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Prevalence of Dengue with Its Pathological Co-Relation at Sentinel Surveillance Unit, Palanpur

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Original Research Article

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Abstract: Dengue, one of the world's major emerging tropical viral disease, is a significant cause of morbidity and mortality in many parts of the world including India. The study is undertaken to study prevalence of dengue and its co-relation with various pathological parameters. 592 clinically suspected cases of dengue fever from November 2015 to July 2018 were included in the study. Blood samples for dengue serology, serum transaminases and platelet count (PC) were drawn in plain and EDTA test tubes. Dengue serology was performed by IgM MacElisa and NSI Antigen ELISA depending upon the duration of onset of fever. Platelet count was carried out on fully automated three part cell counter and serum transaminases study done on semi automated biochemistry analyser. Out of 592, 319 serum samples were tested for dengue NS_1 ELISA and 54 samples were positive. 273 samples were tested for dengue IgM ELISA and 31 samples were positive. So prevalence rate of dengue was 14.36%. Majority of positive cases were males, having sex ratio of 1.93:1. Among dengue positive cases, 62.35% cases were found in 15-44 age group years. Varying degree of thrombocytopenia was seen in 87.05% positive cases. Serum transaminases level with normal acceptable range was noticed in 75.93% of dengue NS_1 positives cases compare to elevate level in 77.42% of dengue IgM positive cases. The study draws attention toward the male, young adult age group. The overall significant increase in dengue IgM and dengue NS_1 seropositivity among suspected cases in last few years indicates an increase in dengue virus activity. This study results indicate that dengue infection is not going to wane away but is going to stay and will play havoc if immediate control measures are not taken. The need of the hour is long-term vector control strategy; so that the outbreaks can be prevented.

Keywords: Prevalence, Dengue IgM, Dengue NS_1, ELISA, Thrombocytopenia, Serum transaminases.

INTRODUCTION

Dengue fever is an important emerging tropical mosquito borne viral disease which cause significant morbidity and mortality [1]. Dengue is caused by four serotypes of dengue virus namely DEN1, DEN2, DEN3 and DEN4 [2]. Clinical spectrum of dengue virus infection varies from asymptomatic through classical dengue fever (DF) to life-threatening dengue haemorrhagic fever (DHF)/dengue shock syndrome (DSS) [2]. The dengue viruses are RNA flavi viruses belonging to flaviviridae family & the principal transmission vectors are peri-domestic mosquitoes Aedes aegypti [3]. Disorganized modern development and migration of people to these areas with improper sanitation facilities are more common causes in increased cases of dengue fever [4]. Since there is no vaccine available for the DF, the prevention and control of the disease mainly depends upon the epidemiological surveillance that provides reliable estimate of the disease and thereby helping to implement effective vector control measures [5]. So present study is aimed to know prevalence of dengue and its co-relation with various pathological parameters.

MATERIALS AND METHODS

Samples from 592 clinically suspected Dengue patients were received or collected at Central Laboratory of Sentinel Surveillance Unit in Palanpur from November 2015 to July 2018. Blood samples for dengue serology, liver enzymes and complete blood count (CBC) were drawn in plain and EDTA test tubes. Dengue serology was performed by IgM antiDengue antibody by Dengue IgM capture ELISA (MacElisa) if duration of onset of fever was more than five days and NS_1 Antigen ELISA if duration of onset of fever was less than five days. Platelet count was carried out on fully automated three part cell counter and liver enzyme study done on semi automated biochemistry analyser.

Kits for ELISA testing were supplied by National Institute of Virology (NIV), Pune. Tests were done and results were read as per the literature provided.

RESULTS

From table-1, 85 cases were dengue fever positive out of 592 cases. So prevalence of denue fever was 14.36%. The positive rate for dengue NS_1 antigen and IgM antibody were 16.92% and 11.36% respectively.

Table-1: Positivity rate of dengue

TEST	DENGUE POSITIVE SAMPLES	TOTAL SAMPLES
NS1 ANTIGEN	54(16.92%)	319
IgM ANTIBODY	31(11.36%)	273
TOTAL	85(14.36%)	592

Figure-1 Shows that Dengue cases were declining during this study period. The number of cases started rising from the month August and peaks at September-October month during this study period.

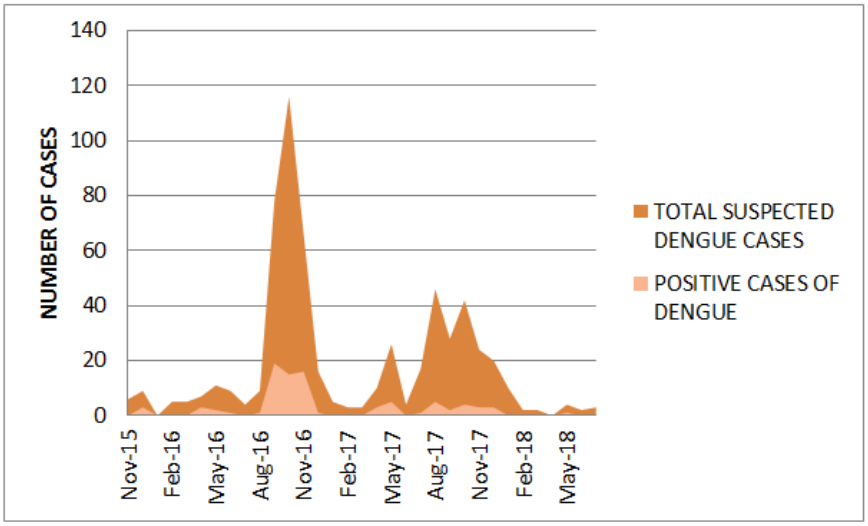

Fig-1: Positive & Total No. of Dengue Cases

Table-2 shows that age group of 15 to 45 years shows maximum numbers of cases (62.35%). Percentage of positive cases of dengue fever in male was 65.88%. Sex ratio for dengue seropositive patients for male to female was 1.93:1.

