

A study of platelet transfusion support to dengue patients in a hospital based blood transfusion centre

Abstract

Dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS) are life threatening clinical manifestations of infection due to dengue virus. Thrombocytopenia is found to be a common finding in dengue. The clinical features of Dengue fever are due to bleeding diathesis and increased capillary leak. The suggested features contributing to bleeding include thrombocytopenia, coagulopathy and vasculopathy. This study was undertaken to find out the number of platelet transfusion in dengue patients and to assess whether platelets have been transfused according to AABB guidelines. This was a descriptive study over a period of one year conducted in Father Muller Medical College Hospital Blood Centre. Details of the platelet component transfused during this period were collected, which included name, age, gender, unique identification number, ward number, blood group, clinical symptoms and signs, indications for transfusion, platelet count, haemoglobin level, and number of units of transfusion. The total number of dengue patients were 227 for whom 835 platelet components were transfused during the study period one year (January 2017 to December 2017). Patients between the age group of 31 to 40 comprised of 25.6% who received platelet transfusion. There was male preponderance (68.3%), females accounting to 31.7%. Platelet transfusion was most common in patients belonging to O Rh positive blood group (41.4%) and least (0.4%) was in B Rh negative. Patients with petechiae comprised of 7.5%, gum bleeding (4.4%) and epistaxis (4.0%). Out of 227 patients, 50.7% required 4 units of platelets. This study provides an information on platelet component usage in dengue patients. Twenty seven patients (11.9%) had a count of <10000 and the utilisation was as per AABB guidelines which improved their platelet count and overall health condition. Patients with bleeding manifestation accounted to 15.9% and hence received transfusion

Keywords: dengue fever, platelet transfusion

Volume 12 Issue 4 - 2024

Shankar S, Pailoor K

Professor and Head, Dept of IHBT, Father Muller Medical College, India

Correspondence: Kirana Pailoor, Professor and Head, Dept of IHBT, Father Muller Medical College, Mangaluru, Karnataka, India, Email dockirana@yahoo.co.uk

Received: November 11, 2024 | **Published:** December 06, 2024

Introduction

Dengue, the most common arbo-viral infection found in humans is caused by the bite of Aedes mosquito. It occurs worldwide in nearly all tropical and subtropical countries. The incidence has increased dramatically over the last few decades all over the world. If untreated, mortality arising from the complications can be as high as 20%, whereas, if recognized early and intervened properly, the mortality rate is found to be less than 1%.¹ Most dengue virus infections in children have minimal or no symptoms and cannot be easily distinguished clinically from other viral infections.² The clinical features of Dengue hemorrhagic fever and Dengue shock syndrome are due to bleeding diathesis and increased capillary leak. The suggested features contributing to bleeding include thrombocytopenia, coagulopathy and vasculopathy.³ The most striking laboratory finding in dengue is thrombocytopenia.⁴ It is essential to transfuse Platelet concentrate in severely thrombocytopenic patients affected with Dengue fever.⁵ Platelet transfusions are used to prevent spontaneous bleeding or to stop established bleeding in patients.⁶ Dengue virus infection may be asymptomatic or may cause undifferentiated febrile illness (viral syndrome), dengue fever, dengue haemorrhagic fever including dengue shock syndrome. Dengue Fever is commonly benign, is defined as acute febrile illness with two or more manifestations among headache, retro-orbital pain, myalgia, arthralgia. Haemorrhagic manifestation i.e., skin haemorrhage with tourniquet test. There have been reports of epistaxis, gingival bleeding, gastrointestinal bleeding, haematuria, and hypermenorrhagia. Dengue Fever complicated by unusual haemorrhage and thrombocytopenia must be differentiated from Dengue Hemorrhagic Fever.⁷ Severe thrombocytopenia can be

seen in both dengue fever and dengue hemorrhagic fever. There is a significant negative correlation between disease severity and platelet count. Although low platelet count and hypofibrinogenemia are the two most prominent hemostatic defects responsible for bleeding in dengue infection, thrombocytopenia and coagulation abnormalities do not reliably predict bleeding in dengue infection. Causes of thrombocytopenia include both bone marrow suppression and platelet destruction. Immune complex mediated platelet destruction is probably the most important factor contributing to thrombocytopenia in dengue infection.⁸

Materials and methods

Patients during the study period of one year (January 2017 to December 2017), 835 platelet components were transfused to 227 patients with Dengue Fever. This was a descriptive study conducted at Father Muller Medical College Hospital Blood Centre. The data was collected from serologically confirmed dengue patients who received platelet transfusion at our hospital over a period of one year. The patients who received platelet transfusion with dengue hemorrhagic fever were utilized for the study. Data such as age, gender, clinical diagnosis, indications, platelet count, hemoglobin level, number of platelet component transfused was collected. Descriptive analysis of the dengue patients from different clinical departments was done under the following parameters such as Diagnosis, Indication for transfusion, Number of units of platelet required and the specialty prescribing it. Also Patients details such as name, age, gender, unique identification number, ward number, blood group, clinical symptoms and signs, and Reports of investigations like Hemoglobin, Platelet count were also recorded. Type of request whether routine or emergency was noted.

