Original Research Article

A study of hematological parameters and requirement of platelet transfusion in dengue fever

Yashaswini L. S.*, Priya

Department of Medicine, Sree Rajarajeshwari Medical College and Hospital Kambipura, Mysore road, Bangalore, Karnataka, India

Received: 11 September 2017
Accepted: 06 October 2017

*Correspondence:
Dr. Yashaswini L. S.,
E-mail: yashaswini1486@yahoo.co.in

ABSTRACT

Background: Dengue is a common vector-borne disease in India with significant morbidity & mortality. Thrombocytopenia is a common complication in dengue. Bleeding manifestations in dengue put an immense pressure on both patients and treating physicians. There are no clear guidelines for transfusion of platelets in bleeding patients and role of Platelet transfusion in this condition is a bit controversial.

Methods: It was an observational study done at Sree Rajarajeswari medical college and hospital between 1st May and 31st July 2016. Total of 100 dengue-positive cases were studied with respect to clinical features, laboratory parameters and requirement of platelet transfusion.

Results: Majority of patients were males and in the age group 21-30 years. Fever was present in all cases, with a mean of 3-6 days duration. Epistaxis was the most common bleeding manifestation (43%), Malena being the least (3%). Leucopenia was observed in 52% patients. Thrombocytopenia was seen in 89% of admitted patients and 38% among them had raised aPTT. 53% of patients in our study received platelet transfusion.

Conclusions: Bleeding manifestations have no significant association with severity of platelet count. Severe leucopenia is associated with thrombocytopenia. There is no need of platelet-transfusion in all patients with thrombocytopenia with minor bleeds.

Keywords: Bleeding manifestations, Dengue fever, Platelet Transfusion

INTRODUCTION

Dengue fever has emerged as a major public health problem in India during recent times. It is a life-threatening illness affecting thousands of patients during epidemics. The word dengue is believed to have originated from Swahili language "ki denga pepo", which describes sudden cramp like seizure.[1] The first epidemic occurred in Manila, Philippines in 1953-54, followed by Bangkok in 1958, and Singapore, Malaysia, and Vietnam in the early 1960s. In India, the first major epidemic illness clinically compatible with dengue was reported from Madras in 1780, which later spread all over the country.[2] Four distinct serotypes of dengue virus are known to cause the disease (DEN-1, DEN-2, DEN-3 and DEN-4) and *Aedes Aegypti* mosquito is the primary vector. WHO classification is defined as follows: Dengue Fever (DF), Dengue Hemorrhagic Fever (DHF), and Dengue Shock Syndrome (DSS). The classical DF defined by the presence of acute febrile illness and $\geqslant 2$ of the following symptoms: headache, retro-orbital pain, myalgia, arthralgia, rash.

DHF was defined as fever with thrombocytopenia, any hemorrhagic manifestation e.g., positive tourniquet test, petechiae; purpura ecchymosis; gum bleeding; or vaginal bleeding and evidence of DHF with plasma leakage ($\geqslant 20\%$ hematocrit or by the presence of pleural or

abdominal effusion or hypoalbuminemia). DSS was defined by rapid and weak pulse with narrow pulse pressure.[3]

The most dreaded complication of Dengue is thrombocytopenia and bleeding as its consequence. The decreasing platelet counts have found to predict the severity of the disease. The association between low platelet count and bleeding manifestations has not been well studied in India. Also, there are lack of evidence-based guidelines for transfusion of platelets and other blood products when patients develop bleeding symptoms. All these can result in inappropriate use of blood components during dengue outbreaks. Early recognition of symptoms and meticulous management of patients is important to save precious lives from this killer disease. In this study, an attempt has been made to record various hematological abnormalities in response to severity of disease. The objective of present study was to analyze the clinical profile, derangement of various hematological parameters, requirement of platelets transfusion and outcome.

