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RESEARCH ARTICLE

STATUS OF DENGUE: IN A TERTIARY CARE RURAL HOSPITAL

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ABSTRACT

Introduction: Depending upon the environmental conditions, serotype of the virus and the vector, the epidemiology of dengue is changing. The increase in number of cases and the mortality due to dengue fever had been reported by various workers. Therefore to know the status of these, we have planned to do retrospective study with an aim to find out the trends of dengue fever in our tertiary care rural hospital.

Material methods: We have conducted a retrospective analysis of cases admitted or visited to our tertiary care hospital during last five years (2012-2016). A total of 16744serum sample sent to the laboratory for serological testing of dengue were enrolled in the study. The enrolled cases were from all age group, from both indoor and outdoor department. A data was analyzed for all positive cases.
Patients were labeled as seropositiveonly when found to be positive for dengue NS1 antigen and/ or dengue IgM antibody. Such patient's data was analyzed in the study.

Results: A total of 16744 cases were analyzed, out of which 1157 (6.91%) were found to be positive by ICT and 1077(6.43%) by both EARLY NS1 Ag ELISA and IgM MAC ELISA for dengue during last five year (2012 to 2016). Out of total dengue positive by both ICT and ELISA, 615 (57.10%) were NS1 antigen positive,462 (42.90%) were IgM antibody positives.
Retrospective analysis revealed that predominantly males **(**60.82%) were more affected than females (39.18%) and most affected age group was 1-20 yrs.

Conclusion: In our tertiary care rural hospital, during the last 5 year the dengue suspected cases has been increased along with their seropositivity.

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INTRODUCTION

Dengue which is increasingly prevalent arthropod borne viral disease is of public health significance (Chakravarti *et al*., 2012). It has become a major international public health concern in terms of mortality and morbidity. The reported mortality rate in most of the countries is 5%, among young adults (Shrivastava *et al*., 2011). In India there is increased proportion of dengue cases with severe disease, known to be endemic and outbreak have been reported at regular intervalfrom all most all parts of India (Ratageri *et al*., 2005; Chakravarti *et al*., 2012). Dengue causes spectrum of illnesses which may be subclinical or symptomatic. Many infections mimic dengue viral infection such as influenza, measles, leptospirosis, etc. Clinically dengue illness occurs in three traditionally recognised forms as dengue fever, dengue haemorrhagic fever and dengue shock syndrome but as per revised WHO guideline broadbased clinical classification of dengue which is gradually being adopted as;dengue;dengue with warning signs and sever dengue (WHO 2009). When patient presents with typical presentation it is easy to treat as per the WHO guidelines but when patients develop undifferentiated nonspecific symptoms, which is difficult for accurate diagnosis. Since, there is no vaccine available for dengue fever, the prevention and control of the disease mainly depends upon the epidemiological surveillance that provides reliable estimates of the disease and thereby helping to implement effective vector control measures. A diagnosis can be made by specific laboratory tests to rule out clinical diagnosis like detection of NS1 antigen and IgM antibody by rapid Immunochromatographic test (ICT) as well as Enzyme Linked Immunosorbent Assay (ELISA), Polymerase chain reaction (PCR), sequencing and other molecular test. But in rural hospital due to unavailability of these facilities, we have to rely on test which is less expensive and give rapid report like rapid Immunochromatographic test (ICT) followed by ELISA for confirmation. Therefore, we had planned to do retrospective evaluation of dengue seropositive cases based on the result of by both ICT and ELISA to find out dengue trend in our rural area during last five year (2012 to 2016).

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MATERIALS AND METHODS

This study is the retrospective analysis of the data of dengue seropositive cases in last five years (2012-2016). We have analyzed dengue seropositive cases that were indoor and outdoor belonging to various age group. Samples were received in 960 beddedtertiary care rural hospital. A total of 16,744 blood samples from suspected cases of dengue fever were received in the Department of Microbiology for serodiagnosis. These samples were screened for dengue NS1 antigen and IgM antibody by Immunochromatographic test (SD BioLine) and were confirmed by specific ELISA for both NS1 Ag and IgM antibody (PanBio, Korea). Procedure was done as per the manufacturers' instructions. Data of dengue seropositive cases were analysed on the basis of age sex, indoor outdoor cases were further analysed month wise.

