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Research Article

INCIDENCE OF DENGUE HEMORRHAGIC FEVER IN CHILDREN: A REPORT FROM MELMARUVATHUR TAMILNADU, INDIA

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ABSTRACT

Dengue is a mosquito borne infection that in recent decades has become a major international public health concern. WHO currently estimated that 50 million dengue infections occur worldwide every year. Also dengue hemorrhagic fever is a leading cause of serious illness and death among children in Asian countries including India. Hence we planned to conduct a study in paediatric population. The study was conducted in department of microbiology from August 2011 to October 2012. A total of ninety children presenting with fever for more than three days were included in the study. Blood samples were analysed for hematologic parameters such as platelet count, total leukocyte count, differential leukocyte count. Serological diagnosis of dengue was done by IgG and IgM ELISA. Out of 90 children screened, 41(45.5%) were positive for dengue. Of which, 16 (39%) had dengue and 25 (61%) had dengue hemorrhagic fever. Thrombocytopenia (96%), elevated aminotransferases (96%), Abdominal pain (92%), hepatomegaly (92%) were the common clinical presentations among children with dengue. This study facilitates distinguished detection of DHF from dengue fever based on warning symptoms and hematologic parameters, which is essential for optimal management of patient**.** Current study strongly suggests that detection of liver enzymes (aminotransferases) elevation can be used as an important marker in children progressing to DHF .

Key Words: Dengue fever, Dengue hemorrhagic fever, Dengue in children, Hepatic involvement in DHF

INTRODUCTION

Dengue is a mosquito- borne viral infection found in tropical and sub-tropical regions around the world. In recent years, transmission has increased predominantly in urban and semi-urban areas and has become a major global public health concern[1]. The symptoms range from a mild dengue fever (DF), dengue hemorrhagic fever (DHF) & dengue shock syndrome (DSS). Worldwide, children younger than 15 years make up 90% of DHF cases[2]. It is a significant cause of paediatric morbidity and mortality[3] in many developing countries including India[4].

The clinical diagnosis of DHF is based on four main characteristic manifestations (WHO 1997)[5]: (i) continuous high grade fever lasting 2-7 days (ii) haemorrhagic tendency as shown by a positive tourniquet test, petachiae or epistaxis (iii) evidence of plasma leakage manifested by hemoconcentration, pleural effusion and ascitis etc. The severity of DHF is categorized into four grades (WHO 1997)[5]: grade I being the mildest and grade IV being most severe, with circulatory failure manifested by a rapid and weak pulse with narrowing of pulse pressure (20mmHg) or hypotension with the presence of cold clammy skin and restlessness. There may be prolonged shock in which pulse and blood pressure are not detectable (DSS).

Dengue- Indian scenario

The first epidemic of clinical dengue-like illness in India was recorded in Madras in 1780[6].The first major wide spread epidemics of DHF/ DSS occurred in India in 1996 involving areas around Delhi[7] and Lucknow[8] and then it spread to all over the country[9,10]. The vector has adapted to extremes of warm and cold weather resulting in occurrence of dengue cases round the year. Now, Dengue is endemic in India with frequent epidemics of DF/ DHF. Several factors may influence disease severity, including host factors, virus serotype or genotype, sequence of virus infection, differences in dengue reactive antibody and T cell response[11]. In hyperendemic areas, dengue fever & DHF affects mainly children less than 15 years of age[6].Shock and plasma leakage seem to be more prevalent in younger patients, the frequency of internal haemorrhage augments as age increases[12]. The outcome of DHF & DSS depends largely on early diagnosis and the immediate replacement of fluid. DHF can be distinguished from DF by the presence of increased vascular permeability (plasma leakage syndrome) and marked thrombocytopenia (<1,00,000/µl) associated with bleeding, hepatomegaly and or abnormal liver functions [13].

