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A Study on Serological Prevalence and Clinical Correlation of Dengue in A Tertiary Care Hospital

Medical Science

KEYWORDS : (3-8) Dengue fever, Dengue haemorrhagic fever, Dengue shock syndrome, IgM and IgG capture ELISA.

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ABSTRACT

BACKGROUND: Dengue is a flaviviral infection occurring worldwide. In tropical region, Its distribution is determined by the presence of principal mosquito vector, Aedes aegypti. Early case detection in dengue cases and management reduces morbidity and mortality due to Dengue haemorrhagic fever and dengue shock syndrome.

OBJECTIVE: To determine the seropositivity of dengue and to categorize dengue cases as Dengue fever, Dengue haemorrhagic fever and Dengue shock syndrome according to WHO guidelines and to evaluate the proportion of primary and secondary dengue infection based on anti-dengue IgM and I gG antibodies.

MATERIALS AND METHODS: A total of 296 samples collected from patients with febrile illness suspected of dengue were subjected to Denue IgM capture Enzyme Linked Immunosorbent assay (ELISA) and Dengue IgG capture ELISA.

RESULTS: Among the samples tested ,39 cases were positive for IgM,22 positive for IgG and 41 positive for both IgM and IgG.Based on IgM: IgG ratio,30 cases had primary dengue infection and 72 had secondary dengue infection.

INTRODUCTION:

Dengue virus transmitted by mosquito vector ,Aedes aegypti1 occurs worldwide and infections are more prevalent in Southeast Asia where all four serotypes are continuously present2. Most dengue infections are subclinical . Self limited dengue fever is the usual outcome of infection but an immunopathogenic response in some patients, usually in the setting of heterologous immunity produces a syndrome of Dengue Haemorrhagic fever4. The main objective of the study was to determine the seroprevalence of dengue and to evaluate the proportion of primary and secondary dengue cases based on antidengue IgG and IgM antibodies and correlating the results with clinical and laboratory data in patients with clinical suspicion of dengue.

MATERIALS AND METHODS:

This study was undertaken for a period of 15 months . Blood samples from 296 patients admitted with clinical features suggestive of dengue fever were taken for the study. Of the 296 samples ,148 were collected during 1-5 days of fever, 95 samples during 6-10 days and 53 samples collected after 10 days of infection. The samples were collected aseptically and serum was separated and stored at -20 0C. Samples were subjected to IgM capture (Panbio) ELISA and IgG Capture ELISA (Panbio).

INCLUSION CRITERIA:

The clinical basis for diagnosing the patients as having dengue fever was based on standard WHO criteria, like presentation of febrile illness of 2-7 days duration ,with features like headache, myalgia, rash, haemorrhagic manifestations and leucopenia3.

EXCLUSION CRITERIA:

Patients with clinical evidence of urinary tract infection , Pneumonia, abscesses or any other apparent causes of fever were excluded.

RESULTS:

The high prevalence of dengue cases at Chennai in the recent years makes it necessary to evaluate the incidence and seropositivity of dengue cases. The seropositivity of dengue cases among clinically suspected fever cases was 34%. A higher distribution of dengue cases in the present study was seen in the 21-40 age group (46.36%) followed by 0-20 age group (43.05%) and above 40 age group (11.76%) out of 140 males, 59 were dengue positive and 43 out of 156 females were dengue positive.

The predominant symptom with which the patients presented were fever (100%), myalgia /arthralgia (71.1%), haemorrhagic manifestations (38.88%), headache (48.88%), rash (27.77%), gastrointestinal symptoms (22.22%) ,hepatomegaly (16.66%) and retro orbital pain (13.33%). The common haemorrhagic manifestations seen in dengue patients were gum bleeding followed by petechiae. According to WHO guidelines3, dengue cases were categorized into dengue fever ,DF(50%) ,dengue haemorrhagic fever,DHF (42.22%) and dengue shock syndrome,DSS (7.7%). Out of the 43 patients who progressed to dengue haemorrhagic fever ,27 had increase in haematocrit, pleural effusion ,ascites and hypoproteinemia indicating clinical evidence of plasma leakage and 8 patients progressed to dengue shock syndrome.(Table 3) they had rapid weak pulse pressure, hypotension and cold clammy skin and restlessness.

