

Platelet Transfusion Practice in Dengue Epidemic; Current Trends and Challenges – an Institutional Study

Soumya MH*, Das S and Kalyani R

Department of Pathology, Sri Devaraj Urs Medical College, Sri Devaraj Urs Academy, India

Abstract

Introduction: Dengue is an arboviral disease with an inherited risk associated with the transfusion of blood components and to prevent unnecessary transfusion during dengue epidemic a standard criteria has to be followed.

Aims/objectives: To record clinical features, laboratory investigations and management of hospitalized seropositive dengue patients. To review the appropriateness of platelet transfusion practices in order to ensure optimal utilization of platelets.

Material and methods: The Retrospective study is being done at RL Jalappa Medical Hospital from April 2015 to June 2019 on seropositive dengue cases. All serologically confirmed dengue cases who received platelet transfusion were included in the study. Patient's clinical data and platelet counts were obtained from platelet requisition forms and Medical Record Department. Case definition of Dengue/DHF/DSS applied in the present study was as recommended by WHO4 i.e. Guidelines for platelet transfusion in R. L. Jallappa Hospital Hospital were utilized as the criteria to assess the appropriateness of platelet transfusion adapted from British Committee for Standardization in Hematology (BCSH) has recommended a platelet count <10000/cmm for prophylactic platelet transfusion in those with no other risk factors which would increase the risk of bleeding.

Statistical analysis: Data management and analysis was done by SPSS version 22.0.

Results: During study period total of 1361 cases were diagnosed as dengue infection (out of which 757-males, 604-females). Maximum cases were seen in the age group of 11-18. All patients were categorized as per WHO dengue case classification into Dengue Fever, Dengue Haemorrhagic Fever, and Dengue Shock syndrome. In which 72.5% of patients were DF, 23.4% were DHF and 4% of DSS. In present study, maximum number of Patients and platelets transfused was seen when platelet count was 11-20 × 1000/cmm that is 777 units in which RDP was 697 and SDP was 80 and lowest number of platelets transfused was seen when platelet count was >60. A total of 2705 RDP and 359 SDP were transfused to 1361 patients, of these 1361 patients, 316 bleeding patient received PT and 1045 non bleeding patient received prophylactic platelet transfusion in which 140 patient was requiring actual platelet transfusion and 905 patients were not needed.

Conclusion: Inappropriate usage of platelets leads to shortage of platelets. Strict adherence to British Committee for Standardization in Hematology (BCSH) Guidelines will optimize platelet usage with this true DHF and DSS will be benefited during epidemic outbreaks. Educating patients and Patients attenders will help reducing anxiety and this in turn help clinician for better judgment on evidence based transfusion reducing inappropriate transfusion. This study emphasis on platelet usage trends in regional areas and highlighting.

Keywords: Dengue fever; Dengue hemorrhagic fever; Dengue shock syndrome; Random donor platelet; Single donor platelet

Introduction

Dengue is an Arboviral disease caused by the dengue virus which is carried by and introduced into human host by the female Aedes mosquito [1]. The global incidence of dengue has significantly increased over the past decade and is now endemic in many developing countries [1]. WHO classifies and defined the disease as follows: Dengue Fever (DF), Dengue Hemorrhagic Fever (DHF), and Dengue Shock Syndrome (DSS). The classical DF is defined by the presence of acute febrile illness and ≥ 2 of the following symptoms: headache, retro-orbital pain, myalgia, arthralgia and rash [2]. DHF is defined as fever with thrombocytopenia, any hemorrhagic manifestation e.g., positive tourniquet test, petechiae; purpura ecchymosis; gum bleeding; or vaginal bleeding and evidence with plasma leakage ($\geq 20\%$ hematocrit or by the presence of pleural or abdominal effusion or hypoalbuminemia) [2]. DSS was defined by rapid and weak pulse with narrow pulse pressure [2]. There is large lack of evidence-based platelet transfusion guidelines when patients develop bleeding symptoms in Dengue infection.

All these cause wastage of platelet component by unnecessary transfusion which can result in scarcity of platelets during dengue outbreaks and actual patients are not benefitted. In India, blood transfusion services are highly fragmented, and only 35% blood units are separated into components [3].

In dengue infection prominent feature is thrombocytopenia. The major cause of thrombocytopenia is immunological destruction of platelets which contributes to platelet dysfunction and disturbed hemostasis in dengue patients [4]. The present study was undertaken

***Corresponding author:** Soumya MH, Department of Pathology, Sri Devaraj Urs Medical College, Sri Devaraj Urs Academy, India, Tel: 8383869289; E-mail: soumyahadimani@gmail.com

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to assess and analyse the utilisation of platelet products in a tertiary care hospital during the period of April 2015 to June 2019.

