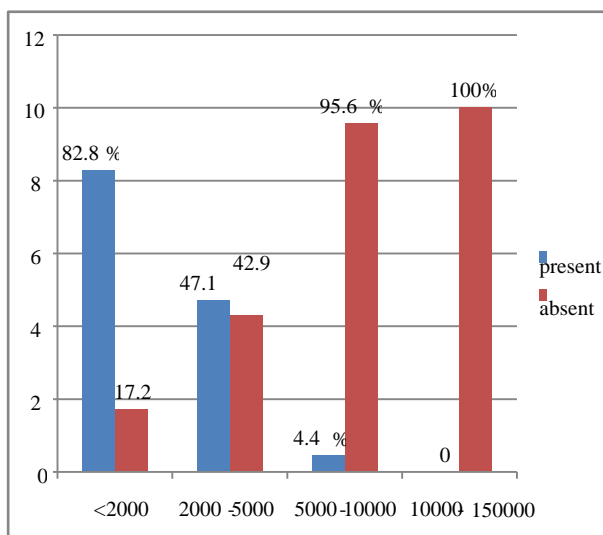

Figure 4: Bar diagram showing correlation between severity of thrombocytopenia and bleeding manifestation.

The above table and bar diagram infers that out of 35 patients with platelet counts <20000, 29 (82.5%) of them had bleeding manifestations. Out of 53 patients who had platelet counts between 20000 and 50000 25 (47.1%) of them had bleeding manifestations. Out of 90 patients with platelet count between 50001 and 100000 4 (4.4%) of them had bleeding manifestations. None of the children who had a platelet count above 1 lakh had bleeding manifestations.

Among 35 children who had a platelet value less than 20000, dengue was found to be the most common aetiology. Dengue accounted for 85.7% (n=30) of cases followed by enteric fever in 5.7% (n=2) of cases, sepsis in 5.7% (n=2) of cases and scrub typhus in 2.9% (n=1) of cases (Table 2).

Among fifty-three children who had a platelet value between 20000 and 50000, dengue was the most common cause. dengue accounted for 71.7% (n=38) of cases followed by enteric fever in 5.7% (n=3) of cases, the sepsis in 13.2% (n=7) of cases, scrub typhus in 5.7% (n=3) of cases and undifferentiated fever in 3.8% (n=2) of cases.

Among 90 children who had a platelet value between 50001 and 100000, dengue was again the most common cause. Dengue accounted for 46.7% (n=42) of cases followed by enteric fever in 28.9% (n=26) of cases, undifferentiated fever in 15.6% (n=14) of cases, sepsis in 4.4% (n=4) of cases, scrub typhus in 3.3% (n=3) of cases and malaria in 1.1% (n=1) of cases.

Among twenty-two children who had a platelet value between 100001 and 150000, undifferentiated fever was the most common cause. Un-differentiated fever accounted for 77.3% (n=17) of cases followed by enteric fever in 13.6% (n=3) of cases, and dengue in 9.1% (n=2) of cases.

The severity of thrombocytopenia has been arbitrarily classified as mild thrombocytopenia (platelet count 1 lakh-1.5 lakh), moderate (platelet count 50000-1 lakh) and severe (platelet count<50000).

Dengue was the most common cause of severe and moderate thrombocytopenia, whereas undifferentiated fever was the most common cause of mild thrombocytopenia.

Majority of cases of enteric fever, scrub typhus and malaria presented with mild to moderate thrombocytopenia.

The 95% (n=190) of the children improved and were discharged. The one percentage (n=2) left against medical advice. The mortality rate in this study is four percentage, (n=8) as shown in the Table 3 and 4.

Table 1: Comparison between bleeding manifestation and various levels of thrombocytopenia.

Lowest platelet	Bleeding manifestation						Statistical inference
	Absent		Present		Total		
	N	%	N	%	N	%	
<20000	6	4.2	29	50	35	17.5	X²=93.146, Df=3 0.000<0.05 Significant
20000 to 50000	28	19.7	25	43.1	53	26.5	
50001 to 100000	86	60.6	4	6.9	90	45.0	
>100000	22	15.5	0	0.0	22	11.0	
Total	142	100	58	100	200	100	

Table 2: Etiology wise severity of thrombocytopenia.

Diagnosis	Lowest								Total		Statistical inference
	<20000		20000 to 50000		50001 to 100000		>100000				
	N	%	N	%	N	%	N	%	N	%	
Dengue fever	30	85.7	38	71.7	42	46.7	2	9.1	112	56	X²=102.001, Df=18, 0.000<0.05, significant
Enteric fever	2	5.7	3	5.7	26	28.9	3	13.6	34	17	
Malaria	0	0.0	0	0	1	1.1	0	0	1	0.5	
Undifferentiated fever	0	0.0	2	3.8	14	15.6	17	77.3	33	16.5	
Sepsis	2	5.7	7	13.2	4	4.4	0	0	13	6.5	
Scrub typhus	1	2.9	3	5.7	3	3.3	0	0	7	3.5	
Total	35	100	53	100	90	100	22	100	200	100	

Table 3: Outcome of cases.