METHODS

The study was conducted on serologically confirmed cases of dengue infection in the inpatient Medicine department of Sree Rajarajeswari Medical College, Bangalore between 1st of May and 31st of July 2016. A total of 100 patients, presenting with fever and diagnosed as dengue based on NS1, IgM and IgG positivity were included in the study. Malaria, Leptospirosis, Enteric, Respiratory and Urinary Tract Infections were excluded by appropriate tests.

Clinical data were collected through interviewing the patients or their attendants and meticulous physical examination. Reports of hematological investigations, dengue serology, platelet requirements and other data obtained from daily follow-up were analyzed.

RESULTS

The involvement of all age groups, especially an adult predominance was observed. The mean age of the dengue patient was 34years and the most belonged to the 21-30-year age group, which included 49 patients (49%).

Table 1: Age distribution of patients studied.

Age in years	No. of patients	%
<20	5	5.0
20-30	49	49.0
31-40	22	22.0
41-50	11	11.0
51-60	9	9.0
>70	4	4.0
Total	100	100.0

Mean ± SD: 33.79±12.64

70 patients were males and 30 were females. Fever was the most common presenting symptom in this study. Fever was predominantly of intermittent type and in majority i.e. 68(68%) patients, fever was of 3-6 days duration. Mean duration of fever was 4days and ranged from 1-15 days. Other predominant symptoms and signs are shown in Table 2.

Table 2: Clinical features and associated co-morbidities distribution of patients studied.

	No. of patients (n=100)	%
Chills	63	63.0
Cough	12	12.0
Headache	48	48.0
Pain abdomen	16	16.0
Vomiting	41	41.0
Myalgia	71	71.0
Joint pain	65	65.0
Diabetes	8	8.0
Hypertension	8	8.0
IHD	4	4.0
Alcoholism	14	14.0
Smoking	15	15.0

Chills were present in 63% of cases and cough was the least common manifestation. In bleeding manifestations, epistaxis was most common, and melena was least (Table 3).

Table 3: Bleeding manifestations.

Bleeding manifestations	No. of patients(n=100)	%
Purpura	35	35.0
Epistaxis	43	43.0
Bleeding from gums	23	23.0
Melena	3	3.0

The hemoglobin level range was from 8-17.4gm%, with a mean level of 12.2 gm%. Most of the patients had hemoglobin level between 10-14gm/dl. The hematocrit ranged from 17.7-48.5% with a mean value of 36.6%.

Table 4: Distribution of patients according to leucocyte count.

Leucocyte count	Number of patients	%
<4000	52	52
4-11000	39	39
>11000	9	9

52 patients had leucopenia (<4000). Leucocyte count range varying between 1300-13700/cmm with a mean count of 5309/cmm. The correlation between low leucocyte count and thrombocytopenia was observed and was not statistically significant.

Table 5 distribution of patients according to platelet count.

Platelet count at admission	No. of patients	%
<10000	6	6
11-20000	28	28
21-50000	25	25
51-100000	30	30
>1 lakh	11	11

The range of platelet count at admission was 5000-186000/cmm, with a mean value of 80195/cmm. Thrombocytopenia was observed in 89 patients.

Table 6 Correlation between aPTT and platelet count.

	Platelet normal	Platelet decreased
aPTT normal	No cases	51
aPTT increased	No cases	38

Out of 89 patients with thrombocytopenia, 51 had normal APTT, 38 patients had raised APTT & 6 patients had raised PT. Raised APTT correlates with findings of severe thrombocytopenia.

About 53 of 100 serologically confirmed patients (53%) received platelet transfusion therapy. Among them, 28 patients were male, and 25 patients were female. 19 patients received transfusion when platelets were above 30000/cmm.

Table 7: At what level of platelets transfusion was done.

If yes at what level of platelets transfusion was done	No. of patients	%
<10	6	6.0
11-20	28	28.0
>30	19	19.0
NA	47	47.0
Total	100	100.0

Mean ± SD: 15.36±4.76

Most of the patients receiving platelet transfusion recovered completely and were discharged within 2-5 days of their last platelet transfusion. The platelet count had picked up considerably and the average platelet count at discharge was 1.2 lakhs.