Though uncomplicated dengue fever occurs both in adults and children, till recently DHF in Chennai has been predominantly restricted to children[14-16]. Since DHF often manifest with atypical presentation in children, many of these may remain unrecognized due to lack of awareness among primary care physicians. This study was intended to highlight the warning signs and early haematological changes in children with DHF.

MATERIALS & METHODS

This study was conducted at department of microbiology, Melmaruvathur Adhiparasakthi Institute of Medical sciences and Research, Melmaruvathur from August 2011 to October 2012. All suspected dengue patients between 0-12 years of age, admitted to medical wards with the history of acute febrile illness with myalgia, arthralgia, headache, retro orbital pain, abdominal pain, nausea and vomiting, bleeding, hypotension or thrombocytopenia were included in the study. A detailed history as well as general and systemic clinical examination was recorded. Patients were classified as dengue fever, dengue hemorrhagic fever or dengue shock syndrome according to WHO guidelines[5]. Approximately 2-2.5ml of blood sample was received, serum separated and subjected to ELISA. Laboratory diagnosis of dengue was

established by performing IgM ELISA & IgG ELISA using kit from NovaLisa, NOVATEC immunodiagnostica GMBH.

Ethical considerations

Ethical approval (MAPIMS/IEC/52/2012) was obtained from Institutional Ethical Committee and informed written consent was obtained from parents /guardians before enrolment into study.

Table1- Seroprevalence of Dengue

Male		female	
No. Of suspected cases	No. Of positives (%)	No. Of suspected cases	No. Of positives (%)
57	27(65.8%)	33	14 (34%)

Table-2 Age wise distribution of dengue cases

Age (years)	Dengue fever (no:16)		Dengue hemorrhagic fever (no:25)	
	Number	%	Number	%
<1	3	18.75	3	12
1-5	8	50	15	60
6-12	5	31.25	7	28

Table 3 -Warning symptoms observed in Dengue hemorrhagic fever & Dengue fever

Symptoms	Dengue hemorrhagic fever(no:25)		Dengue fever(no.:16)	
	cases	%	cases	%
Abdominal pain	24	96	5	31
Ascitis	22	88	0	0
Hepatomegaly	23	92	4	25
Thrombocytopenia	25	100	7	44
Elevated liver enzymes	24	96	4	25
Vomiting	15	60	8	50
Hemorrhagic manifestations	25	100	7	44
Splenomegaly (by USG)	12	48	0	0
Cholecystitis (by USG)	9	36	0	0

*- Ultra sonography

RESULTS

A total of ninety children with suspected dengue fever were enrolled in this study of which sixty seven (74%) patients were male and thirty three (26%) were female children (Table-1). Among 41 (45.5%) laboratory confirmed cases, sixteen (39%) patients had DF while twenty five (61%) patients had DHF (Table-2).

The rate of dengue positivity was high among 1-5 year old children (57%), followed by 6-12 years (29%). DF and DHF were common in male children than in female children. Thrombocytopenia (96%), elevated aminotransferases (96%), hematocrit (96%), abdominal pain (92%), hepatomegaly (92%) were the common clinical presentations among children with DHF (Table-3).

DISCUSSION

The incidence of atypical presentations in dengue and DHF are more common, especially in children. Moreover the WHO classification does not include unusual manifestations such as encephalopathy, acute hepatic failure, cardiomyopathy and acute respiratory distress syndrome. Although these manifestations are rare, they have been reported from endemic areas[17-18]. Therefore, determination of risk factors of DHF and DSS are crucial for early diagnosis and prompt management of shock.

In our study, Dengue was common in male (65.8 %) than in female (34%) children. The incidence of dengue was remarkably high during monsoon, which was re-established in our study[19]. This shows that the presence of stagnating water during rain fall favours mosquito breeding. Other important factors involved in transmission include uncontrolled urbanization, international travel[20], crowding, lack of mosquito control and deterioration of public health infrastructure [21].