Among the samples tested , 39 cases were positive for IgM , 22 cases positive for IgG and 41 cases positive for both IgM and IgG.(Table 1) All dengue cases had thrombocytopenia and most of the cases had platelet count of about 50,000. Increase in incidence of dengue cases were seen during rainy season (august-october). The cases were classified as primary and secondary dengue, based on IgM: IgG ratio. 30 cases had IgM: IgG ratio greater than 1.78 suggesting primary dengue infection and 72 cases lesser than 1.78,suggesting secondary dengue infection5.(table 2) On correlating the serological positivity with the clinical types of presentation of dengue among the study group,24 DF patients and 48 patients with DHF or DSS had a secondary antibody response .Platelet transfusions were given for a total of 34 patients ,which includes 20 patients of DHF and 8 patients with DSS, a total of 34 patients in the present study .All cases of dengue and dengue haemorrhagic fever recovered with treatment ,except for 2 cases out of 8

DSS which were fatal.(Table 3) Both the patients were females in early twenties of age and one was antenatal and the other one did not have any comorbid condition . The duration of hospital stay was 3 days for both the cases. The antenatal mother died of profound shock and cardiopulmonary arrest, Whereas the other patient went in for hepatic and renal failure, brainstem dysfunction ,intracranial haemorrhage ending in cardiopulmonary arrest. Secondary antibody response was seen in all the DSS cases, with a fatality rate of 1.96%.

DISCUSSION:

Dengue has been increasingly recognized as an emerging infectious disease for the last four decades. The global burden has grown dramatically in recent years. The high prevalence of dengue cases at Chennai in the recent years , makes it necessary to evaluate and to find out the seropositivity of dengue cases.

The seropositivity of dengue cases in the present study among clinically suspected fever cases was 34%. In this study, an increased incidence of dengue was found among male patients 59 (42%), as compared to females 43(28%). The incidence of dengue was higher following rainfall. In this study, a clear cut increase in incidence of dengue cases was seen between August to December when Tamilnadu receives rainfall from northeast monsoon.

An increased detection of IgM antibody (66.66%) was seen in the early febrile period (1-5 days), as compared to the late period, when both IgM and IgG antibodies are seen at higher levels (68.75%). Elevations of haematocrit to ≥were seen in more than half of the subjects with Dengue haemorrhagic fever. Elevated AST levels, elevated bleeding time and clothing time and hypoproteinaemia were more in DHF patients.

The serological tests used were IgM capture and IgG capture ELISA in which the cut off value of the IgG is set to discriminate between high levels of IgG (characteristic of secondary dengue infection) and lower IgG (Characteristic of primary /past dengue). The Quantitation of antidengue IgG allows distinction of primary and secondary dengue infections. In this study, the proportion of primary dengue infections to secondary dengue infections was 1:2.4, with primary infections in 29.41% of patients and secondary dengue infections in 70.58% of cases. Case fatality rate in this study was 1.96% .The WHO factsheet 2002 also shows a statistics of 2.5% case fatality rate among dengue cases which coincides well with the present study6. An early diagnosis of dengue and categorization of primary and secondary dengue will be of immense help not only in early management of cases but also in monitoring disease progression and bringing down mortality.

TABLES

TABLE 1

ANTIBODY LEVELS IN THE EARLY AND LATE FEBRILE PERIOD OF PATIENTS PRESENTED WITH FEVER

DURATION	IGM	%	IgG	%	BOTH	%
1-5days (n=51)	34	66.66%	3	5.88	14	27.45
6-10days (n=32)	3	9.38	7	21.87	22	68.75
>10days (n=19)	2	10.52	12	63.15	5	26.32
% of Antibody detection	39	36.27%	22	21.56%	41	40.20%

TABLE 2

CATEGORISATION OF PRIMARY AND SECONDARY DENGUE INFECTIONS BASED ON IgM:IgG RATIO

Igm:IgG ratio	No. of cases	Percentage	Interpretation
≥1.78	30	29.41	Primary dengue infection
<1.78	72	70.58	Secondary dengue infection

TABLE3

CLINICAL FEATURES AND LAB PARAMETERS OF DF & DHF/DSS

VARIABLES	DF POSITIVE	DHF/DSS POSITIVE
Clinical features		
Age group	21-40yrs	21-40yrs
Sex	Males (64.44%)	Females (60%)
Haemorrhagic manifestations	29(64.44%)	36(80%)
Retro- orbital pain	12(26.66%)	4(8.88%)
Average days of stay in the hospital	4-6	5-11
Platelet transfusions	3	26
OUTCOME		
Deaths	-	2
Lab findings		
Elevated SGOT (AST) (>40U/ml)	16(35%)	31(68.88%)
Elevated SGPT (ALT) (>35U/ml)	14.(35%)	26(57.77%)
Elevated BT/Ct	26.(57.77%)	41(91.11%)
Throbocytopenia (Platelet <1.5lakhs / cu.mm)	38(84.44%)	43(95.55%)
Hypoprotenemia (Total protein <6 gms)	-	24(53.33%)
Elevated haematocrit (haematocrit>45%)	-	26(57.77%)
Leukopenia (<4000/cu.mm)	24.(53.33%)	28.(62.22%)

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