Results

Table 1 Age wise distribution of patients who received platelet transfusion

Age	Frequency	Percentage
20 and below	14	6.2
21 – 30	50	22
31 – 40	58	25.6
41 – 50	52	22.9
51 – 60	34	15
Above 60	19	8.4
Total	227	100

The maximum number of platelet components was utilized in the age group of 31-40 years (25.6%) and least utilized in the age group of 20 and below (6.2%)

Table 2 Gender wise distribution of patients who received platelet transfusion

Gender	Frequency	Percentage
F	72	31.7
M	155	68.3
Total	227	100

Female recipients constituted 31.7% of total transfusion and the rest 68.3% were male recipients.

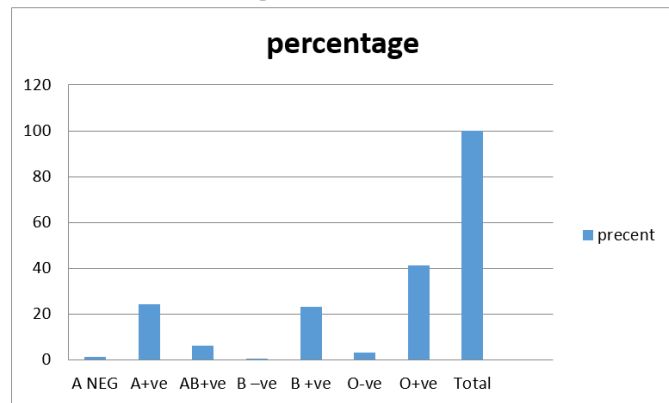


Figure 1 Distribution of blood groups.

The most common blood group for whom platelet was transfused was O Rh positive blood group (41.4%) and the least was B Rh negative (0.4%)

Table 3 Indications of platelet transfusion

Indications	Frequency	Percentage
Epistaxis	9	4
Gum bleeding	10	4.4
Petechiae	17	7.5
Thrombocytopenia(no bleeding manifestation)	191	84.1
Total	227	100

The most common indication for platelet transfusion in the study was thrombocytopenia without bleeding manifestation (84.1%) and the least was in Epistaxis (4.0%)

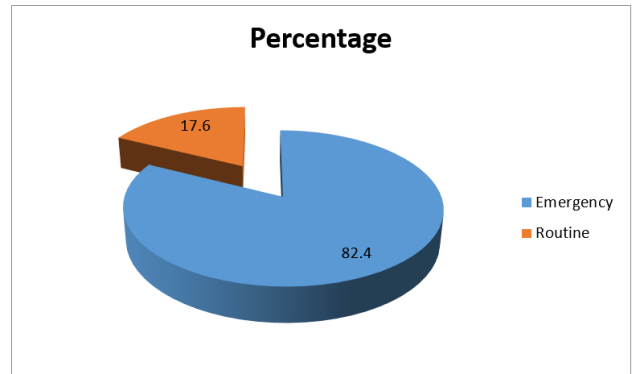


Figure 2 Type of request.

Out of 227 patients who received platelet during the study, 82.4% was emergency request and 17.6% were routine request.

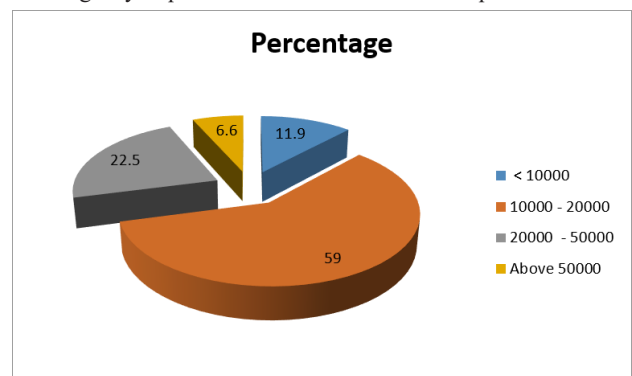


Figure 3 Platelet usage trend.

