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A Study on Dengue Infection among Febrile Illness Cases in a Tertiary Care Hospital in South India

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Abstract: *- Introduction: Dengue is the most important arthropod-borne viral disease of public health significance. Dengue virus has been prevalent in the Indian subcontinent for the last 50 years and has become hyper-endemic with circulation of all the four serotypes. The disease follows seasonal and cyclical patterns with large outbreaks occurring every two to three years. Dengue affected children are known to have serious disease outcome. As there is no prevention in the form of any vaccine for dengue, early diagnosis and treatment is recommended for preventing complications. Aims and objectives: 1. To know IgM positivity of dengue virus among febrile illness cases. 2. To know the most common age group affected with dengue virus. Material and Methods: The study was undertaken for a period of one year from January 2015 to December 2015. Blood samples from 4045 patients admitted with febrile illness were tested for IgM of dengue virus by MACELISA. Results: Total numbers of cases tested for IgM antibody were 4045. More number of samples (39.5%) were in November. Majority of the samples were from the age group of 11-20yrs (25.8%) and <10 yrs (24.6%). More positive samples were in the month of October (68/235). But the percentage of positivity was high in the months of March (24.1%) and April (20%). The overall positivity for IgM antibody of dengue virus was 5.8%. Throughout the year dengue positive cases were seen among in patients. High positivity was seen in the < 10 years age group both in males and females. Conclusions: 1. Most common affected age group with dengue infection was < 10 years. 2. Male were more affected with dengue infection than females. 3. Dengue virus is endemic in our area.*

Keywords: ***Dengue virus, febrile illness, IgM antibody.***

Introduction:

Dengue is the most important arthropod-borne viral disease of public health significance.[1] Dengue virus transmitted by mosquito vector, Aedes aegypti occurs worldwide and infections are more prevalent in Southeast Asia where all four serotypes are continuously present[2] either singly or in combination[3] cause epidemics[4]. According to World Health Organization two Fifths of the world population is at risk from dengue disease and every year 50 million dengue virus infections are suspected world over.[5] Dengue virus has been prevalent in the Indian subcontinent for the last 50 years[6] and has become hyper-endemic to dengue with circulation of all the four serotypes[7] The disease follows a seasonal and cyclical patterns with large outbreaks occurring every two to three years[8].Dengue manifests in three forms, Dengue Fever (DF), Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS), the latter being the most serious form of illness. Dengue affected children are known to have serious disease outcome. After an incubation period of 3-15 days (usually 5 to 8), classical DF begins with an abrupt onset of high fever. As there is no prevention in the form of any vaccine for dengue, early diagnosis and treatment is recommended for preventing complications.[9] In order to detect Dengue fever, there are various tests available like antigen detection tests (Non structural 1 antigen - NS1 antigen), Antibody detection tests like Dengue IgM and Dengue IgG, virus isolation in cell culture or by detection of viral RNA by nucleic acid amplification tests (NAAT). Out of these, virus isolation and nucleic acid amplification tests require expertise, expensive equipments and reagents and time delay.[10] A WHO/TDR/PDVI laboratory network recently evaluated selected commercial ELISAs and first-generation rapid diagnostic tests, finding that ELISAs generally performed better than rapid tests.[11] As IgM antibodies are the first immunoglobulin isotype to appear the present study was aimed to know the IgM seropositivity of dengue in febrile illness cases in our hospital.

Aims and objectives:

1. To know IgM positivity of dengue virus among febrile illness cases.
2. To know the most common age group affected with dengue virus.
3. To know the seasonal variation among dengue positive cases.

Study Design: Retrospective study.

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MATERIAL AND METHODS:

The study was undertaken for a period of one year from January 2015 to December 2015. Blood samples from 4045 patients admitted with febrile illness were tested for IgM of dengue virus by MACELISA in clinical microbiology laboratory, RIMS, Kadapa. Standard operative procedures and manufacturer's instructions were followed all the time.

Results:

Table 1 showing distribution of cases tested for IgM antibody of dengue virus.

