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Application of WHO-2009 guidelines in management of dengue in children and its outcome evaluation

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ABSTRACT

Background: Dengue is the commonest mosquito born viral infection. The numbers of dengue cases are increasing in recent days. Though the manifestations of dengue are complex, management is made simple by WHO-2009 guidelines. Many of clinicians are unaware or not sensitized about WHO-2009 guidelines in classification and management of dengue cases.

Methods: 143 suspected dengue cases were selected based on presumptive diagnostic criteria and were classified as group A, B and C, and all the patients were treated according to WHO guidelines. 108 cases with positive dengue IgM/IgG were chosen for analysis and rest of the cases were excluded from the study. The ELISA for IgM & IgG was sent on 5th-6th day of fever.

Results: 108 dengue IgM/IgG positive cases were selected for the study. They were grouped as Group A (20), Gr B (60), Gr C (28) according to guidelines. Most common associated symptoms were vomiting (60%), pain abdomen (61%), and puffiness of face (58%). Rashes were present in small number of patients (7.4%) and bleeding in 2.7% children. 5% in group A, 6.6% in group B and 17.8% in group C had platelet counts of <20000/mm³. 70% children of Group -A, 75% of Group -B and 85.7% of Group -C had PCV of >35, with maximum of 53.2 belonging to Group C. None of the patient received platelet transfusion. All children recovered well.

Conclusions: In the present study we managed all the dengue cases as per guidelines of WHO-2009. The treatment is cost effective and has very good outcome with less complications. The mortality, morbidity and duration of hospital stay were reduced. The need for iv fluids, blood and blood products were brought down significantly.

Keywords: Dengue fever, Platelets, WHO-2009 guidelines

INTRODUCTION

Dengue is the most rapidly spreading mosquito-borne viral disease in the world with higher a higher case-fatality rate (3.55%) in south-east Asia compared to rest of the world.¹ Dengue inflicts a significant health, economic and social burden on the populations of endemic areas. Dengue virus (DEN) is a small single-stranded RNA virus comprising four distinct serotypes (DEN-1 to -4). These closely related serotypes of the dengue virus belong to the genus Flavivirus, family

Flaviviridae. The various serotypes of the dengue virus are transmitted to humans through the bites of infected Aedes mosquitoes, principally *Ae. Aegypti*, and humans are the main amplifying host of the virus. The disease has now become endemic in India with infection occurring throughout the year. Dengue has a wide clinical spectrum that includes both severe and non-severe clinical manifestations. Triage, appropriate treatment, and the decision as to where this treatment should be given are influenced by the case classification for dengue. Symptomatic dengue virus infections were grouped into three categories: undifferentiated fever, dengue fever (DF) and dengue haemorrhagic fever (DHF). DHF was further classified into four severity grades, with grades III and IV being defined as dengue shock syndrome.² There have been many reports of difficulties in the use of this classification. The classification into levels of severity has a high potential for being of practical use in the clinicians' decision as to where and how intensively the patient should be observed and treated. World Health Organisation (WHO) -2009 guideline classifies dengue as dengue±warning signs and severe dengue. Additionally, the guide uses three categories for case management (A, B, C). Though the disease is complex in its manifestations, by following WHO-2009 guidelines, management has become relatively simple, inexpensive and very effective in saving lives.

METHODS

The study is conducted at a tertiary care hospital of south India with intensive care facility, for a period of six months. It is a prospective observational study.143 Suspected dengue cases (live in /travel to dengue endemic area, with fever and 2 of the following criteria: Nausea and/or vomiting, rash, aches and pains, tourniquet test positive, leukopenia) were selected based on WHO presumptive diagnostic criteria. Cases were tested for Dengue IgM/IgG ELISA on 5th-6th day of fever, 108 cases were tested positive and they formed the study population. WHO classifies dengue as dengue±warning signs (abdominal pain or tenderness, persistent vomiting, clinical fluid accumulation, mucosal bleed, lethargy, restlessness, liver enlargement >2 cm, increase in haematocrit (HCT) concurrent with rapid decrease in platelet count) and severe dengue (severe plasma leakage, severe bleeding, severe organ involvement). Additionally, the guide uses three categories for case management (A, B, C). Dengue cases without warning signs as group A, those with warning signs as group B and group C includes severe dengue cases. The study population is categorized as per WHO guidelines and managed accordingly.