Since it is a tertiary care hospital, the incidence of DHF (61%) were high compared to DF(39%).In our study, children with DHF commonly presented with abdominal pain (96%),elevated liver enzymes (96%), hepatomegaly (92%) along with thrombocytopenia(100%), were similar to the previous studies[14,22-27]. Recent studies from India showed that dengue infection is the most important cause of acute hepatic failure in children contributing to 18.5% of the cases[28, 29]. Hepatomegaly and elevated liver enzymes[23, 30-32], one of the common sign of DHF were distinct in our study. Although, we had many cases of DHF none of them has gone for DSS. Hence, continuous scrutiny of these warning signs can prevent development of DSS.

CONCLUSION

DHF is a severe disease with high fatality rate, early diagnosis is mandatory particularly in children for prompt management. As hepatic involvement is a prominent feature of DHF, estimation of aminotransferases can be used as a surrogate marker for DHF in children.

REFERENCES

1. World Health Organization. Dengue and severe dengue. Geneva. Fact sheet N° 117; Nov 2012
2. Malavige GN, Fernando S, Fernando DJ, Seneviratne SL. Dengue viral infections.Postgrad Med J. Oct 2004;80(948): 588-601.
3. Cho-Min-Naing. Assessment of dengue hemorrhagic fever in Myanmar. Southeast Asian J Trop Med Public Health. 2000 Dec; 31(4): 636-41.
4. Centre for Disease Control and Prevention: Chapter 5- Dengue fever (DF) and dengue hemorrhagic fever (DHF). 2010 yellow book. Retrieved 2010 : 12-23.
5. World Health Organization. Dengue hemorrhagic fever: Diagnosis, Treatment, Prevention and Control.2nd ed. Geneva: World Health Organization; 1997: 12-23.
6. Gubler D J. Dengue/ Dengue hemorrhagic fever: its history and resurgence as a global public health problem. In:Gubler DJ,Kuno G, (ed.), Dengue/ Dengue hemorrhagic fever. CAB International Press, Wallingford, Oxon, UK: 1997: 1-22.
7. Dar L, Broor S, Sengupta S, Xess I and Seth P. The first major outbreak of dengue hemorrhagic fever in Delhi, India; Emerg Infect Dis. 1999 (Jul-Aug); 5 (4): 589-90.
8. Agarwal R, Kapoor S, Nagar R, Misra A, Tandon R, Mathur A, et al. A clinical study of the patients with dengue hemorrhagic fever during the epidemic of 1996 at Lucknow, India, Southeast Asian J Trop Med Public Health. 1999 Dec; 30 (4): 735-40.
9. Singh J, Balakrishnan N, Bhardwaj M, Amuthadevi P, George E G, Subramani K, et al. Silent spread of dengue and dengue haemorrhagic fever to Coimbatore and Erode districts in Tamil Nadu, India, 1998: need for effective surveillance to monitor and control the disease. Epidemiol Infect. 2000 Aug; 125 (1):195-200.
10. Shah I, Deshpande G C, and Tardeja P N. Outbreak of dengue in Mumbai and predictive markers for dengue shock syndrome. J Trop Pediatr 2004 Oct; 50 (5):301-5.
11. Green S, Rothman A. Immunopathological mechanisms in dengue and dengue hemorrhagic fever. Curr Opin Infect Dis. 2006 Oct; 19 (5): 429-36.
12. Hammond SN, Balmaseda A, Perez L, Tellez Y, Saborio SI, Mercado JC, 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 Dec; 73 (6):1063-70.
13. Wang CC, Liu SF, Liao SC, Lee IK, Liu JW, Lin AS, et al. Acute respiratory failure in adult patients with dengue virus infection. Am J Trop Med Hyg. 2007 Jul; 77 (1):151-8.
14. Kamath SR, Ranjith S. Clinical features, complications and atypical manifestations of children with severe forms of dengue hemorrhagic fever in south India. Indian J Pediatr 2006 Oct; 73 (10): 889-95.
15. Narayanan M, Aravind MA, Thilothammal N, Prema R, Sargunam CS, Ramamurty N. Dengue fever epidemic in Chennai- a study of clinical profile and outcome. Indian J Pediatr. 2002 Nov; 39 (11):1027-33.