DISCUSSION

Bangalore is one of the big cities in India where dengue epidemics are becoming common during rainy season. In this study, majority of cases were adults with the largest proportion in the age group of 21-30 years. This may be due to the fact that most of them are working population, construction site labourers and travelers. Habitats for *Aedes aegypti* are domestic containers, stagnant water, ornamental containers and roof gutters. These findings were comparable with a study conducted by Mukherjee s et al 4 in which 70% of the patients were aged 15-30 years.

In our study, 70 (70%) patients were male and 30 (30%) were females with a male to female ratio of 2:1. This is due to the fact that males predominantly form the working population and more prone to infection by mosquito bite in a day time. These findings were comparable with a study conducted by Mukherjee S et al in which male to female ratio were 3.3:1.[4] Similar results were also observed in studies conducted by Raiker S R et al and Ahmed S et al.[5,6]

In the present study all cases (100%) had fever (similar to Md Yousuf Khan et al study).[7] The typical 2-7 days fever as described by WHO was found in 68 cases (68%). Severe body ache, which is reported as prominent symptoms in dengue, was also seen in this study (71%). Retro-orbital pain which is generally considered as a cardinal feature of dengue fever was not so in our study. Other common clinical features included chills and rigor, vomiting and nausea, headache, melena, joint pain, abdominal pain, rashes. This is very similar with several other studies done in various other parts of India.[4,6]

Leukopenia was observed in 52% in present study. Neutropenia may be due to marked degeneration of mature neutrophils and "shift to left during febrile phases of illness. In a study by Ahmed et al, leukopenia was observed in 43%.[8] Prathyusha et al, in her study at eluru showed that with increasing severity of leukopenia there is increased incidence of hemorrhagic manifestations (P value 0.023). However, significant association between the two were not found.[9] Similar results were noted by Md Yousuf Khan and Manoj kumar et al.[7,10] In present study also, there was no statistically significant correlation between leukopenia and hemorrhagic manifestations.

On taking the WHO limit of less than 100000/mm^3 for thrombocytopenia, 89% patients had thrombocytopenia. Although thrombocytopenia was a common finding, there was poor correlation between thrombocytopenia and bleeding tendencies, an observation similar to other studies.[9] The platelet counts at admission were neither an indicator of prognosis nor of bleeding tendencies or progression of the disease.

This suggests that other factors like platelet dysfunction or disseminated intravascular coagulation may have role in bleeding in dengue fever. Therefore, coagulation profile should be done to rule out the cause of bleeding.

An altered coagulation profile was observed in 38% patients in our study and is indicative of the activation of both coagulation and fibrinolysis during acute dengue infection. This result was similar to that observed by Basak TB et al 11(33%), and Vibha et al.[12]

Published data from various institutions and countries have put varying figures as the trigger for platelet transfusion in hospitalized dengue patients. The DHS guidelines stipulate that platelet transfusion should be given to patients with platelet count < 20,000/cmm. In our study, 44 of the 53 patients receiving platelet transfusion followed the norms laid down by WHO. Among 19 patients having platelet count greater than 20,000/cumm, 5 had hemorrhagic manifestations like petechiae, gum bleeding, epistaxis, etc. that necessitated the use of platelet transfusion. However, 14 (14%) patients received inappropriate platelet transfusion.

Charulfath. A et al in their study showed that there was no influence of transfusion over bleeding symptoms as circulating platelets are hematologically active to prevent serious bleeding.[13] Chuansumrit et al in their study postulated that platelet transfusion is required in GIT bleeding and not for mere mucosal bleeding.[14] Vishwanath M et al conducted a study on pediatric patients at Mysore and concluded that thrombocytopenia in dengue is primarily immune mediated and giving platelets only worsened the situation. Also, transfusion might not be of great help as platelets have a short life span. They were also concerned about the hazards of transfusion in the form of fluid overload, hypersensitivity reactions.[15] Many times the prescription for this blood component is not based on medical rationale, but as a response to an intense social pressure on the treating physicians by the patients and their relatives.