Methodology

Case definition of DF/DHF/DSS applied in the present study was as recommended by WHO Guidelines for platelet transfusion in R. L. Jallappa Hospital were utilized as the criteria to assess the appropriateness of platelet transfusion adapted from British Committee for Standardization in Hematology (BCSH) which has recommended a platelet count <10 000/cmm for prophylactic platelet transfusion in those with no other risk factors which would increase the risk of bleeding. Grades of bleeding were evaluated as per criterion listed in Table 1 [5].

Results

During the study period, a total of 1361 patients were diagnosed of dengue infection, (757 males, 604 females) was admitted and given platelet transfusion. Maximum age group having dengue infection was seen in the age group of 10-30 years, out of which maximum cases were seen in the age group of 11-18 which may be attributed to increased exposure to environment and less knowledge about the safety measures (Figure 1).

All patients were categorized as per WHO dengue case classification into Dengue Fever, Dengue Haemorrhagic Fever and Dengue Shock Syndrome. In our study Dengue fever cases was 72.5%, Dengue Haemorrhagic Fever was 23.4%, Dengue Shock Syndrome was 4.0% (Table 2).

Category	Definition
Minor	Petechiae, purpura, ecchymosis, oropharyngeal/gum bleeding, epistaxis, vaginal spotting, retinal haemorrhage without visual impairment and any bleeding not requiring red cell transfusion,
Major	Melaena, haematemesis, haemoptysis, haematuria, haematochezia, abnormal vaginal bleeding, musculoskeletal/soft tissue bleed, CNS bleeding including retinal bleeding with visual impairment, invasive site bleeding or any bleeding requiring red cell transfusion and any debilitating/ fatal bleed

Table 1: Grades of bleeding.

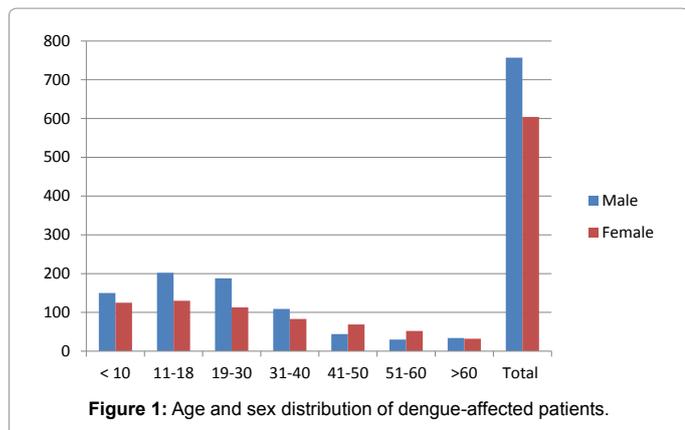


Figure 1: Age and sex distribution of dengue-affected patients.

Category	Number	%
Dengue Fever	987	72.5
Dengue Haemorrhagic Fever	319	23.4
Dengue Shock syndrome	55	4.0
Total	1361	100

Table 2: Categories of dengue infection.

The diagnosis was established on clinical suspicion and confirmed by laboratory tests like ELISA and dot blot assays of non-structural protein 1 (NS1) or by commercially available immunochromatographic kits for anti-dengue IgM and IgG antibodies. In our study total no of NS1 positive cases were 652(45.90%), IgM was 310 (22.77%) and NS1 and IgM was 399 (29.31%) (Table 3).

In Table 4 we have divided total no of patients having different platelet counts ranging from <10 to >60 × 1000/cmm and observed how many units of platelets transfused, out of which how many patients were transfused with RDP (Random Donor Platelet) and SDP (Single Donor Platelet). In present study, maximum number of Patients transfused with platelets was seen when platelet count was 11-20 × 1000/cmm that is 777 units in which RDP was 697 and SDP was 80. Lowest number of platelets transfused was seen when platelet count was >60.

In Table 5 we have divided patients receiving platelet transfusion into bleeding and non bleeding. In Table 6 the patients are classified as bleeding and non-bleeding patients versus BCSH guidelines followed and unfulfilled. Total no of bleeding patients was 316 and non-bleeding was 1045. We observed that maximum no of bleeding patients was seen with platelet count of 11-20 × 1000/cmm and maximum

	Total no of cases	%
NS1 Positive	652	45.90
IgM Positive	310	22.77
NS1 and IgM Positive	399	29.31
Total	1361	100

Table 3: Patients with NS1 Positive, IgM positive, both NS1 and IgM positive and negative cases.

