STUDY OF DENGUE FEVER BETWEEN INFANTS (≤ 1 YEAR) AND OLDER CHILDREN (> 1 YEAR) IN A TERTIARY CARE HOSPITAL

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ABSTRACT

BACKGROUND

Dengue fever has been a common and fatal vector borne disease in tropical countries and is found to be present throughout the year and also to occur in epidemics. There has been very little information on dengue illness in infants; also, there are few efforts to compare the illness of infants and that of older children. We wanted to compare the clinical features of dengue fever including complications and outcome along with the laboratory parameters in infants with those of older children.

METHODS

This is a retrospective cohort study. Case records of sero positive cases of dengue fever admitted to in the Department of Paediatrics of KAHER's Dr. Prabhakar Kore Hospital & Research Centre, attached to Jawaharlal Nehru Medical College, Belagavi, Karnataka, India, throughout the epidemic period from 1st June to 30th September 2015, were analysed.

RESULTS

A total of 31 infants (less than or equal to one year) with dengue fever, were compared with 80 older children (more than one year) with dengue fever. Mean age of infants was 5 months and that of older children was 9.2 years. Male to female distribution was 2:1.4 in infants, and 1.8:1 in older children. Symptoms like cough, coryza, diarrhoea, convulsions, flushing and reduced urine output, were more common in infants compared to older children, which was statistically significant ($p < 0.05$). Hepatosplenomegaly, ascites, pleural effusion, petechiae, conjunctival haemorrhage were more common in infants which was statistically highly significant ($p = 0.000$). Mean haematocrit value was significantly higher in infants compared to older children ($p = 0.000$). Complications of dengue like dengue shock syndrome (DSS) and/or dengue haemorrhagic fever (DHF) and acute respiratory distress syndrome (ARDS) were more common in infants as compared to older children ($p < 0.05$). The time taken for recovery of platelet count to more than 100000/cumm, time taken to become afebrile, and duration of hospital stay, were longer in infants as compared to older children which was statistically highly significant ($p = 0.000$).

CONCLUSIONS

Dengue infection in infants when compared with that of older children is more severe.

HOW TO CITE THIS ARTICLE: Machakanur V, Kamble M. Study of dengue fever between infants (≤ 1 year) and older children (> 1 year) in a tertiary care hospital. J. Evolution Med. Dent. Sci. 2019;8(18):1443-1445, DOI: 10.14260/jemds/2019/321

BACKGROUND

Dengue fever is the most rapidly-spreading mosquito-borne disease worldwide. An estimated 50 million infections occur every year. The case fatality rates of Dengue in the South-East Asian region are 1%, but it is maximum in focal outbreaks of India, Indonesia and Myanmar (3%-5%).¹

In majority of cases, nearly 95% occur in children less than 15 years of age, and most of all dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS) are found to manifest in infants. The death rate of severe forms of DHF/DSS, grade 3 DHF or grade 4 DHF is 5% in children less than 15 years of age.^{1,2}

Infants have more significantly severe Symptoms, signs and complications of dengue, compared to older children and adults. There is evidence of vertical transmission of dengue virus and IgG type of anti-dengue antibodies (from mother to baby) and it might be responsible for the pathogenesis and

severe manifestations in infants.² There is lack of literature on dengue in Indian infants due to various practical limitations. Hence, we did take this study to analyse the clinical spectrum, outcome of dengue in infants and children. Hence, we provide a comprehensive description of spectrum of dengue infection in infants (Equal or less than 1 year) and older children (More than 1 year) and compare both these groups. This study also reviews existing knowledge on dengue virus infection, its challenges in infants and stimulates us to the need to focus on this problem.

Aims and Objectives

1. To compare the clinical features of dengue-fever, complications and laboratory parameters in infants with older children.
2. To compare outcome of dengue fever between infants and older children.

METHODS

Design

This is a retrospective cohort study.

Setting

The study was done in The Department of Paediatrics of KAHER's Dr. Prabhakar Kore Hospital & Research Centre, attached to Jawaharlal Nehru Medical College, Belagavi, Karnataka, India

'Financial or Other Competing Interest': None.
Submission 26-03-2019, Peer Review 23-04-2019,
Acceptance 26-04-2019, Published 06-05-2019.

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DOI: 10.14260/jemds/2019/321

Patients

The study population was cases of dengue fever with positive serology (NS1 and/or IgM positive) who were either dengue fever (DF), DSS or DHF admitted in the Department of Paediatrics of KAHER's Dr. Prabhakar Kore Hospital & Research Centre throughout the epidemic period of 2015 from 1st June to 30th September.

Main Outcome Measures

Present study being a case record review of patients of dengue fever, who were admitted in The Department of Paediatrics of KAHER's Dr. Prabhakar Kore Hospital & Research. A checklist of such patients was prepared which included age of the patient, duration of fever before admission, other associated symptoms, danger signs, bleeding manifestations, result of dengue serology, platelet count on admission and daily reports, highest packed cell volume, administration of platelet transfusions were recorded.

