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PATTERN OF DENGUE FEVER EPIDEMIC: OBSERVATIONS FROM LABORATORY RESULTS OF A TERTIARY CARE HOSPITAL IN CENTRAL KERALA.

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ABSTRACT

Background: Dengue fever is spreading widely and is a major public health problem now. Most of the research reports from Kerala are on clinical presentations or complications. This study was to explore the magnitude and pattern of incidence based on the investigations done in our hospital.

Materials and methods: The number of cases tested for Dengue and IgM test positive was gathered from the Microbiology register for year 2006 to 2016. The data entered in excel sheet year wise and month wise. The analysed data is presented in tables.

Observations : Total number of cases, both clinically suspected and tested positive showed steady rise from 2006 to 2016; except a plateau in 2010-2011 and fall in 2013-2014. A rise during the months of June, July and August every year was consistent. The rise begins earlier and fall starts later in consecutive years that followed. For the period 2011 to 2016 the incidence showed wide variations in rises & falls and extent of rise without any similarity in pattern to nearby years. However spread to nearby months – both in the beginning and at the end - was universally present.

Conclusions: The importance of Dengue as a serious mosquito-borne viral infection is evident from the large number of incidences. Though incidence observed throughout the year, there was noticeable rise during June, July months. There was a progressive rise in incidence every year during the decade of study period. The rise in incidence showed a tendency to last longer to later months every year. Changes in the environment, mosquito or viral population may be responsible for the rise in transmission, morbidity, mortality and to the spread to later months. The need for long term surveillance including sero-epidemiological is proposed.

As studied sample is not representational, it is cautioned against generalizations to Kerala population. However inferences from this study are definite pointers for further research.

KEYWORDS :

Introduction:

Disease burden of Dengue fever is 465,000 globally. Among vector borne illnesses, its disability adjusted life years (DALYs) is similar to Malaria[1]. It is a serious disease due to its rapid spread and confirmed mortality. Kerala currently is considered as Dengue hyper-endemic. In the current year2017, it is reported that one in every 23 houses suffered a febrile illness[2]. Rapid increase in incidence and need for approaching it as major public health problem is recently reported from Odisha[3]. Considering its seriousness and spread in many states of the country, a wide campaign is organized by Ministry of Health, Government of India through visual and print media.

Considering the magnitude of problem and paucity of scientific literature from Kerala, it was decided to explore the pattern of incidence based on the investigations done in our hospital.

Materials and methods:

From the register maintained by the Microbiology department in the laboratory, the number of samples received for testing Dengue Fever was gathered from year 2006. Multiple samples if any received for single patient is counted as one only. These were patients who came for treatment of fever to departments of General Medicine or Pediatrics and suspected to be suffering from Dengue fever based on clinical examination findings. They were considered as clinically diagnosed cases. All of them were tested for IgM antibodies by Dengue IgM antibody capture ELISA method. This method has 90% sensitivity and 98% specificity. NS1 antigen test also was done for all cases from 2013 onwards, but those results were not included in the study as it was limited to latter three years only and may not contribute to analyse the trend. Equivocal results for Ig M test also were not included in test positive; but they were there included in the clinically diagnosed cases.

The collected data was entered in excel sheet year wise and month wise. Table prepared for the total numbers of samples received and test positive every year from 2007 to 2016. The difference in the incidence from previous month was calculated and its percentage is derived taking previous month incidence as the denominator.

Table with month wise data was prepared for every year of the study decade. Tables were prepared separate for the clinically diagnosed cases and test positive cases.

Observations and results:

The table 1 shows that the incidence of dengue cases increased from 2007 to 2016. The difference in incidence in comparison with previous month with its percentage is given taking previous month incidence as denominator. The number and percentage of incidence according to samples received for clinically diagnosed cases and test positive are shown in same table separately. The rise was sharp in 2009 and 2012. It then fluctuated with drops in 2011 and 2014; and with rises between 13 and 30 percentages during other years. The same trend was seen for the number of samples received and tested positive.

Table 2 shows that the incidence of dengue was present during all the months every year. In 2007 there was a sharp rise in June which started declining after August. In 2008 also the rise started in June, but high incidence persisted up to December. In 2009 the rise started in May and fall noticeable from November. The same was the trend in 2010, 2012, 2013 and 2014.In 2015 and 2016 the rise started in June, but the figures for the incidence was already high from the beginning of year; continued from the previous year end.

Table 3 of incidence based on test positive cases also showed same trend with relatively smaller number.

Discussion:

The rise in the number of cases observed was consistent with media reports and administrative concern[2]. Professionals, activists and administrators were focusing on the relationship between monsoon and the illness. The spread to nearby months; both pre and post monsoon periods appears not received its due attention. The previous studies from our centre also were on clinical profile[4] and hepatic complications[5].

Co-morbidity with Diabetes Mellitus and Hypertension are known to contribute to mortality. Similar was the observation in a recent study from Kerala[1]. These co-morbidities may be contributing to vulnerability for the Dengue infection also. However neither there is neither any report nor any logic to consider the rising incidence of life style diseases are responsible for the rise in Dengue frequency.