Platelet counts × 1000/cmm	No of patients	No of units of platelets transfused	RDP	SDP
<10	230	664	566	98
11-20	302	777	697	80
21-30	326	434	399	35
31-40	152	364	296	68
41-50	160	359	315	44
51-60	90	232	200	32
>60	101	234	232	2
Total	1361	3064	2705	359

Table 4: Platelet counts and platelet transfusion details.

Platelet count 10 ⁹ /l	Number of patients		
	Total	Bleeding	Non-bleeding
<10	230	90	140
11-20	302	110	192
21-30	326	50	276
31-40	152	23	129
41-50	160	29	131
51-60	90	11	79
>60	101	3	98
Total	1361	316	1045

Table 5: Platelet counts of patients receiving platelet transfusion (Bleeding and Non-Bleeding).

	Bleeding	Non bleeding
Guidelines fulfilled	316	140
Guidelines unfulfilled	-	905

Table 6: Number of patients following BCSH Guidelines.

Blood group	Patients			Total cases
	%DF (72.5)	% DHF (23.4)	%DSS (4)	100% (1361)
A	218	153	10	381
B	101	222	13	336
AB	56	51	7	114
O	202	303	25	530

Table 7: Association between different blood groups and forms of dengue.

no of non-bleeding cases was seen with platelet count $21-30 \times 1000/\text{cmm}$. Patients who fulfilled British Committee for Standardization in Hematology (BCSH) Guidelines was 316 bleeding patients, out of 1045 non-bleeding patients, 140 patients with platelet count $<10,000/\text{cmm}$ followed guidelines and prophylactic platelet transfusion was done. 905 non-bleeding patients received platelet transfusion unnecessarily and did not follow guidelines leading to wastage of platelet component (Table 7).

In present study we divided DF, DHF and DSS into different blood groups and observed association between different blood groups and forms of dengue. Maximum no of patient who had DF was of A blood group, severe forms of dengue like DHF and DSS was associated with O blood group.

Discussion

In present study total 1361 cases with Dengue infection was transfused platelets (757 males, 604 females). Male predominance was seen similar to that reported in other studies [5-8]. In present study maximum number of patients was in the age group of 11-18years i.e. pediatric age group predominance was seen, which may be attributed to increased exposure to environment and less knowledge about the safety measures, while study done by Yashaswini et al. [9] shows adult predominance.

In present study dengue infections included DF (72.5%), DHF (23.4%), DSS (4.0). In a study by Rahul et al 531 dengue positive cases were given platelet transfusion of which 457(86.0%) DF, 19 (6.4%) DHF and 21 (4%) DSS. Present study has more number of DHF and less number of DF. The difference may be attributed to better reporting of bleeding status in present study.

In present study 2705 RDPs and 359 SDPs were transfused to 1361 patients. Rahul et al. reported transfusion of 1750 RDPs and 114 SDPs unit of platelets transfused to 531 patients. The higher amounts of platelet transfusion in present study may be because of larger number of bleeding patient (200) with platelet count $<20 \times 10^9/l$ in present study who were appropriate candidates for platelet transfusion according to BCSH. Non-bleeding 905 patient was received inappropriate platelet transfusion. Causes of bleeding other than dengue were ruled out before initiation of platelet transfusion in all patients [10]. In present study maximum number of patients with O blood group has DHF and DSS. In contrast to present study, study done by Kalamathy et al. showed high number of cases with AB blood group having severe forms of Dengue like DHF and DSS.

Conclusion

Inappropriate usage platelets for stable patients with low platelet count causes decreased availability of platelets, Consequently, with best efforts by blood bank the sever forms of Dengue patients with DHF/DSS might not get intended dose of platelets. There is a need for decreasing unwanted transfusions, which can be achieved by strict adherence to British Committee for Standardization in Hematology (BCSH) Guidelines. Educating patients and Patients attenders will help in reducing anxiety and this in turn help clinician for better judgement on evidence based transfusion reducing inappropriate transfusion. This study highlight the trends of platelet usage in Kolar and adjoining areas, with emphasis on appropriate and inappropriate usage, which in turn may help in identifying the deficiencies in platelet transfusion services and also help in formulating Indian Guidelines to render better patient care based on regional scenarios.

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