The main outcome measures studied were complications of dengue such as DSS, DHF and acute respiratory distress syndrome (ARDS), any other morbidities, mortalities, time taken to improve platelet count to rise greater than 100000/cu mm, to become afebrile and to get discharged from hospital were recorded, analysed all with respect to two groups i.e., infants and older children. WHO recommendations-2012 were used to define DF, DSS and DHF.

Statistical Analysis

Chi square test were used to analyse and interpret the results. Statistical-software SPSS version 20.0 was used. The p-value of <0.05 was taken statistically significant.

RESULTS

In this epidemic period, total of 111 cases of seropositive dengue were collected of which 31 were infants (27.8%) and 80 older children (72.2%). The mean age was 5 months in infants and 9.2 years in older children.

The male: female ratio in study population was 2:1.4 in infants and 1.8:1 in older children. There was no mortality in either study groups.

1. Analysis of Symptoms and Signs: [Shown in Table 1]

Infants presented with mean 4.2 days of fever whereas older children with 5.1 days. Cough was a common presenting complaint in 18.2% infants as compared to 5.5% in older children, which was statistically significant ($p=0.011$). Coryza, diarrhoea and flushing were more common in infants as compared to older children which were statistically highly significant ($p=0.000$). Convulsions with fever was common presenting symptom in infants compared to older children which was statistically highly significant ($p=0.000$). Reduced urine output was more common in infants compared to older children ($p=0.011$). Hepatomegaly and splenomegaly were significantly more common in infants compared to older children ($p=0.000$). Petechiae and conjunctival bleeds were more common in infants compared to older children, with statistically high significance ($p=0.000$).

Symptoms and Signs	Infants N (%)	Older Children N (%)	p Value
Fever	31 (100)	80 (100)	
Lethargy	4 (12.9)	0 (0)	0.000
Vomiting	17 (54.8)	21 (26.25)	0.420
Restlessness	3 (9.6)	3 (3.75)	0.000
Cough	7 (22.5)	11 (13.75)	0.011
Coryza	4 (12.9)	2 (2.5)	0.000
Diarrhoea	8 (25.8)	1 (1.25)	0.000
Convulsions	7 (22.5)	2 (02.5)	0.000
Flushing	8 (27.9)	4 (5)	0.000
Reduced urine output	1 (3.2)	10 (12.5)	0.011
Hepatomegaly	22 (68.6)	2 (2.5)	0.000
Splenomegaly	4 (12.9)	4 (5)	0.000
Pleural effusion	20 (64.1)	22 (27.5)	0.000
Ascites	5 (16.1)	9 (11.25)	0.021
Petechiae	14 (45.1)	5 (6.25)	0.000
Purpura	2 (6.45)	2 (2.5)	0.312
Epistaxis	0 (0)	7 (8.75)	0.327
Conjunctival bleed	2 (6.45)	0 (0)	0.000
Melena	5 (16.1)	6 (7.5)	0.237

Table 1. Comparison of Symptoms and Signs of Dengue Fever in Infants and in Older Children

Complications	Infants N (%)	Older Children N (%)	p Value
DSS	8 (25.8)	30 (37.5)	0.000
DHF	5 (16.1)	12 (15)	0.000
DSS and DHF	8 (25.8)	7 (8.75)	0.000
ARDS	9 (29)	3 (3.75)	0.000

Table 2. Comparison of Complications in Infants and Older Children

Recovery	Infants (Mean Days)	Older children (Mean Days)	p Value
Time to raise platelet count to >1 lakh/cu mm	5.57	3.1	0.000
Time to become afebrile	4.8	2.3	0.000
Duration of hospitalization	8.9	5.2	0.000

Table 3. Comparison of Outcome/Recovery in Infants and Older Children

What is Already Known...
1. Dengue fever is more common in children than adults.
2. Severe forms of dengue including complications are more common in children as compared to adults.

What this Study Adds...
1. There is more incidence of complications of dengue fever in infants as compared to older children.
2. Recovery of dengue fever is prolonged in infants as compared to older children.

2. Comparison of Laboratory Parameters

The highest value of haematocrit was found in infants (38.12%) compared to older children (34.19%). All infants in the study had severe thrombocytopenia (<50, 000/cu mm) and majority were in the range of 11, 000 to 20, 000/cu mm (57.1%). Majority of older children had lowest platelet counts above 50, 000/cu mm (44.4%).

3. Comparison of Complications: [Shown in Table 2]

Infants were found to be associated with more severe complications of dengue compared to older children. DSS, DSS with DHF and ARDS were more prevalent in infants as compared to older children which were statistically highly significant ($p=0.000$). DHF was a common complication in infants compared to older children ($p=0.000$). One infant developed encephalitis and left hemiparesis as post dengue encephalitic sequelae.

Platelet transfusion was required more frequently in infants (16.4%) compared to older children (3.9%) which was statistically significant ($p=0.021$).