Not all the suspected cases were tested positive. The rate of tested positive was 30.8 % in our study. 21.5% was the finding in another report[1] and is comparable. The test is based on measuring the antibody and it will take at least five days after the onset of fever to be definitely positive. As the epidemic progress, the patients seek medical help at the beginning itself; there by negatively affecting the test result.

Earlier studies[1,3] reported highest incidence in the month of September. Our study showed presence of Dengue fever during all the months of year and rise during months of June-July. Lower frequency after high rise in the previous year during 2011 and 2014 are understandable. It could be due to efficient intervention following public, media and administrative attention which follows any epidemic of large scale. That efficiency might failed to sustain as the enthusiasm recedes with the drop in incidence, as in any other public health concerns. This could explain the rising incidence during other years. The spread of dengue to later months of year noticed in recent years are noteworthy. Environmental factors like rain fall rate, pollution and mosquito density may also be influencing the incidence. Association of dengue fever incidence with climacteric parameters and its spatial & temporal clustering were reported recently after a study using robust research methods and sophistic software programs[6]. However extension of epidemic to months after monsoon is a matter of concern. It cannot be explained on water logging alone; favoring mosquito breeding.

Presence of co-infection with multiple subtypes of virus and local genomic evolution were reported from Ernakulam in 2008[7]. Earlier reports emphasized that the mortality was limited to Leptospirosis only, while it was not observed in Chikkungunya and Dengue[8] infections. But the current picture in Kerala is different with proven mortality in Dengue. It could be because of high prevalence making the deaths more visible due to big number. A change in breeding pattern of vector might have happened contributing to this change in pattern. Or a mutation might have happened to virus which facilitated its lethality and morbid presence in non-monsoon periods also.

Our hospital caters to people of three districts of central Kerala. As a missionary hospital with more than half a century of standing, large number of patients from low socio-economic status approach our hospital for medical care. Still it cannot be considered scientifically as a representational sample of the state. Hence generalization to population of Kerala is cautioned against. However observations from this study and inferences drawn are definite pointers for further research.

Summary and conclusions:

The importance of Dengue as a serious mosquito-borne viral infection is evident from the rising number of tested and test positive cases observed in this retrospective study. The rise of incidence noticed progressively through the years during the decade 2007 to 2017. The rise in incidence showed spread to later months of the year more recently.

Changes in the environment, mosquito or viral population can be attributed to the rise in transmission, morbidity and mortality. The need for long term surveillance including sero-epidemiological studies, vector studies and virus studies proposed.

Table 1: Number of samples tested on clinical diagnosisi and test positive results during the decade 2007 to 2016

Year	Incidence of clinically diagnosed cases		Incidence of test positive cases	
	Number	Difference from previous month	Number	Difference from previous month
2007	181		7	7
2008	203	+22 (12.15%)	7	0 (0.0%)
2009	548	+345 (169.6%)	48	+41 (3400%)
2010	660	+11 (20.4%)	152	+104 (216.7%
2011	641	-19 (-2.9%)	141	-11 (-7.2%)
2012	1076	+435 (67.9%)	445	+304 (215.6%)
2013	1220	+144 (13.4%)	584	+139 (31.2%)
2014	739	-481 (- 39.4%)	210	-374 (-64.0%)
2015	1006	+267 (36.1%)	326	+116 (55.2%)
2016	1337	+331(32.9%)	474	+148 (45.4%)

Table2: Number of cases clinically diagnosed per month according to year

Year	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec	Total
2007	8	6	9	21	7	31	25	31	16	8	12	7	181
2008	6	5	8	7	7	14	27	25	15	30	18	41	203
2009	21	21	14	13	22	55	106	104	62	54	48	28	548
2010	29	10	11	11	31	93	139	93	65	69	65	44	660
2011	64	41	28	20	25	36	59	68	97	85	74	44	641
2012	48	30	26	27	39	86	151	176	133	180	72	108	1076
2013	69	58	74	89	149	164	136	130	99	97	81	74	1220
2014	51	44	42	32	34	58	77	72	83	89	81	76	739
2015	28	44	41	33	42	134	124	118	105	104	121	112	1006
2016	105	62	46	51	47	103	169	204	171	130	117	132	1337

Table3: Number of cases test positive per month according to year

Year	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec	Total
2007	0	0	0	1	1	0	0	3	1	0	1	0	7
2008	0	0	0	0	2	0	2	1	0	1	1	0	7
2009	0	0	0	0	0	0	0	11	1	11	16	9	48
2010	5	2	1	2	8	28	29	24	17	15	13	8	152
2011	16	8	5	3	4	11	19	13	23	17	11	11	141
2012	13	5	9	4	14	27	67	79	55	81	27	64	445
2013	26	16	49	55	76	72	93	68	41	41	23	24	584
2014	14	10	7	5	6	25	24	25	38	25	11	20	210
2015	7	8	8	6	7	64	46	33	37	32	39	39	326
2016	42	32	15	12	16	38	55	90	58	35	32	49	474

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