



A RECENT REPORT ON CHIKUNGUNYA STATUS IN GUJARAT, WESTERN INDIA

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ABSTRACT

Chikungunya fever (CHIKF) is a mosquito borne viral disease caused by chikungunya virus (CHIKV). Gujarat is the second state of India, being higher than Karnataka with respect to suspected cases. We here report CHIKF in Gujarat from October 2016 to December 2019 (39 months) in 2475 suspected cases following Real Time PCR and blood profiles using standard techniques. The confirmed cases were 56% (1393/2475) in four age groups (0-20, 21-40, 41-50 and 51 above yrs.). This infection increased with age. Older age group (51 and above) had a high percentage of infection (47.38%) followed by other age groups (24.62%, 18.23%, 9.76%) of 41-50, 21-40 and 0-20 years. Males were infected more than females (52% against 48%). The frequency of infection was higher in 2018 (58.11%) and 2017 (57.38%) followed by 2019 (37%) with more cases in monsoon and early post monsoon months. The transaminase levels increased marginally in regard to SGOT level, whose normal value ranges 0-37 U/L. Complete blood count (CBC) indicated lymphocytes were significantly reduced in positive cases, followed by a fall in WBC count comparatively in them. This epidemic outbreak was higher in Ahmedabad District (42%) in comparison to other three Districts of Gujarat due to climate, social community, migration and other factors. This study hence calls for the strict implementation of health protective measures in future.

KEYWORDS: Chikungunya, Cases in Gujarat, RT-PCR, Blood Profiles, Epidemiology.

INTRODUCTION

Chikungunya is mostly widespread in Africa and Asia countries and Australia, In India around 0.13 million suspected cases are reported during 2016 and 2017 contributing the majority of cases reported from Karnataka state followed by Gujarat, still increasing till now.^[1,2] It is also proposed that approximately 3.9 billion people living in about 120 countries are at risk of becoming infected with any of these three major arboviruses, chikungunya viruses (CHIKV), Dengue virus (DENV) and Zika virus epidemic.^[3] It is transmitted by mosquito borne Chikungunya virus (CHIKV) first isolated in 1953 and detected in Kolkata and then in Chennai.^[1] This infection is characterized by fever, myalgia, rash, headache and other complications due to Aedes mosquito bites.^[4-9] Ahmedabad is one of the Districts affected by Chikungunya fever (CHIKV) recently in Gujarat. Then repeatedly our recent report also detected a high rate of infection.^[5] Similarly the epidemiology of this infectious disease depends on geographic isolation, environmental factors, climatic details, populations and social communities.^[10,11,12] Hence, this study cohort was undertaken to investigate the distribution of CHIKF from 2016 to 2019 (39

months), its frequency in four Districts of Gujarat following guidelines of WHO.^[13]

MATERIALS AND METHODS

Patient's selection

Patients' (2475) suspected for this Chikungunya fever based on clinical reports from four district centers were recorded to our main center namely Neuberg-Supratech reference Diagnostic and research laboratory, Ahmedabad. These referral cases were divided into four age groups 0-20, 21-40, 41-50, and 51 above years from October 2016 to December 2019 (39 months). Each Patient was asked to fill out a concern form followed by blood collection on priority basis. Then analysis was done after approval of our ethical committee for investigation (GU/HEC/001/2015) in 2015, Ahmedabad.

Hematological and Biochemical Profiles

Complete blood cell (CBC) count was done using a cell counter (Siemen's Advair 2010, Germany). Serum transaminases of serum glutamic oxaloacetic transaminase (SGOT)/Aspartate transaminase (AST) and serum glutamate-pyruvate transaminase (SGPT)/Alanine

transaminase (ALT) were estimated using a kit (Dimension EXL, Germany) that were expressed as U/L.

Chikunguniya viral Detection

The Real Time-PCR (RT-PCR) assay used in this study for the detection of the Chikungunya virus was a Taqman primer probe mixer by in-house method. The assay allowed for a qualitative detection of dengue virus specific RNA, with reverse- transcription of the RNA into complementary DNA (cDNA) followed by PCR for the amplification of specific target sequences. The probes utilized were specific for CHIKV RNA labeled with the fluorophore FAMTM and specific for the Internal Control (IC) is labeled with the fluorophore VICTM. In-house protocol/ Quant studio5 was used for antibody (Ab) detection. The data were entered into the Microsoft excel spreadsheet and descriptive statistics were done. P value less than 0.05 was considered significant.