4. Comparison of Outcome: [Shown in Table 3]

The time taken for recovery of platelet count to more than 100000/cu mm, time taken to become afebrile and duration of hospital stay were longer in infants as compared to older children which was statistically highly significant ($p=0.000$).

DISCUSSION

This study deals with the clinical spectrum and outcome of dengue fever in infants as compared with older children in the epidemic period of 2015 from 1st June to 30th September.

The burden of disease severity was found to be predominantly concentrated on infants compared to older children; this observation is found to be consistent with the theory of maternal antibody dependent disease enhancement, i.e., maternal antibodies in infants of 4-9 months of age, wane from protective to enhancing levels resulting in severe clinical manifestations and complications.^{2,3,4,5,6} However, there are not many supportive Indian studies throwing light on severity of dengue-fever in infants.

High fever was a consistent symptom in both infants and older children groups in this study. Symptoms of cough, coryza, diarrhoea, flushing, decreased urine output and convulsions were more commonly presented by infants with dengue, compared to older children who had myalgia, headache, abdominal pain, and retro-orbital pain (In 15.6%, 24.1%, 5.8% and 11.1% respectively). This age-related rise in these symptoms might be due to the difficulty in communication for young children (Such as head ache, abdominal pain etc.). Similar study results were obtained by Hammond SN, Balmaseda A et al. In a 3-year hospital-based study in Nicaragua.⁷ Similar results with respect to diarrhoea, convulsions and encephalopathy was documented and was statistically significant in infants compared to older children in a study by Kalayanarooj S and Nimmannitya S in Thailand children hospital between 1995 and 1999.⁷

In our study it is evident that the signs of plasma leakage and also thrombocytopenia were more prevalent in infants compared to older children; and were associated with more complications related to these two. This may be because, the vascular-permeability, which is the principal complication of dengue illness, decreases with increasing age. In general, infants have greater capillary fragility than older children.^{6,8,9,10} Similar results were obtained by Gamble J, Bethell D et al in their study.⁶

External bleeding in such as petechiae were more common in infants whereas internal bleeding was ore in older children. The prevalence of internal bleeding in dengue

increases with the age. Internal bleed is common in adolescents and adults than infants & older children. The maximum haemoconcentration was a significant feature of infants. Infants were found having severe thrombocytopenia (All cases <80000/c mm) during their illness. The High grades of DHF (gr 3 and 4) were a feature of infants compared to older children. Infants had more complications such as DSS, DHF. Similar results were obtained by Prasonk Witayathawornwong et al. In a comparative study done in Thailand between 1999 and 2002.¹¹

This study hence emphasizes on the high propensity for infantile dengue to go for complications such as, shock syndrome and haemorrhagic fever. Recovery duration also was prolonged in infants compared to older children.

CONCLUSIONS

Complications like DHF, DSS and ARDS were more common in infants. The time taken, to become afebrile, for recovery of platelet count, was longer, hospitalisation was prolonged, when compared to older children of >1-year of age.

REFERENCES

- [1] World Health Organization, Dengue Haemorrhagic Fever: Diagnosis, Treatment, Prevention and Control. 2nd edn. Geneva: WHO 1997.
- [2] Jain A, Chaturvedi UC. Dengue in infants: an overview. FEMS Immunol Med Microbiology 2010;59(2):119-30.
- [3] Kliks SC, Nimmannitya S, Nisalak A, et al. Evidence that maternal dengue antibodies are important in the development of dengue hemorrhagic fever in infants. Am J Trop Med Hyg 1988;38(2):411-9.
- [4] Halstead SB, Lan NT, Myint TT, et al. Dengue hemorrhagic fever in infants: research opportunities ignored. Emerg Infect Dis 2002;8(12):1474-9.
- [5] Nguyen TH, Nguyen TL, Lei HY, et al. Association between sex, nutritional status, severity of dengue hemorrhagic fever and immune status in infants with dengue hemorrhagic fever. Am J Trop Med Hyg 2005;72(4):370-4.
- [6] Gamble J, Bethell D, Day NP, et al. Age-related changes in microvascular permeability: a significant factor in the susceptibility of children to shock? Clin Sci (Lond) 2000;98(2):211-6.
- [7] Kalayanarooj S, Nimmannitya S. Clinical presentations of dengue hemorrhagic fever in infants compared to children. J Med Assoc Thai 2003;86 Suppl 3:S673-S80.
- [8] Hongsiriwon S. Dengue hemorrhagic fever in infants. Southeast Asian J Trop Med Public Health 2002;33(1):49-55.
- [9] Hammond SN, Balmaseda A, Perez L, et al. Differences in dengue severity in infants, children and adults in a 3-year hospital-based study in Nicaragua. Am J Trop Med Hyg 2005;73(6):1063-70.
- [10] Bethell DB, Gamble J, Pham PL, et al. Noninvasive measurement of microvascular leakage in patients with dengue hemorrhagic fever. Clin Infect Dis 2001;32(2):243-53.
- [11] Witayathawornwong P. DHF in infants, late infants and older children: a comparative study. South East Asian J Trop Med Public Health 2005;36(4):896-900.