RESULTS

108 dengue IgM/IgG positive cases were selected for the study. They were categorized as Group A (20), Group B (60), Group C (28) according to guidelines (Table 1).

Table 1: Number of cases.

WHO class	Number (N=108)	Percentage
Group A	20	18.51
Group B	60	55.55
Group C	28	25.94

Most common associated symptoms were vomiting (60%), pain abdomen (61%), and puffiness of face (58%). Rashes were present in small number of patients (7.4%) and bleeding in 2.7% children (Table 2).

Table 2: Symptomatology.

Symptoms	Number (N=108)	Percentage
Fever	108	100
Vomiting	65	60
Pain abdomen	66	61
Head ache	63	58
Puffiness of face	63	58
Tourniquet test	23	21
Rash	8	7.4
Bleeding	3	2.7

Most of the patients belong to age >5 yrs, 60% in Group A, 78% in Group B, and 64% in Group C. Male to female ratio was 1.3:1

Table 3: Duration of fever.

Duration (days)	Number (N=108)	Percentage
3-5	44	40.74
6-8	52	48.14
>8	12	11.11

40% patients had fever for 3-5 days, 48% had 6-8 days, 11% had >8days (Table 3).

Table 4: Platelet counts.

Platelet count	Group A	Group B	Group C
<20000	5%	6.6%	17.8%
20000-50000	10%	43%	39%
50001-100000	60%	45%	39%
>100000	25%	5.4%	4.2%

In Group A, 60% had platelet count of 50000-100000, 10% had 20000-50000 and 5% less than 20000. In Group B, 45% had platelet count of 20000-50000, 43% had 50000-100000, and 6.6% had less than 20000. In Group-C, 39% had platelet count of 20000-50000 and 50000-100000, 17.8% had <20000 (Table 4).

Table 5: Hematocrit at presentation.

Hematocrit	Group A	Group B	Group C
>35	70%	75%	85.7%
<35	30%	25%	14.3%

70% children of Group -A, 75% of Group -B and 85.7% of Group-C had PCV of >35, with maximum of 53.2 belonging to Group C (Table 5). Hypoalbuminemia was significant finding in all groups (Gr A-95%, Gr b-95%, Gr C-85.7%).

Management

The intravenous (iv) fluid was given to those patients who had hypotension and for those who were not tolerating oral fluids. The iv fluid used was Ringer lactate. The entire group A patients were treated with ORS and oral fluids with strict urine output monitoring.

76.6% of group B patients were treated in similar way with only oral fluids and only 23% were given iv fluids, of them 71% given for 2 days and 29% for 3 days.

All group C patients were given iv fluids,46% of the patients for 2 days,37% for 3 days and 17% for 4 days.3% needed 20ml/kg bolus initially (decompensated shock) and needed iv fluids for 3 more days because of persistent hypotension.

Table 6: Duration of stay.

Duration (days)	Group A	Group B	Group C
<3 days	45%	20%	0%
3-5 days	50%	55%	64.28%
>5days	5%	25%	35.72%

Average duration of stay for group A patients were <3 days in 45% children, 3-5 days in 50% and only 5% patients needed >7 days. 55% children in group B stayed for 3-5 days and 35.7% children from group C stayed for >7 days (Table 6).

With WHO guidelines, 2 patients in Group B and 4 in Group C received fresh frozen plasma (FFP), and 1 in Group -B and 2 patients in Gr-C had complications like acute respiratory distress syndrome (ARDS) and encephalitis.

1 patient changed from Group A to Group B in course of treatment and 3 patients changed from Group B to Group C.