16. Kabilan L, Balasubramanian S, Keshava SM, Satyanarayana K. The 2001 dengue epidemic in Chennai. Indian J pediatr. 2005 Nov; 72 (11):919-23.
17. Gulati S and Maheswari A. Atypical manifestations of dengue. Trop Med Int Health.2007 Sep; 12 (9): 1087-95.
18. Kumar R, Tripathi S, Tambe JJ, Arora V,Srivastava A, Nag VL. Dengue encephalopathy in children in Northern India: Clinical features and comparison with non dengue. J Neurol Sci. 2008 Jun; 269(1-2): 41-48.
19. Reiter P. Climate change and mosquito- borne disease. Environ Health Perspect. 2001 Mar; 109 (1): 141-61.
20. World Health Organization. Dengue guidelines for diagnosis, treatment, prevention and control:new edition. Geneva; 2009:1-149.
21. Rigau- Perez JG, Clark GG,Gubler DJ, Reiter P, Sanders EJ, Vorndam AV. Dengue and dengue haemorrhagic fever. Lancet 1998 Sep; 352 (9132): 971-7.
22. Wiwanitkit V. Liver dysfunction in dengue infection: an analysis of the previously published Thai cases. J Ayub Med Coll Abbottabad. 2007 Jan; 19 (1): 10-2.
23. Kalenahalli jagadishkumar, Puja Jain, Vaddambal G Manjunath, Lingappa Umesh. Hepatic Involvement in Dengue Fever in Children. Iran J Pediatr 2012 June; 22 (2): 231-36.
24. Mohan B, Patwari AK, Anand VK. Hepatic dysfunction in childhood dengue infections. J Trop Pediatr 2000 Feb; 46 (1): 40-3.
25. Wahid SF, Sanusi S, Zawawi MM, Ali RA. A comparison of pattern of liver involvement in dengue hemorrhagic fever with classic dengue fever. Southeast Asian J Trop Med Public Health. 2000 Jun; 31 (2): 259-63.
26. Itha S, Kashyap R, Krishnani N, Saraswat VA, Choudhuri G, Aggarwal R. Profile of liver involvement in dengue virus infection. Natl Med J India 2005 May; 18 (3): 127-30.
27. Ali K Ageep and Abu elgasim S. A correlation study between clinical manifestations of dengue fever and the degree of liver injury. J Microbiol and Antimicrobials 2012 Feb ;4 (2): 45-48.
28. Kumar R, Tripathi P, Tripathi S, Alok kanodia, Vimala Venkatesh. Prevalence of dengue infection in north Indian children with acute hepatic failure. Ann Hepatol 2008 Jan; 7 (1): 59-62.
29. Poovorawan Y, Hutagalung Y, Chongsrisawat V, Boudville I, Bock HL. Dengue virus infection: a major cause of acute hepatic failure in Thai children. Ann Trop Paediatr 2006; 26 (1): 17-23.
30. Kalayanarooj S, Rimal HS, Andjaparidze A, Vatcharasaevee V, Nisalak A, Jarman RG, et al. Clinical intervention and molecular characteristics of a dengue hemorrhagic fever outbreak in Timor Leste, 2005. Am J Trop Med Hyg. 2007; 77: 534-7.
31. Kuo CH, Tai DI, Chang-Chien CS, Lan CK, Chiou SS, Liaw YF. Liver biochemical tests and dengue fever. Am J Trop Med Hyg. 1992 Sep; 47 (3):265-70.
32. Kurane I, Innis BL, Nimmannitya S, Nisalak A, Rothman AL, Livingston PG, et al. Human immune responses to dengue viruses. Southeast Asian J Trop Med Public Health. 1990; 21:658-62.

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