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Prevalence of dengue virus infection among population of Bhaili visiting tertiary health institution; Chhattisgarh

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A B S T R A C T

Background: Dengue fever, dengue haemorrhagic fever and dengue shock syndrome of infection is distinct clinical forms which is caused by Dengue Virus that belong to a member of the Flaviviridae family. It is most important arthropod borne viral disease that causes morbidity and mortality. Dengue virus infection is a major public health problem growing in worldwide and it is estimated about 2.5 billion people of world are at risk of this infection. In India several parts of the country it is an endemic disease. **Aims and Objective:** The current work is an attempt to review current perspectives of dengue infection among population of Bhilai visiting tertiary health institution. In study also we have compared the serological profiles of the dengue cases. **Materials and Methods:** Samples received were performing retrospective analysis in the department of microbiology and process in the departmental microbiology laboratory obtaining during monsoon season. The duration of fever (in days) and other relevant clinical information were recorded from the requisition form. Rapid test for dengue as NS1Ag, IgG and IgM test were performed in accordance with the manufacturer's instructions. The dengue NS1Ag, IgG and IgM rapid test is an in vitro immunochromatographic test (ICT) which is a onestep assay designed for the qualitative determination of dengue NS1Ag, IgG and IgM in human serum for the diagnosis dengue infection. **Result:** During the study period total 1308 serum samples were collected from suspected Dengue fever patients. Among 1308 samples 412(31.5%) samples were found to be positive dengue fever. In the month of August maximum number of sample were received. Out of 1308 patients with dengue suspected patients 792(60.6%) were male and 516(39.4%) were female. Among 60.6% of male 28.2% were positive and out of 39.4% of female 36.6% were positive for dengue. Age between 10-20 years old (55.83%) patients were most affected age group and 70-80 years old (8.77%) age group were least affected. Among the dengue positive patients, dengue parameter associated with thrombocytopenia was also recorded which showed that there was no significant difference between the parameters in relation to thrombocytopenia. **Conclusion:** Especially in developing countries like India where there are poor resources for diagnosis of dengue infection, the sensitivity of these tests is more than immunochromatographic Test (ICT). By NS1 assay early detection of dengue infection can help in early confirmation and management of this before its gets complicate. Therefore commercial available dengue NS1 antigen test kits provided additional laboratory diagnostic tool for early detection of dengue.

Key words: Prevalence; Dengue; Thrombocytopenia; NS1; IgM; IgG

INTRODUCTION

From long period of history to this era, present information about public health news is uncommon pathogens or infection syndromes; infection of dengue virus (family Flaviviridae) is an endemic problem increasingly important in many parts of the world. Dengue fever is a mosquito born viral disease which is widely spread in tropical and sub tropical regions of the world. Dengue virus infection is a major public health

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problem growing in worldwide and it is estimated about 2.5 billion people of world are at risk of this infection. In India several parts of the country it is an endemic disease. Antigenetically, there are four distinct serotypes of the dengue virus: DENV1, DENV2, DENV3, and DENV4. Each serotype has several genotypes or subtypes. Although there are different serotype, but in human only one serotype induce lifelong immunity against particular serotype re-infection but only partial and temporary immunity against the other serotypes[1] and[2]. Every serotype has unique characteristics and shows harsh manifestation in particular population depending on interaction with response of host. Several preventive measures have taken The World Health Organization (WHO) to control the spread of dengue virus infection. However in several parts of the world still new outbreaks were reported during post monsoon season. Better education, public awareness programs, newer diagnostic techniques and proper monitoring of vector control are required to prevent outbreaks.

In the microbiology laboratory, diagnostic methods commonly used for confirming dengue infection involve as detection of virus antigen in serum or plasma, virus isolation and also detection of dengue virusspecific antibodies in serum and other body fluids. Molecular techniques are more expensive so most of laboratories favor detection of IgM, IgG, and NS1Ag by ELISA as confirmatory test which is also recommended by the WHO. Many studies show high prevalence of dengue among the population from different parts of the developing countries.[3-7] Dengue disease is first isolated in Japan in 1942.[8] Primary infection results acute febrile illness known as Dengue Fever (DF) which usually clear by an immune response complex in about 7 days. Secondary infection is more severe which results in Dengue Shock Syndrome (DSS) or hemorrhagic fever (DHF) or both. This can be life-threatening and may lead to death.[9] The fatality rate is 1-5%.[10]