Outcome	Dengue Fever		Enteric Fever		Malaria		Undifferentiated Fever		Sepsis		Scrub Typhus		Total		Statistical inference
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	
Death	2	1.8	0	0	0	0	0	0	5	38.5	1	14.3	8	4	X²=47.995, Df=12, 0.000<0.05, Significant
*LAMA	2	1.8	0	0	0	0	0	0	0	0	0	0	2	1	
Improved	108	96.4	34	100	1	100	33	100	8	61.5	6	85.7	190	95	
Total	112	100	34	100	1	100	33	100	13	100	7	100	200	100	

*LAMA-left against medical advice.

Table 4: Comparison between outcome and severity of thrombocytopenia.

Outcome	Lowest								Total		Statistical inference
	<20000		20000 to 50000		50001 to 100000		>100000				
	N	%	N	%	N	%	N	%	N	%	
Death	4	11.4	3	5.7	1	1.1	0	0	8	4.0	X²=11.251, Df=6, 0.081>0.05, not significant
LAMA	1	2.9	1	1.9	0	0	0	0	2	1	
Improved	30	85.7	49	92.5	89	98.9	22	100	190	95	
Total	35	100	53	100	90	100	22	100	200	100	

DISCUSSION

200 children aged 1month to 12 years were enrolled in our study. The male:female ratio in our study was 103:97. The male and female ratio noticed by the Gutthi et al study and Nair et al study was 54:46 and 94:86 respectively. In the present study also, male children were slightly more affected than female children but it is not statically significant (p>0.05).

In the present study majority of the children were in the age group between 5 to 12 years-47% followed by 44.5% in the age group 1 to 5 years. The Gutthi et al study also shows the same trend with majority of cases in the age group 6 to 10 years around 41% and 32% in the age group 1 to 5 years.[6] This can be attributed to the reason that most of the primary dengue cases may go unnoticed or might have been treated as a simple viral fever during early days of their life. They present with secondary dengue which is prone for complications later in life. The clinical features of the present study are compared with the other studies as in Table 5.

In the present study, abdominal pain was the most common presenting symptom which is seen in 66% of cases followed by vomiting in 54%, bleeding manifestation in 29%, skin rash in 22%, and headache in 19.5%.

In Nair et al study, most common presenting symptom was headache seen in 61.6% of patients. Other frequently noted clinical features were bleeding manifestation (19.4%), vomiting (18.9%), abdominal pain (16.1%), and skin rash in 8.3%.[15]

In the present study hepatomegaly was the most common sign seen in 63% of subjects. Dengue fever was associated with tender hepatomegaly. Enteric fever was commonly associated with hepatosplenomegaly or isolated splenomegaly.

In the present study Dengue was the most common infectious cause of children admitted with fever and thrombocytopenia in our hospital accounting for about

56% of cases. This is followed by enteric fever in 17%, undifferentiated fever in 16.5%, sepsis in 6.5%, scrub typhus in 3.5% and malaria in 0.5%. In a study done by Gutthi et al in north India malaria (35%) was found to be the commonest cause followed by dengue (34%).[6] In the Meena et al study done in Karnataka dengue was seen in 46% and malaria in 41% of patients.[16]

The higher prevalence of dengue in our study could be attributed to the higher prevalence of the disease during the rainy season. The differences in various studies could be attributed to the seasonal and regional variation.[15,18,19] In the present study malaria was the least common cause. This could be attributed to the fact that this region is not endemic for malaria. The one case reported in this study, had a history of travel to endemic area 2 weeks before the onset of fever. Septicaemia still continues to contribute to the morbidity and mortality, but the incidence has decreased of late due to improvement in sanitation and hygiene, immunisation, early diagnosis and better antibiotic coverage. Scrub typhus has been one of the emerging infections. There continued to be a group of patients whose diagnosis remained uncertain even after evaluation with baseline and available investigations. They could be probably of viral aetiology. Serological diagnosis of viral infections was cumbersome and not easily available.[20] They were also expensive and were not affordable by our patients. These have been classified as undifferentiated fever. Ramabhatta et al conducted at Bengaluru demonstrated dengue as the most common cause of febrile thrombocytopenia in children but other causes like sepsis, scrub typhus are not prominent in that study. Whereas which shows about the geographical variation in the etiology of the condition.[21]

Table 5: Comparison of clinical features from various study.