RESULTS

A number of 2425 suspected causes were enrolled in our laboratory during 39 months. Only 1393 (56%

1393/2421) were detected positive to CHIKF, being higher in 2018 followed by 2017 (Table 1). CHIKF cases increased with age, where 51 and above age groups were more infected (47.38 %) than other age groups (24.62%, 18.23%, 09.76%) in our study respectively males were similarly infected than female cases (52% Vs 48%), during this report (Table 2). In four Districts of Gujarat, Ahmedabad (42%) was affected followed by Vadodara (30%), Surat (16%) and Jamnagar (12%) respectively by this infection (Fig.1). In regard complete blood count (CBC): a decrease in WBC of positive cases was noted in all age groups as compared to that of negative cases, but lymphocytes were significantly reduced ($p < 0.0137$; 0.0001; 0.0162; 0.0001) (0-20, 21-40, 41-50, 51 and above years) in our study. A marked reduction ($p < 0.0001$) was also observed in platelet counts in the above 51 years age group (Table-4). Transaminases, SGOT, were altered in all age groups of positive cases marginally (Table 3).

Tables 1: Year wise prevalence of Chikunguniya cases referred in Oct 2016 to Dec 2019 (39 months).

Duration (months)	Chikungunya cases		
	Total	Positive	Percentage
Oct- Dec 2016*	436	273	62.61%
Jan-Dec 2017	840	482	57.38%
Jan-Dec 2018	924	537	58.11%
Jan- Dec 2019	275	101	36.72%
Total	2475	1393	56.28%

*Only three months.

Table 2: Age and gender wise percent (%) of positive Chikungunya cases (1393) in the study (Oct 2016 – Feb 2019).

Age Group (Yrs)	Male		Female		Total Patients	
	Positive	Percentage	Positive	Percentage	Positive	Percentage
0-20	80	11.09%	56	8.33 %	136	09.76%
21-40	154	21.35%	189	28.12%	343	24.62%
41-50	112	15.53%	142	21.13%	254	18.23%
51 Above	375	52.01%	285	42.41%	660	47.38%
Total	721	51.75%	672	48.24%	1393	56.28%

Table 3: Percent (%) of serum transaminase level in Chikungunya cases (1393) (Oct 2016 – Dec 2019) in four age groups.

Age Group	SGPT (100%) (U/L)	SGOT (100%) (U/L)
0-20	29.23 (80.08%)	37.26 (100.67%)
21-40	35.13 (96.24%)	40.55 (107.60%)
41-50	36.89(101.06%)	35.98(97.24%)
51 Above	37.24(101.02%)	43.52 (117.62%)

Normal Range - SGPT: 14-59 U/L; SGOT: 0-37 U/L

Table 4: Blood cell count in Chikungunya positive cases vs negative cases (Oct 2016 – Dec 2019) in our study.

Blood parameter	Case type	Age Groups in years			
		0-20 yrs.	21-40 yrs.	41-50 yrs.	51 ABOVE yrs.
Platelets Count (150000-410000)/ μ L	Negative	277297 $\pm$ 114206	251610 $\pm$ 105146	261481 $\pm$ 130767	256744 $\pm$ 105346
	Positive	246975 $\pm$ 96634	221329 $\pm$ 78002	225855 $\pm$ 78365	195076 $\pm$ 80218
	P value	0.4944	0.0879	0.1412	<0.0001
RBC (3.8 -4.8 Million/Cumm)	Negative	4.844 $\pm$ 0.66	5.45 $\pm$ 5.05	6.21 $\pm$ 7.81	4.65 $\pm$ 1.43
	Positive	4.48 $\pm$ 0.42	5.75 $\pm$ 6.35	5.07 $\pm$ 4.54	4.65 $\pm$ 3.13
	P value	0.1475	0.7783	0.4217	1.0000
WBC (4000 – 10000)/ μ L	Negative	6590 $\pm$ 3609	7026 $\pm$ 3777	6503 $\pm$ 3294	7773 $\pm$ 3844
	Positive	5723 $\pm$ 2268	5623 $\pm$ 2451	6389 $\pm$ 2136	6050 $\pm$ 2277
	P value	0.5233	0.0229	0.8567	0.5088
Lymphocytes Count (1000 – 3000)/ ul	Negative	1679 $\pm$ 907	1484 $\pm$ 894	1330 $\pm$ 769	1718 $\pm$ 1289
	Positive	833 $\pm$ 288	742 $\pm$ 479	897 $\pm$ 682	803 $\pm$ 555
	P value	0.0137	<0.0001	0.0162	<0.0001
Hb (12.0 -15.0 G %)	Negative	13 $\pm$ 1.89	13.32 $\pm$ 1.95	12.45 $\pm$ 1.86	14.65 $\pm$ 1.44
	Positive	12.51 $\pm$ 1.20	12.16 $\pm$ 2.16	12.40 $\pm$ 2.16	12.19 $\pm$ 1.80
	P value	0.4483	0.0031	0.9230	0.8001