	Out patient	In patient	Total
Male	1369	715	2084(51.5%)
Female	1225	738	1963(48.5%)
Total	2594(64.1%)	1453(34.9%)	4047(100%)

Table 2 showing month and age vice distribution of cases

Month	<10yrs	11-20yrs	21-30yrs	31-40yrs	41-50yrs	51-60yrs	>60yrs	Total
Jan	9	10	08	3	1	2	3	36
Feb	3	5	6	3	3	1	00	21
Mar	10	00	3	4	7	1	4	29
Apr	1	6	7	3	1	3	4	25
May	3	7	6	10	7	1	4	38
Jun	4	5	5	1	2	3	00	20
Jul	18	22	24	7	7	3	3	84
Aug	164	167	87	50	37	19	15	539
Sep	189	148	105	50	26	24	16	558
Oct	396	392	307	201	142	84	76	1598
Nov	134	199	153	75	66	54	39	720
Dec	59	84	90	56	35	29	26	379
Total	990	1045	801	463	334	224	190	4047

Table 3 showing gender vise distribution of positive cases

Month	Male		Female		Total	
	No.of cases	No.of positives	No.of cases	No.of positives	No.of cases	No.of positives
Jan	21	02(9.5%)	15	01(6.2%)	36	03(8.1%)
Feb	10	01(10%)	11	01(9%)	21	02(9.5%)
Mar	08	01(12.5%)	21	06(28%)	29	07(24.1%)
Apr	16	02(12.5%)	09	03(33.3%)	25	05(20%)
May	14	00(0%)	24	01(4.1%)	38	01(2.6%)
Jun	07	01(14.2%)	13	01(7.6%)	20	02(10%)
Jul	32	00	52	05(9.6%)	84	05(5.9%)
Aug	287	17(5.9%)	252	11(4.3%)	539	28(5.2%)
Sep	285	18(6.3%)	273	09(3.3%)	558	27(4.85%)
Oct	850	35(4.1%)	748	33(4.4%)	1598	68(4.2%)
Nov	350	37(10.5%)	370	26(7%)	720	63(8.7%)
Dec	204	15(7.3%)	175	09(5.1%)	379	24(6.3%)
Total	2084	129(6.2%)	1963	106(5.43%)	4047	235(5.8%)

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Table 4 showing Distribution of positive cases among out patients and in patients

Month	Out patient		In patient		Total	
	No.of cases	No.of positives	No.of cases	No.of positives	No.of cases	No.of positives
Jan	07	00	29	03(10.3%)	36	03(8.1%)
Feb	05	00	16	02(12.5%)	21	02(9.5%)
Mar	21	05(23.8%)	08	02(25%)	29	07(24.1%)
Apr	06	02(33.3%)	19	03(15.7%)	25	05(20%)
May	31	00	07	01(14.2%)	38	01(2.6%)
Jun	10	00	10	02(20%)	20	02(10%)
Jul	49	04(8.1%)	35	01(4%)	84	05(6.7%)
Aug	395	24(6.1%)	144	04(2.7%)	539	28(5.2%)
Sep	206	13(6.3%)	352	14(3.8%)	558	27(4.8%)
Oct	1174	45(3.8%)	424	23(5.4%)	1598	68(4.2%)
Nov	436	26(5.9%)	284	37(13%)	720	63(8.7%)
Dec	254	13(5.1%)	125	11(8.8%)	379	24(6.3%)
Total	2594	132(5.1%)	1453	103(7 %)	4047	235(5.8%)

Table 5 showing distribution of positive cases in different age groups

Age group in years	Males		Females		Total	
	No.of cases	No.of positives	No.of cases	No.of positives	No.of cases	No.of positives
< 10	531	59(11.1%)	459	49(10.4%)	990	108(10.8%)
11-20	582	32(5.5%)	463	22(4.7%)	1045	54(5.1%)
21- 30	359	21(5.8%)	442	17(3.9%)	801	38(4.8%)
31- 40	214	6(2.8%)	249	5(2%)	463	11(2.3%)
41-50	162	3(1.8%)	172	6(3.3%)	334	9(2.6%)
51-60	112	3(2.6)	112	3(2.65)	224	6(2.6%)
>60	124	5(4%)	66	4(6%)	190	9(4.7%)
Total	2084	129(6.2%)	1963	106(5.43%)	4047	235(5.8%)

Total number of cases tested for IgM antibody of dengue virus were 4047. More number of samples were from males (51.5%). Samples from outpatient department were 64.1% and from inpatient department were 34.9% as shown in table 1. More number of samples (39.5%) were in November followed by October (17.8%). There is drastic increase of samples from August month onwards. Majority of the samples were from the age group of 11-20yrs (25.8%) and <10 yrs (24.6%) as shown in table 2. Among the tested samples more positive samples were in the month of October (68/235). But the percentage of positivity was high in the months of March (24.1%) and April (20%). 6.2% of samples from male individuals were positive whereas it was 5.43% in females. The overall positivity for IgM antibody of dengue virus was 5.8% as shown in table 3. Out of 2592 cases of out patients 132 (5.1%) were positive for IgM. 103 cases were positive of 1453 (7%) in patients. No cases were positive from out patients in the months of January, February, May and June. Throughout the year dengue positive cases were seen among in patients as shown in table 4. High positivity was seen in the < 10 years age group both in males and females (10.8%) followed by 11-20 years age group (5.1%). Among females most common age group with dengue positivity was <10 years (10.4%) followed by >60 years (6%). Positive cases were high in males (6.2%) than females (5.43%) as shown in table 5.