DISCUSSION

There are at least 4 distinct antigenic types of dengue virus (dengue 1, 2, 3, and 4), members of the family Flaviviridae. Dengue viruses are transmitted by mosquitoes of the Stegomyia family. *Aedes aegypti*, a daytime biting mosquito, is the principal vector. The pathogenesis of dengue hemorrhagic fever is incompletely understood, but epidemiologic studies suggest that it is usually associated with second heterotypic infections with dengue types 1-4.³

All the patients presented with fever, 48% had fever for 6-8 days, very few (11%) had fever for >8 days. Vomiting, pain abdomen, headache were the other predominant presenting features. 58% had facial puffiness during the clinical course of the disease. Tourniquet test was positive only in 21% of cases. Rash and bleeding manifestations were less. In a study from Kerala, another south Indian state, incidence of rash, bleeding manifestations and tourniquet test positivity was more compared to present study.⁴ This may be related to prevalence of particular type of dengue virus.

Dengue infection is a systemic and dynamic disease. The clinical course of dengue infection varies from individual to individual and even in the same individual from time to time. It has a wide clinical spectrum that includes both severe and non-severe clinical manifestations.5 While most patients recover following a self-limiting non-severe clinical course, a small proportion progress to severe disease, mostly characterized by plasma leakage with or without haemorrhage, but the group progressing from non-severe to severe disease is difficult to define. WHO in 1997 released the guidelines where the cases were classified in to undifferentiated fever, dengue fever (DF) and dengue haemorrhagic fever (DHF). DHF was further classified into four severity grades, with grades III and IV being defined as dengue shock syndrome (DSS).² Many counties including India adapted the same in their national guidelines.^{6,7} Even in 2014 guidelines by Government of India, the same classification is been followed.8 There have been many reports of difficulties in the use of this classification.9,10 Hence, WHO in 2009 guidelines classifies dengue into dengue \pm warning signs and severe dengue. Additionally, the guide uses three categories for case management i.e., A, B and C.¹ Majority (55%) of our study population had children belonging to group B, 26% belonged to group C (severe dengue). Thrombocytopenia is an important laboratory finding in dengue fever. 17.8% of children in group C, 5% in group A had platelet count of <20000. None of the children in any groups received the platelet transfusion. This in contrary to the study by Kanth et al, where they suggest urgent platelet transfusion for patients having platelet count <20,000/mm^{3.11} Bleeding in dengue fever may result from a combination of factors such as thrombocytopenia, coagulation defects, vasculopathy or liver injury. Hence platelet transfusion alone may not prevent bleeding. WHO mentions that there is little evidence to support the practice of transfusing platelet concentrates and/or fresh-frozen plasma for severe bleeding. Tau-Hong Lee et al notes that platelet transfusion in absence of bleeding in adult dengue with platelet count <20,000/mm³ did not reduce bleeding or expedite platelet recovery.¹²

Increased haematocrit (HCT) is another important finding especially in severe dengue. We noted 85.7% children in group C had HCT of >35, which is indicative of plasma leak. 35.7% patients from group C stayed in hospital for >5 days.

Management of dengue fever is made simple by WHO guidelines. Group A patients can be sent home with proper advice about follow up, if kept in hospital for other reasons, they can be given only oral fluids. Group B patients needs meticulous fluid management, stable patients can be asked to consume more fluids, those who are not tolerating oral fluids will be given intravenous fluids. Group C patients are to be managed in intensive care units with meticulous treatment of shock and/or organ involvement. In present study 2 patients were mechanically ventilated for severe ARDS, another one had encephalitis. All the 108 patients recovered, no mortality was observed.

CONCLUSION

For a disease that is complex in its manifestations, management is made relatively simple by WHO-2009 guidelines; it is inexpensive and very effective in saving lives so long as correct and timely interventions are instituted. We stress up on adherence to the WHO classification of dengue for the proper treatment and better outcome. Need for platelet transfusion is rare unless patient has severe bleeding, no role of prophylactic platelet transfusion.

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