Out of 227 patients, 27(11.9%) patients had platelet count <10,000, 134 (59.0) had platelet count between 10000-20000, 15 (6.6%) patients had platelet count of >50000, 51(22.5%) patients had platelet count between 20000- 50000 It shows that significantly higher number of patients have received transfusion with platelet count of >10000 (P=0.000, <0.01). Only 11.9% of the patients who received platelet transfusion was as per AABB guidelines

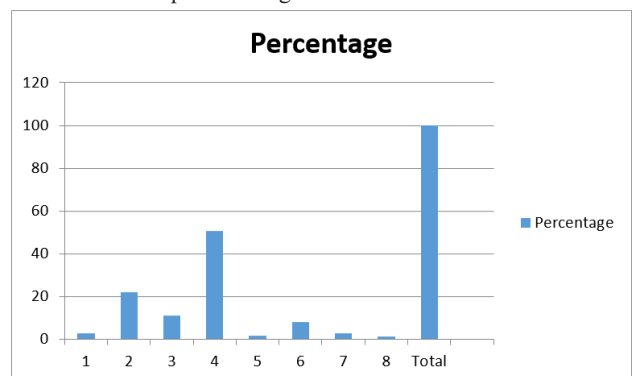


Figure 4 Number of platelets transfused.

Out of 227 patients, more than half number of patients (50.7%) received a maximum of 4 units each and only 3 patients (1.3%) received a maximum of 8 units each.

Discussion

Dengue fever is caused by the dengue virus which is transmitted to humans by the bite of Aedes aegypti mosquito. Patients suffering from

dengue fever (DF) present with fever, myalgia, headache, rash, and thrombocytopenia. Dengue hemorrhagic fever (DHF) and Dengue Shock Syndrome (DSS) are the two most severe complications of Dengue Fever as they are associated with decreasing platelet counts and increased vascular permeability. The critical phase of infection can be followed after defervescence and is more common in patients with secondary infection and other comorbidities. Thrombocytopenia is common and can occur with vascular leakage, shock, and organ impairment. Theorized mechanisms for thrombocytopenia include platelet activation, which causes attachment to the vascular wall forming thrombi and removal from circulation, immune cytotoxic effects through opsonization of platelets and direct infection of platelets, and megakaryocytes by the virus. The recovery phase occurs with resolution and stabilization of vitals.⁹ According to Ahammed SI et al, 19.5% platelet component transfusion was between the age group of 31 to 40 years.¹⁰ In our study, we found that the majority of the platelet transfusion (25.6%) was between the age group of 31-40 years, which is almost similar to the study done by Ahammed SI et al. In the present study, we found that 68.3% of population who underwent platelet transfusion were males. Thereby our study supported the previous existing study done by David C et al stating that nearly 64% of male patient received platelet component.¹¹ In a study done by RN Makroo et al, they found that (15.11%) hemorrhagic manifestations were present in patients with dengue fever which mainly included petechiae (9.3%), epistaxis (2.7%) and gum bleeding (3.55%).¹² In present study, we too derived similar finding with respect to the above mentioned study as hemorrhagic manifestations accounted to 15.9% in patients with dengue fever, which included petechiae (7.5%), epistaxis (4.0%), and gum bleeding (4.4%). A study done by Koifman et al, found that about 57.0% of hemorrhagic manifestations were present in their study.¹³ It is in contrast with the findings obtained in the present study. In our study, we found that hemorrhagic manifestations were upto 15.9%. The most probable reason for this difference could be due to the large number of transfusions that were conducted in their study when compared to the present study. A study done by⁷ found that 8% of patients who underwent platelet transfusion also had a platelet count of <10000. Our study correlates with the former findings as we found that 11.9% of the patients who underwent platelet transfusion also had a platelet count of <10000. A study done by Chaurasia R et al, found that 35.7% patients underwent platelet transfusion with the count of <10000.¹⁴ In contrast to this, in our study, we found that only 11.9% patients underwent platelet transfusion with the count of < 10000. The most probable reason for this difference could be due to the large number of transfusions that were conducted in their study when compared to the present study.

A study done by David C et al, found that majority of patients were transfused with 4 units of platelet component (75.5%),¹⁵ which is in contrast with our finding (50.6%). The most probable reason for this difference could be due to the large number of transfusions that were conducted in their study when compared to the present study. According to our study, patients belonging to O Rh positive blood group received maximum number of platelet transfusion (41.4%) and the least was in patients with B Rh negative blood group (0.4%). Out of 227 patients who received platelet in the present study, 82.4% was emergency request and 17.6% were routine request. However, after thorough literature search, we could not find studies describing about the usage of platelet component in dengue patients in terms of specific blood group, and also the type of request, whether emergency or routine. Hence, comparison could not be made in the present study. Our study shows that significantly higher number of patients have received transfusion with platelet count of >10000 (P=0.000, <0.01).