Discussion:

Dengue is an acute viral infection with potential fatal complications. Dengue fever was first referred as "water poison" associated with flying insects in a Chinese medical encyclopedia in 992 from the Jin Dynasty (265-420 AD).[12] The first evidence of occurrence of DF in the country was reported during 1956 from Vellore district in Tamil Nadu. Since the first epidemic in Kolkata during 1963-64, many places in India have experienced dengue infection.[4] Ae. aegypti is the most potential vector but other species such as Ae albopictus, Ae. polynesiensis and Ae. niveus have also been incriminated as secondary vectors. In India Ae. aegypti

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is the main vector in most urban areas; however, Ae albopictus is also found as vector in few areas of southern India.[13] In present study it was observed that there was sudden increase of febrile illness cases from august onwards and as dengue shows seasonal variation all febrile illness cases were screened for dengue infection. More number of cases that were tested for dengue infection was in the month of October (1548/4047). Presence of Dengue positive cases all over the year showed that the virus is endemic in our region. Even though number of positive cases were more from august onwards the percent of positive cases was less which might be not only due to samples of all febrile illness cases were sent for dengue test through which dengue infection can be ruled out as the most common symptom of dengue infection is fever but also due to an increase in the alertness among medical fraternity following the initial epidemic and the availability of diagnostic tools in the hospital have contributed to the increased detection of cases.[14]

In our study the percentage of positivity was high in the month of March (24.1%) followed by April (20%) as only after complete clinical screening for dengue infection, test samples were being sent for laboratory confirmation. But major contributions for positive cases were from August to December. Several studies also showed that more positive cases were from august onwards. [4,15,16,17] In our study the prevalence of dengue infection in the study period was 5.8%. There was wide variation of dengue positivity in many studies such as Ankita et al[15]– 23%, Biswas et al [18]– 52%, Sharmila et al[4] – 29.41%, Sri hari et al[19] - 11.46%, Biradhar et al[16] – 20.42%, Hati et al[17] – 44.8%, Kushal et al[10] – 53% as epidemiology of dengue is a complex phenomenon that mainly depends upon an intricate relationship between the 3 epidemiological factors: the host (man and mosquito), the agent (virus) and the environment (abiotic and biotic factors). The complexity of relationship among these factors eventually determines the level of endemicity in an area.[13] The percentage of dengue positivity can be varied from place to place and also year to year.

In our study it was observed that up to July month majority of positive cases were from in-patients and from august onwards positive cases were distributed among both inpatient and outpatient departments. It might be because of screening of febrile illness patients for dengue infection in monsoon and post monsoon season. In present study high percentage of positivity was seen in < 10 years age group (10.8%) followed by 11-20 years (5.1%) 21- 30 years (4.8%) and > 60 years (4.7%). The same was observed in studies by sharmila et al[4], Biradhar et al[16] and Rashmi et al[20]. In studies conducted in North India (Lanciotti *et al.*, 1992) in Chennai (Zainah *et al.*, 2009) and in several international studies dengue has been reported to mainly a pediatric public health problem. True endemicity will be reached when the adult infection declines and only the new entrants into the population, that is, the children, are affected more by the disease.[15] Dengue positivity was more in males (6.2%) than in females (5.43%) not only in our study but also in studies by Sarmila et al[4], Rashmi et al[20] whereas female preponderance was seen in studies by Ankita et al[15] and Sri hari et al.[19] High prevalence amongst males is probably due to more outdoor activities by males in comparison to females which results in more exposure to day biting mosquitoes. A seasonal trend was observed for dengue infections with maximum cases in post monsoon and late monsoon months which coincides with increased breeding of mosquitoes during these seasons. Therefore, vector control measures should be started before monsoon to prevent the outbreaks of dengue. This will simultaneously solve the problem of other mosquito borne diseases like malaria, chikungunya, Japanese encephalitis and filariasis.[15]

Conclusion:

1. Most common affected age group with dengue infection was < 10 years.
2. Male were more affected with dengue infection than females.
3. Dengue virus is endemic in our area.

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Conflicts of interest: Nil

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