RESULTS

During last five year from 2012–2016 a total of 16,744 blood samples were received from wards and OPDs from all age group for dengue investigation. Out of the total 16,744 serum samples, 1157 (6.91%) serum samples were found to be positive for dengue by Immunochromatographic test (SD BioLine). During this period, it was noted that the seropositivity was more in the year 2014 which was found to be 9.94% followed by in the year 2013 which was 8.54%. Then 4.90%, 3.99% & 3.19% during 2012, 2016 & 2015 respectively (Table-1)

Out of total 1157 positive serum samples, NS1 Ag positivity was found to be 57.30% and positivity for IgM antibody was found to be positive for 42.70% (Table -2). All the serum samples found to be positive by ICT were then subjected to the ELISA for both NS1 Ag and IgM MAC ELISA by PanBio for confirmation and procedure was followed as per manufacturer's instructions. Overall seropositivity for dengue NS1 antigen was more than the IgM seropositivity during the last 5 years. This reflects that more than 50% of the patients were having primary acute infection during that period.In the year 2013 and 2016 highest NS1 Ag positivity were seen which was found to be 71.62% and 71.54% as compare to 54.62% during 2014 followed by 55% in 2012 and least during 2015, 24.74%. Out of total IgM antibody positives maximum positivity was seen during 2015 which was 75.26% followed by 45.38% and 45% in 2014 and 2012 respectively. Out of total 1,157 ICT positives serum samples, when subjected to the ELISA both NS1 Ag and IgM antibody 1,077 (93.09%) serum samples were found to be positive for dengue. Out total 1,077 ELISA positives, NS1Ag ELISA positives were 615 (57.10%) and IgM ELISA positives were 462 (42.90%). But when we compare ICT and ELISA, out of total NS1Ag 663 positive by ICT, NS1Ag ELISA positivity was 92.76% and for IgM 494

Table 1. Distribution of seropositive samples during last 5 years (2012-2016)

Years	Total samples	Positives	
		Total positive	Percentage
2012	1632	80	4.90%
2013	2683	229	8.54%
2014	6315	628	9.94%
2015	3036	97	3.19%
2016	3080	123	3.99%
Total	16744	1157	6.91%

*Percentage in parenthesis is from total samples received during that period.

Table 2. Seropositivity of serum samples for Dengue NS1Ag and IgM antibody during last 5 years

Years	ICT Positives		
	Total positives	NS1 Ag	IgM
2012	80	44(55%)	36(45%)
2013	229	164(71.62%)	65(28.38%)
2014	628	343(54.62%)	285(45.38%)
2015	97	24(24.74%)	73(75.26%)
2016	123	88(71.54%)	35(28.46%)
Total	1157	663(57.30%)	494(42.70%)

Table 3. Distribution of ELISA and ICT positives dengue samples

Years	Total samples	ELISA Positives				
		Total positive	IPD	OPD	Male	Female
2012	1632	64	51	13	46	18
2013	2638	224	176	48	143	81
2014	6315	582	442	140	357	225
2015	3036	91	60	31	46	45
2016	3080	116	76	40	63	53
Total	16744	1077	805(74.74%)	272(25.26%)	655(60.82%)	422(39.18%)

Table 4. Age wise Distribution of dengue Seropositive Cases

Year	Total Positives	1-10yrs	11-20yrs	21-30yrs	31-40yrs	41-50yrs	51-60yrs	61-70yrs	>70yrs
		Positives							
2012	64	25 (39.06%)	15 (23.44%)	15 (23.44%)	4(6.25%)	02(3.12%)	02(3.12%)	01(1.56%)	00
2013	224	55 (24.55%)	115 (51.34%)	27 (12.05%)	09(4.02%)	06(2.68%)	07(3.13%)	05(2.23%)	00
2014	582	145 (24.91%)	258 (44.33%)	103 (17.70%)	40(6.87%)	14(2.41%)	08(1.37%)	09(1.55%)	05 (0.86%)
2015	91	15 (16.48%)	15 (16.48%)	30 (32.97%)	9 (9.89%)	8 (8.79%)	6 (6.59%)	5 (5.49%)	3 (3.30%)
2016	116	25 (21.55%)	38 (32.76%)	17 (14.66%)	10 (8.62%)	8 (6.90%)	9 (7.76%)	5 (4.31%)	4 (3.45%)
Total	1077	265(24.61%)	441 (40.95%)	192 (17.83%)	72 (6.69%)	38 (4.32%)	32 (2.97%)	25 (2.32%)	12 (1.11%)

ICT positive, IgM ELISA positives was 93.52%. This finding shows that ICT is more sensitive and ELISA is more specific for diagnosis.