This correlates with a study done by Kurukularatne C et al who also found that large number of platelet transfusion was done in patients with platelet count >10000 (P<0.02). This was due to the prophylactic platelet transfusion followed in their study. This is similar to that of our study wherein prophylactic platelet transfusion was carried out with the intention of preventing hemorrhagic complications especially in patients with platelet count between 10000 to 20000 who comprised of 59% in our study.

Conclusion

This study provides an information on platelet component usage in dengue patients. Twenty seven patients (11.9%) had a platelet count of <10000 and the utilisation was as per AABB guidelines. Patients with bleeding manifestation accounted to 15.9% and hence received transfusion. However, 84.1% of the patients had thrombocytopenia without bleeding manifestation out of which 59% belonged to patients who had platelet count between 10000 to 20000. The transfusion was suggested by the clinicians in these patients due to the persistent request by the bystanders of patients. This was due to the anxiety because of reduced platelet count among patients and the relatives which lead to prophylactic platelet transfusion in order to prevent hemorrhagic manifestations. Irrational use of platelets will put the patient at a huge risk from transfusion-transmitted infections as well as transfusion-related adverse events. Hence proper co-ordination among Clinicians and Transfusion Medicine Specialist would be helpful in promoting rational use of platelets.

Acknowledgments

Blood centre team and management of Father Muller Medical College.

Conflicts of interest

The authors declare that there are no conflicts of interest.

References

1. Chaudhary R, Khetan D, Sinha S, et al. Transfusion support to dengue patients in a hospital based blood transfusion service in north India. *Transfus Apher Sci.* 2006;35(3):239–244.
2. Agruvat A, Pansuriya H, Dhruva G. Platelet count & haematocrit as early indicators in acute dengue illness. *Int J Res Med.* 2013;2(2):63–66.
3. Kabra SK, Jain Y, Madhulika, et al. Role of platelet transfusion in dengue hemorrhagic fever. *Indian Pediatr.* 1998;35(5):452–455.
4. Lee T, Wong J, Leo Y, et al. Potential harm of prophylactic platelet transfusion in adult dengue patients. *Plos Negl Trop Dis.* 2016;10(3):e0004576.
5. Kaufman R, Djulbegovic B, Gernsheimer T, et al. Platelet transfusion: a clinical practice guideline from the AABB. *Ann Intern Med.* 2015;162(3):205.
6. Gupta C, Gupta A. Platelet transfusion in dengue patients. *IJTM.* 2016;2–3.
7. Tewari KN, Tuli NR, Devgun SC. Clinical profile of dengue fever and use of platelets in four tertiary level hospitals of Delhi in the year 2009. *JIACM.* 2013;14(1):8–12.
8. Assir M, Kamran U, Ahmad H, et al. Effectiveness of platelet transfusion in dengue fever: a randomized controlled trial. *Transfus Med Hemother.* 2013;40(5):362–368.
9. Shwetha JH, Ashoka A, Shashikala P. Evaluation of platelet count as a predictive parameter in pediatric patients with dengue fever in a tertiary care center in Davangere. *Indian J Pathol Oncol.* 2017;4(1):77–79.

10. Ahamed SI, Bharath RR. Role of Platelet transfusion and its misuse in managing dengue fever. *International Journal of Scientific Study*. 2015;3(3):110–113.
11. Lye D, Lee V, Sun Y, et al. Lack of efficacy of prophylactic platelet transfusion for severe thrombocytopenia in adults with acute uncomplicated dengue infection. *Clin Infect Dis*. 2009;48(9):1262–1265.
12. Makroo RN, Raina V, Kumar P, et al. Role of platelet transfusion in the management of dengue patients in a tertiary care hospital. *Asian J Transfus Sci*. 2007;1(1):4–7.
13. Fujimoto DE, Koifman S. Clinical and laboratory characteristics of patients with dengue hemorrhagic fever manifestations and their transfusion profile. *Rev Bras Hemotol Hemoter*. 2014;36:115–120.
14. Chaurasia R, Zaman S, Chatterjee K, et al. Retrospective review of platelet transfusion practices during 2013 dengue epidemic of Delhi, India. *Transfus Med Hemother*. 2015;42(4):227–231.