Table-2: Sex wise and age group wise distribution of positive cases of dengue

	AGE GROUP						
SEX	<5	5 TO 14	15 TO 45	45 TO 60	>60	TOTAL	
MALE	1	12	38	5	0	56(65.88%)	
FEMALE	1	11	15	0	2	29(34.12%)	
TOTAL	2(2.36%)	23(27.06%)	53(62.35%)	5(5.87%)	2(2.36%)	85(100%)	

From table-3 total leukocyte count in 43 (50.59%) patients was normal. In 38(44.71%) patients it was less than 4,000 (leucopenia) while 4(4.70%) patients had count more than 11,000 (Leukocytosis). 75 patients had thrombocytopenia (<1,50,000/mm3) of which 58(68.24%) had mild thrombocytopenia while 12(14.11%) had moderate thrombocytopenia, 5(5.88%) patients had severe thrombocytopenia and 10(11.77%) had normal platelet counts.

Table-4 shows that 37(42.35%) cases had elevated transaminases level. But interesting finding was that 41(75.93%) NS_1 positive dengue cases had normal tranaminases level while 24(77.42%) IgM positive dengue cases had elevated level of tranaminases.

DISCUSSION

In our study, Prevalence of Dengue in Palanpur, North Gujarat was 14.36% which were comparable to study done by Hitesh *et al.*, [6] in Valsad, South Gujarat(12.91%) and Panwala T *et al.*, [5] in Surat(20.41%). In this study we found that number of cases started rising from August with a peak in September and October.

Table-3: Distribution of cases according to hematological finding

Sr. No.	Investigations	Total no. Of cases (%)
1	Platelet count/mm3(Thrombocytopenia)	N=85
	Mild:50,000-1,50,000	58(68.24%)
	Moderate:20,000-50,000	12(14.11%)
	Severe:<20,000	5(5.88%)
	Normal:>1,50,000	10(11.77%)
2	Total Leukocyte count/mm3	N=85
	Leucopenia:<4,000	38(44.71%)
	Normal:4,000-11,000	43(50.59%)
	Leucocytosis:>11,000	4(4.70%)

Table-4: Distribution of cases according to transaminases level

Serum transaminase	NS1	IgM	TOTAL
NORMAL RANGE(<40 U/l)	41(75.93%)	7	49(57.65%)
ELEVATED(>40 U/l)	13	24(77.42%)	37(42.35%)
Total	54	31	85(100%)

The correlation between occurrence of dengue and monsoon season is clearly evident in this study and is further supported by similar findings from Surat [5], Kerala [7], Ludhiana [8] and Karachi [9]. It may be because this season is very favourable for high breeding of the vector, Aedes aegypti. Presence of some dengue positive cases even during dry months as seen in this study could probably be reflective of the year-round activity of the mosquito vector. Even minimal collections of water sources (like stagnating water within indoor plants) can favours breeding of the vector thereby helping in the maintenance of the vector population throughout the year. The year-round occurrence of dengue infection, with peak in rainy season was concordant with reported patterns of dengue transmission. This seasonal outbreak of disease transmission is very important at local level for effective control measures and that preventive measures against dengue infection should come into full swing during water stagnation periods after the initial bouts of rainfall and at the end of monsoon [5]. In our study, male to female ratio was 1.93:1, similar pattern of male preponderance was found in previous studies conducted by Seema Avasthi *et al.*, [10]; Karolie *et al*., [11] Malavige *et al*., [12], Sri Lanka and G Lepakshi *et al*., [13]. Males(65.88%) were found to be more affected than females (34.12%) in our study. Lower disease incidence in women may be a statistical artefact related to lower reporting and careseeking for women[5]. The proportion of dengue sero-positive cases for age group 15-45 years of age was highest (62.35%) followed by age group 5-14 years (27.06%). Similar results were also noted in study by Panwala T *et al*., [5] and Ashwini Kumar *et al*., [14]. Dengue infection occurred in most active age groups i.e. children and adults, who were out of the house most of the times during play or at work. Seventy-five patients (88.23%) had thrombocytopenia (<1,50,000/mm^3) comparable to study by Mane V *et al*., [15] (80%) and Ratagiri *et al*., [16] (82%). The increased destruction or decreased production of platelets could result in thrombocytopenia. The release of high levels of platelet-activating factor by monocytes with heterologous secondary infection may induce platelet consumption and augment adhesiveness of vascular endothelial cells resulting in thrombocytopenia [17]. Total leukocyte count in 43(50.59%) patients was normal. In 38(44.71%) patients it was less than 4,000 (leucopenia) while 4(4.70%) patients had count more than 11,000 (Leukocytosis). Leucopenia was observed in more than 60% of patients in the study of Mane V *et al*., [15] and 26% of patients by Ratagiri *et al*., [16]. Elevated liver enzymes were found in a total of 37 (42.35%). But important finding was that 41(75.93%) NS_1 positive dengue cases had normal tranaminases level due to low viral load and virus is in replication and multiplication stage. 24(77.42%) IgM positive dengue cases had elevated level of tranaminases as virus gets entry into the hepatocytes, virus is shredding, active synthesis of new virus particles and more viral load leads to damage to hepatocytes.

CONCLUSION

The study draws attention toward the male, young adult age group. The overall significant increase in dengue IgM and dengue NS_1 seropositivity among suspected cases in last few years indicates an increase in dengue virus activity. This study results indicate that dengue infection is not going to wane away but is going to stay and will play havoc if immediate control measures are not taken. The need of the hour is long-term vector control strategy; so that the outbreaks can be prevented

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