Last few decades, in India dengue have dramatically expanded with rapidly changing epidemiology.[11] In India epidemic of dengue virus was in 1996.[12] In 2003 all four serotypes of dengue viruses were found.[2] In the years 2005–2008, outbreaks of DF/DHF were reported from various states in India.[13] in 2010 India reported a total of 28,292 cases and 110 deaths, the highest number of cases and number deaths in a single year in the country in the previous two decades.[14] This paper tried to review current perspectives of dengue infection among population of Bhilai visiting tertiary health institution. In study also we have compared the serological profiles of the dengue cases.

MATERIALS AND METHODS

The present study was conducted in CCMMC and hospital, a tertiary healthcare centre, catering to the healthcare needs of the people in and around Krud village, Bhilai, Durg district of Chhattisgarh. The samples received were performing retrospective analysis in the department of microbiology and process in the departmental microbiology laboratory obtaining during monsoon season, over a period of 3 months from august 2018 to October 2018. Individual visiting to hospital of all age groups, clinically suspected of dengue by presented 1-9 days of fever were include in this study. The serum was separated from the sample and treat with early dengue diagnostic tests, viz., rapid NS1 antigen, IgG and IgM. The duration of fever (in days) and other relevant clinical information were recorded from the requisition form. Rapid test for dengue as NS1Ag, IgG and IgM test were performed in accordance with the manufacturer's instructions. The dengue NS1Ag, IgG and IgM rapid test is an in vitro immunochromatographic test (ICT) which is a onestep assay designed for the qualitative determination of dengue NS1Ag, IgG and IgM in human serum for the diagnosis dengue infection. About 50 µl of patients' serum was added to the sample well marked as "S" and then three drops of buffer were added in the buffer well marked as "B". The result was interpreted in 20-30 min. The presence of only one color line within the control line marked as "C" indicated negative result and the presence of two color lines within the marked as "T" band and "C" line indicated a positive result. The test was concluded as invalid when no control line (C) was found. However the positive samples were also processed for ELISA as a confirmatory test.

RESULT

During the study period august 2018 to October 2018, total 1308 serum samples were collected from suspected Dengue fever patients. Among 1308 samples 412(31.5%) samples were found to be positive dengue fever. Month -wise distribution of dengue positive cases over 3 months period as in August 41.73%, in September 21.45 % and in October 22.88% were positive as shown in Table 1 below. In the month of August maximum number of sample were received.

Out of 1308 patients with dengue suspected patients 792(60.6%) were male and 516(39.4%) were female. Among 60.6% of male 28.2% were positive and out of 39.4% of female 36.6% were positive for dengue. Although male patient were more in number but female showed more prevalence to dengue fever as shown in Table 2 below.

Table 1: Showing total no. of patients with positive cases within 3 months

Month	Total number of patients	Number of positive patients	Percentage
Aug	623	260	41.73
Sept	331	71	21.45
Oct	354	81	22.88
Total	1308	412	31.50

Table 2: Showing gender profile of patients with positive percentage cases

Sex	Total number of patients	Percentage	Positive	Percentage
Male	792	60.6	223	28.2
Female	516	39.4	189	36.6
Total	1308	100	412	31.5

Table 3: Age profile of the patients

Age group	Total number of patients	Number of positive patients	Percentage
01–10	156	32	20.51
10–20	120	67	55.83
20–30	383	126	32.90
30–40	226	92	40.71
40–50	126	52	41.27
50–60	145	26	17.93
60–70	95	12	12.63
70–80	57	5	8.77
Total	1308	412	31.50

Table 4: Comparison of various dengue parameters

Parameters	Number	Percentage
NS1 only	78	18.9
IgM only	74	18.0
IgG only	68	16.5
NS1 and IgM only	39	9.5
NS1 and IgG only	96	23.3
IgM and IgG only	57	13.8
Total	412	100

NS1: Non- structural protein 1, IgM: Immunoglobuline M, IgG: Immunoglobuline G

Table 5: Comparison of platelet count and dengue parameters

Parameters	Number	Platelet count <1,00,000/ml	Percentage
NS1 only	78	37	47.4
IgM only	74	32	43.2
IgG only	68	27	39.7
NS1 and IgM only	39	25	64.1
NS1 and IgG only	96	54	56.3
IgM and IgG only	57	32	56.1
Total	412	207	50.2