Table –3 shows the distribution of seropositive cases by both ICT and ELISA. Out of total 1,077 positives cases for dengue, 74.74% were indoor patients and 25.26% were outdoor patients. Maximum positivity in hospitalized patients as compare to outdoor patients indicates that dengue infection is in the severe form which makes the patient hospitalized. Early diagnosis helps in the accurate treatment of patients and minimizes the complications. Male patient positivity (60.82%) which was more than female (39.18%).On analysis of age wise distribution for positive cases it was revealed that highest positivity was seen in the age group of 1-20 yrs (24-40%) and the second seropositivity was noted in 21-30 yrs of age group (17.83%) as shown in Table 4. Similar type of age preponderance was observed in many studies (DayarajCecilia, 2014; Ekta Gupta *et al*., 2006). It has been also evident that with increase in age the percentage seropositivity has gone down. From the age 60 yr. onwards positivity was about 1-2%.We had also seen that the seropositivity for the dengue is more during post monsoon period from August to November in every year. Similar type of findings was also shown by Ekta *et al*. (2006).

DISCUSSION

Since the year 2012 at many places of India has witnessed outbreaks. Dengue fever represents as any other viral infection. Hence, it is difficult to differentiate clinically. There are only minimal test which are available to reach to diagnosis as dengue fever which may be diagnosed by RT PCR which detect genomic sequence of nucleic acid by amplification and dengue virus specific IgM antibody by MAC ELISA and rapid dengue Ìmmunochromatography. Though virus isolation is considered as a gold standard but it is expensive method and to find out anti dengue specific IgM depends on time for immunological response to produce IgM antibody against dengue virus antigen. Hence, a single serological detection of IgM is indicative of recent dengue infection and should not be interpretative as confirmatory diagnosis. Dengue EARLY ELISA has an advantage as it gives good detection rates upto seven days of illness. Studies have found the presence of NS1Ag in 82.83% of patients with dengue infection from day 1 upto day 9 to 18 after the onset of fever. There is no cross reactivity of NS1 antigen with other viral infections. In the following year (2012-2016) though no outbreak was revealed in our hospital but definitely higher number of cases with dengue like symptoms than usual was noted. There was an increase in total sample through last five year period almost double the number in 2016 than 2012. This increase in the number of total samples through year had shown that dengue infection is increasing. For which more accurate strategies are required to diagnose for instituting early treatment to the patients to avoid complication. Patients with both ICT and ELISA positive for dengue were more in indoor patients (74.74%) than outdoor patients (25.26%). This findings suggest that if the patient is found to be positive by both or any one test either ICT or ELISA indicates acute infection and requires hospitalization.

Dengue seropositivity in male patients was found to be 60.82%which was almost double than the female patients 39.18% throughout last five year. Similar finding was also shown by Bhaswati *et al.* (2013). Gupta *et al.* (2006), Chakravarti *et al.* (2012). A study conducted by Sarkar*et al.* (2012) showed female preponderance. In our study, dengue highest number of cases was reported in the age group of 1-30 yrs during the last five year from 2012-2016 ranging from 17-40%. Most of the studies also shows highest cases during 11-30 yr (Bandyopadhyay *et al.,* 2013; Ekta Gupta *et al.,* 2006; Chakravarti *et al.,* 2012). However, Sarker *et al.* (2012) reported most affected age group was 0-10yrs. This retrospective analysis has enabled us to suspect cases with viral infection from the month of August to November due to maximum seropositivity during these months. This study had been carried out in tertiary care hospital where viral culture is not possible. Without viral culture and other molecular facilities to provide reasonable opinion to the clinician in the management of infections like dengue we have to rely on ICT and ELISA. Along with that, if we take preventive measure in early and post monsoon period we can lower down the complications due to dengue infection.

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