Values are Mean $\pm$ S.E.; Figures in Parentheses indicate normal range

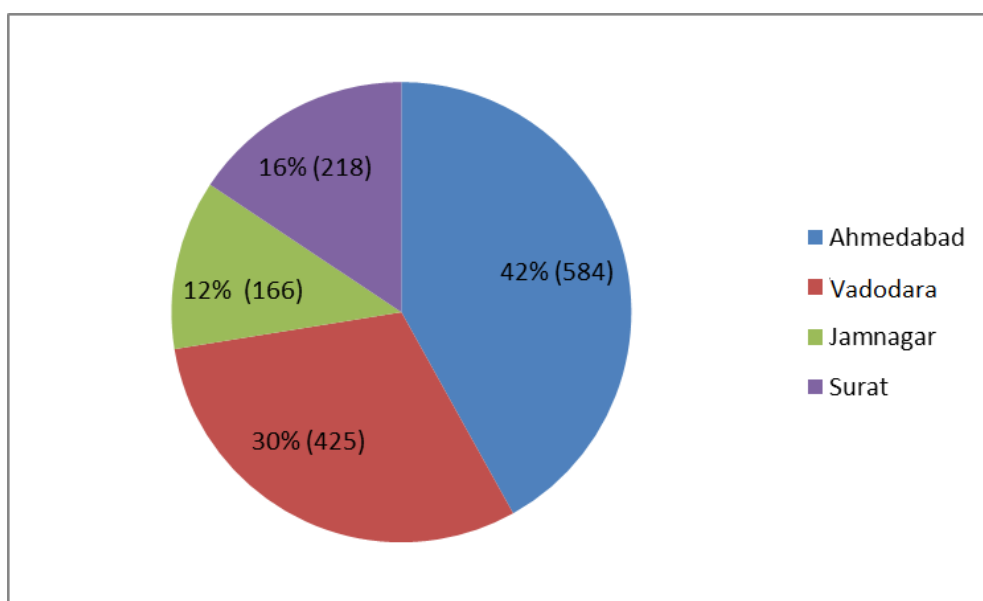


Figure 1: Distribution of Chikungunya positive cases (1393) within four Districts of Gujarat (Oct 2016 – Dec 2019).

DISCUSSION

In India, the laboratory capacity for diagnosis of outbreaks regarding infectious diseases in Indian states is variable depending upon the laboratory network attached through government organizations like Indian Council of Medical Research (ICMR) and Department of Health Research (DHR).^[14] The Chikungunya investigation was carried out in our main center, Neuberg-Supratech Reference Diagnostic and Research Laboratory, Ahmedabad, Gujarat during 2016-2019 (39 months) in Gujarat, West India.

The data emphasized the infection was higher in 2018 and 2017 followed by 2019 which varies depending on seasonal variations and other factors. This infection was more in monsoon and early post monsoon time in Gujarat annually^[5] ranging the temperature from 20°C to

40°C to support our data. Mavalankar *et al*^[8,9] also indicated that outbreak of CHIKV is also variable during monsoon and post monsoon seasons in Ahmedabad during 2006-2008. The frequency of CHIKF cases were more in Ahmedabad (42%) followed by adjacent Districts Vadodara, Surat and Jamnagar to implicate geography isolation in our age groups. All age groups were correlated with higher degree of infection in support of the data of Kumar *et al*^[15] in Kerala and Shah *et al*^[5] in Gujarat. The gender difference showed that males were highly infected with CHIKV in comparison to females who are probably exposed to high risk factors in the environment like climatic conditions.^[5,14] Lee *et al*^[16] used several prediction laboratory tests of cell counts to separate Dengue types. In our report lymphocyte count was significantly decreased as compared to negative cases in all age groups during our

study. A slight drop was also noted in WBC counts, which indicated viral infection in these positive cases with no change in other cell count, supporting earlier data in Gujarat.^[5] We also analyzed serum transaminases (ALT/SGPT and AST/SGOT) for detecting liver and heart function, An insignificant increase in SGOT/SGPT indicated organ dysfunction in addition to other indicators in these age groups, like heartbeat, troponins, bilirubin and proteins which are also predictors of CHIKF Vs Dengue.^[16,17] Hence, our cohort stressed upon year wise distribution of CHIKF along with seasonal and geographic areas where people suffer in Gujarat. So urgent preventive measures are called for by National Health Centers.

CONCLUSION

Our data revealed that Chikungunya infection was higher in 2018 during monsoon and post monsoon season depending on geographic and climate changes. Its infection also varies with age and males are more prone to get infection in our study. Further lymphocytes and transaminase were altered during infection.

PREVENTIVE MEASURES

Mabs to neutralize virus E1gp has been tried in vitro in addition to drugs like Ribavirin to cure illness. Numerous unlicensed vaccines are under trial with no success. Hence only Vector control and protection from mosquito bites are main prevention measures. Individual protectants like limited exposure, use of bed nets and limited exposure to mosquito repellents. Cleaning the environment to avoid mosquito budding sites is also an important measure of Chikungunya control^[1] following existing study National and Local health measures without fail.

CONFLICT OF INTEREST

There is no conflict of interest among authors.

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