Clinical feature	Nair et al[15] (%)	Gutthi et al[6] (%)	Meena et al[16] (%)	Fawas et al[17] (%)	Present study (%)
Vomiting	18.9	38	72	17	54
Abdominal pain	16.1	43	52	22	66
Skin rash	8.3	11	10	-	22
Headache	61.6	-	73	52	19.5
Bleeding manifestation	19.45	45	-	17	29

Table 6: Comparison of signs with other studies.

Signs	Gutthi et al[6] (%)	Meena et al[16] (%)	Present study (%)
Hepatomegaly	41	32	63
Splenomegaly	32	38	32.5
Hepatosplenomegaly	55	-	21

Table 7: Comparison of etiologic factors of fever with thrombocytopenia among various studies.

Etiology	Nair et al study (%)	Nair et al study (%)	Gutthi et al study (%)	Meena et al study (%)	Nikaljeanad et al study (%)	Present study (%)
Dengue	14	22.2	34	43	26	56.0
Malaria	9	8.33	35	41	36	0.5
Enteric fever	15	12.22	5	6	6	17.0

Continued.

Etiology	Nair et al study (%)	Nair et al study (%)	Gutthi et al study (%)	Meena et al study (%)	Nikaljeanad et al study (%)	Present study (%)
Septicaemia	27	5.55	5	-	-	6.5
Scrub typhus	-	-	3	-	-	3.5
Others (Undifferentiated viral fevers)	18	25	12	10	28	16.5

Table 8: Comparison of various studies regarding severity of thrombocytopenia.

Severity of thrombocytopenia	Nair et al (%)	Nair et al (%)	Raghunandan Meena et al (%)	Nikaljeanand et al (%)	Present study (%)
<20000	17.5	30	8	15.33	17.5
20000-50000	25.7	23.89	22	45	26.5
>50000	56.8	46.11	70	38.66	56

Table 9: Comparisons various studies regarding bleeding manifestations.

Bleeding manifestations	Nair et al study (%)	Gutthi et al (%)	Present study (%)
Hematemesis	5.89	47	7
Malena	5.89		19.5
Hematochezia	5.89		3.5
Skin bleed	44.12	35	18.5
Hematuria	2.94		1
Gum bleed	25.71	12	4
Cns bleed	2.94		0.5
Menorrhagia	-	6	1
Epistaxis	5.89		2.5

30 % of children with bleeding manifestations had GI bleed according to the present study. GI bleed reported by Gutthi study and Nair study was 47% and 17% respectively. Skin bleed (44.12%) was the most common bleeding manifestation in the Nair study.[18] The Gutthi study reports GI bleed (47%) to be the most common bleeding manifestation.[6] Nair his study also reports GI bleed (30%) followed by skin bleeds (18.5%) as the most common bleeding manifestations. In the present study 32.5% of children had Ascites,48% had Pleural effusion, 3.5% had eschar, and 6.5% had significant generalized lymphadenopathy.

Platelet transfusions were given in 10 patients, whose platelet counts were <10000. Around 7 children presented with febrile seizures, 3 had HLH syndrome. Among patients with dengue 2 children had ARDS,1 had dengue encephalopathy, 1 child had an associated Urinary tract infection and in 1 known case of type 1 diabetes mellitus diabetic ketoacidosis was precipitated. One case was associated with acute glomerulonephritis 1 week following recovery from dengue fever. Compare to the study done by Kamath et al the present study denotes HLH syndrome as the newer raising complication during this epidemic.[22]

The major contributor to the mortality was sepsis in 5 (62.5%) children, dengue in 2 (25%) and scrub typhus in

1 (12.5%) child. The mortality in sepsis is attributed to multiorgan dysfunction, late hospital admissions, severe acute malnutrition.[23] The mortality in dengue was associated with ARDS and multiorgan dysfunction. The mortality in scrub typhus was associated with multi organ dysfunction and hemophagocytic lymphocytic histiocytic syndrome. There was no mortality noted in children who had malaria, enteric fever and undifferentiated fever. Gandhi et al found that good recovery was noted in 89% while 6% had mortality and 5% went DAMA. Dengue VHF and septicemia accounted for 50% of deaths each.[24]

Limitations

This study is applicable only to paediatric age group. Whether the study results can be extrapolated to the general population is not known.

This study includes only the infectious causes of febrile thrombocytopenia. Other haematological causes like ALL, sickle cell anaemia, megaloblastic anaemia were not taken into account.

Maximum possible effort to establish the aetiological diagnosis were made, however diagnosis could not be established in some of them which were labelled as undifferentiated fever.

The seasonal and regional variations play a definite role in the results of the study. The duration of study is limited.

CONCLUSION

Dengue is the most common aetiology Febrile thrombocytopenia especially during epidemic outbreaks. So, all fever cases should be evaluated and a baseline platelet count should be done. The major contributor to the mortality in febrile thrombocytopenia was sepsis in children. Establishing a correct diagnosis and early intervention can prevent fatal outcome. The risk of bleeding increases as the platelet count decreases. The mortality is not related to the severity of thrombocytopenia. Dengue was most commonly associated with severe thrombocytopenia whereas enteric fever and scrub typhus was associated with moderate thrombocytopenia. Complications like hemophagocytic lymphohistiocytosis syndrome are on the rise and it is important to diagnose them. Dengue has a very good outcome if treated early.