NS1: Non- structural protein 1, IgM: Immunoglobuline M, IgG: Immunoglobuline G

Table 6: Showing the outcome of dengue infection

Outcome	Number of dengue infection	Percentage
Discharge patients	361	87.6
Refer	49	11.9
Death	2	0.5
Total	412	100

In this study from the age between 1 year old to 80 years old patients were included. The mean age was 33.82±11.17 years old and Standard deviation σ is 18.9063. Age between 10-20 years old (55.83%) patients were most affected age group and 70-80 years old (8.77%) age group were least affected as shown in Table 3 below.

Out of 1308 samples 412 samples were positive for one or more Dengue specific parameters as shown in Table 4 below. Out of total 412 positive samples NS1 Ag and IgG Ag only (23.3%) are maximum in number whereas least positive were NS1 Ag and IgM Ag only 9.5%.

In this study among the dengue positive patients, dengue parameter associated with thrombocytopenia was also recorded as shown in Table 5 below. Out of total positive cases thrombocytopenia was seen in 207 (50.2%) patients. In 213 NS1 Ag positive patients thrombocytopenia was seen in 116 (54.5%) whereas considering antibodies along thrombocytopenia was observed in 91(45.7%) out of 199 patients. The p=0.307 which showed that there was no significant difference between the above two parameters in relation to thrombocytopenia. In 78 NS1 only positive patients

47.4% thrombocytopenia was observed whereas considering NS1 and IgM Ag only thrombocytopenia was observed in 25(64.1%) out of 39 positive patients. The p=0.353 which showed that there was no significant difference between the above two parameters in relation to thrombocytopenia.

For all the dengue positive patients was monitored closely following admission as shown in Table 6 below. After the admission of the patient's regular follow up was done as a result following outcomes were observed. Out of 412 positive patients 361 (87.6%) discharge from the hospital after the recovery whereas 49(11.9%) were refer to higher government hospital centre and 2(0.5%) were death.

DISCUSSION

According to the World Health Organization, in the past 50 years globally the incidence of dengue has shot up 30-fold. Dengue disease presents highly complex

pathophysiological, economic, and ecologic problems.[15] In order to provide early information about management and public health control of dengue outbreaks, it is important to diagnosis of acute dengue infection on the first days of manifestation of the clinical symptoms.[16] In dengue infection the role of NS1 Ag for early detection is currently being assess by many investigators, without the requirement of paired sera.[17,18] The NS1 antigen is a highly specific marker of dengue infection which circulates uniformly in all serotypes of dengue virus. During the first few days of illness it circulates at high level as there is no cross reaction of the dengue NS1 protein, with those of other related flaviviruses.[19,20] According to the studied of Kulkarni et al[21] NS1 alone and with IgM correlated well with thrombocytopenia whereas in this study there was no correlation. This may be because level of NS1 depends on the viral load as level of NS1 is indirectly proportional to the duration of illness increases. After starting antibodies the NS1 antigen is sequestered into immune complexes.[17]

According to the study of Ghouth et al[18] and Padhi S et al[19] age group was between 11 - 30 years are commonly effected. Dengue cases was about to be 28.5% and 29.4% for the age groups 11-20 years and 21-30 years respectively which was lesser than this study. Sunyoto T et al[20] studied 7% patients Dengue cases were reported which was hospitalized and no report of death among patients whereas in this study 0.5% of death were recorded. Annually about 5% of the cases require hospitalization worldwide. However in India has seen an increase in the number of cases over the years, mortality is decreasing.[21]

CONCLUSION

In dengue positive patients the association of thrombocytopenia was highly significant as compared to thrombocytopenia in dengue negative patients. Especially in developing countries like India where there are poor resources for diagnosis of dengue infection, the sensitivity of these tests is more than immunochromatographic.

Test (ICT). By NS1 assay early detection of dengue infection can help in early confirmation and management of this before its gets complicate. National level of study from different places should be estimate for true burden of dengue in India. From various sectors for the prevention of dengue policy making and health education should be provided to control further disease transmission. Therefore commercial available dengue NS1 antigen test kits provided additional laboratory diagnostic tool for early detection of dengue.

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