CONCLUSION

Our study showed no significant correlation between hemorrhagic manifestations and low platelet count which was existent in previous literature. Though leukopenia was seen early in the disease there was no significant correlation to risk of complications. Bleeding in dengue fever is not due to thrombocytopenia alone but also due to altered coagulation parameters and platelet dysfunction. Platelet transfusion is not required in all cases of thrombocytopenia and treating physician should take decisions depending on patient condition. However, more such studies are required with more sample size to confirm these findings.

REFERENCES

1. Goel A, Patel DN, Lakhani KK, Agarwal SB, Aarwal A, Singla S et al. Dengue fever- A dangerous foe. J Indian Acad Clin Med. 2004; 5(3):247-58.
2. Chaturvedi UC, Nagar R, Shrivastava R. Macrophage and dengue virus: Friend or foe? Indian J Med Res. 2006;124:23-40.
3. World Health Organization, Special Programme for Research, Training in Tropical Diseases, World Health Organization. Department of Control of Neglected Tropical Diseases, World Health Organization. Epidemic, Pandemic Alert. Dengue: guidelines for diagnosis, treatment, prevention and control. World Health Organization; 2009.
4. Mukherjee S, Manna K, Datta P, Datta S, Chatterjee P. Dengue fever and its epidemiological characteristics: a study from Eastern India. Int J Community Med Public Health. 2016;3:3588-94.
5. Raikar SR, Kamdar PK, Dabhi AS. Clinical and laboratory evaluation of patients with fever with thrombocytopenia.Indian J ClinPract. 2013;24:360-3.
6. Ahmed S, Arif F, Yahya Y, Rehman A, Abbas K, Ashraf S, et al. Dengue fever outbreak in Karachi 2006 - A study of profile and outcome of children under 15 years of age. J Pak Med Assoc. 2008;58:4-8.
7. Khan MY. A study of clinical and laboratory profile of dengue fever in a tertiary care hospital, Nizamabad, Telangana State, India. Internat J of Contemp Medic Res. 2016;3(8):2383-8.
8. Narayanan M, Aravind MA. Dengue fever-clinical and laboratory parameters associated with complications. Dengue bulletin. 2003;27:108-15.
9. Prathyusha CV, Srinivasa Rao M, Sudarsini P, Uma Maheswara Rao K. Clinico-haematological profile and outcome of dengue fever in children. Int J CurrMicrobiolAppl Sci. 2013;2:338-46.
10. Kumar CM, Vyas KSK, Krishna YS. Clinical profile of dengue fever with severe thrombocytopenia and its complications: a retrospective study at a tertiary care hospital in South India. Int J Res Med Sci. 2017;5:1751-5.
11. Basak TB, Talukder SI. Clinical profile of dengue infection.Dinajpur Med Col. 2014;7(1):37-41.
12. Vibha V. Study of Haematological Profile of Dengue Fever and its Clinical Implication annals of applied biosciences. 2016;3:3.
13. Chairulfatah A, Setibudi D, Agnes R, Colebunder R. Thrombocytopenia and platelet transfusion in dengue. Hemorrhagic fever and dengue shock syndrome. WHO Dengue Bull. 2003;27:141-3.
14. Chansumrit A, Phimolthares V, Tartong P, Tapaneya-Olarn C, Tapaneya-Olarn W, Kowsathi P et al. Transfusion requirements in patients with Dengue hemorrhagic fever. Southeast Asian J Trop Med Public health. 2000;31(1):10-4.
15. Vishwanath M, Savitha MR, Krishnamurthy B. Platelet transfusion in dengue: peril or protection. Internat J Medic Res Rev. 2015;3:3.