ACKNOWLEDGEMENTS

REFERENCES

1. Mahajan P, Batra P, Thakur N, Patel R, Rai N, Trivedi N et al. consensus guidelines on evaluation and management of the febrile child present to the emergency department in India. J Indian pediatr. 2107;54:652-60.
2. Modi TN, Mehta AD, Sriram AS. Clinical profile of febrile thrombocytopenia: A hospital-based cross-sectional study. J Res Med Dental Sci. 2016;4(2):115-20.
3. Mustafa MS, Rasotgi V, Jain S, Gupta V. Discovery of fifth serotype of dengue virus (DENV-5): A new public health dilemma in dengue control. Med J Armed Forces India. 2015;71(1):67-70.
4. Innis BL. Dengue and dengue hemorrhagic fever. Exotic viral infections. London: Chapman and Hall. 1995:103-40.
5. Kumar P, Chandra K. A clinical study of febrile thrombocytopenia: a hospital-based retrospective study. Indian J Clin Prac. 2014;24(10):952-7.
6. Gutthi LP, Vegesna S, Pundarikaksha V, Kolla S, Gundapaneni M, Karimi PK. A study of clinical and lab profile of fever with thrombocytopenia. Int J Contempt Medic Res. 2017;4(5):1057-61.
7. Paul UK, Bandyopadhyay A. Typhoid fever: a review. International Journal of Advances in Medicine. 2017;4(2):300-6.
8. Fadeel MA, House BL, Wasfy MM, Klena JD, Habashy EE, Said MM et al. Evaluation of a newly developed ELISA against Widal, TUBEX-TF and Typhidot for typhoid fever surveillance. Naval med res unit N York. 2011;09527.
9. A new vaccine for typhoid control. Lancet. 2018;391(10116):96.
10. Rose W. Scrub typhus in children. Curr Med Issues. 2017;15(2):90.
11. Kumar S, Kumar M, Aggarwal B, Kumari R. Scrub typhus in children: Clinical profile and complications at a Tertiary Care Teaching Hospital in Uttarakhand. Indian J Child Health. 2017;4(2):188-92.
12. Venkatesh C, Arulraj R, Soundararajan P, Srinivasan S. Scrub typhus in a child: Looking behind the ear and beyond. Indian j dermatol venereal leprol. 2014;80(2):165.
13. Rathi N, Kulkarni A, Yewale V. IAP guidelines on rickettsia diseases in children. Indian pediatrics. 2017;54(3):223-9.
14. Guerrier G. Association between age and severity to leptospirosis in children. PLOS neglected trop diseases. 2013;26;7(9):e2436.
15. Nair PS, Jain A, Khanduri U, Kumar V. A study of fever associated with thrombocytopenia. JAPI. 2003;51:1173.
16. Meena R, Meena NK. Clinical Profile of Fever with Thrombocytopenia in Tertiary Hospital, Jhalawar Medical College. JMSCR. 2016;4(12):14535-9.
17. Fawas MN. Study of acute febrile illness with thrombocytopenia in a tertiary care centre. IJRMS. 2018;6(1);455-8.
18. Nair BT, Sharma K, Sandeep D. A study of clinical and laboratory profile of febrile children presenting with thrombocytopenia. IJCP. 2017:4(6):2114-9.
19. Anand N. Clinical Outcomes of Patients Presenting as Fever with Thrombocytopenia in Marathwada Region. IJSR. 2016;5(2);530-33.
20. Pierce VM, Hodinka RL. Comparison of the GenMark Diagnostics eSensor Respiratory Viral Panel to Real-Time PCR for Detection of Respiratory Viruses in Children. J Clin Microbiol. 2012;50(11):3458-65.
21. Ramabhatta S, Kariyappa P, Kondappa B, Rao UM, Sanikam H. An aetiological profile of febrile thrombocytopenia in children. Sri Lanka J Child Health. 2018;47(2):146-8.
22. Kamath SR, Ranjit S. Clinical Features, Complications and Atypical Manifestations of Children with Severe forms of Dengue Hemorrhagic Fever in South India. Indian J Pediatr. 2006;73;889-95.
23. Shah S, Deshmukh CT, Tullu MS. The predictors of outcome and progression of pediatric sepsis and

septic shock: A prospective observational study from western India. J Postgrad Med. 2020;66(2):67-72.

24. Gandhi D, Pandya M, Dave H. Study of Febrile Thrombocytopenia in Pediatric Patients. Res Reviews J Med. 2017;7(1):17-20.

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