Clinico-Epidemiological Profile of Chikungunya Infection and it's Coinfection with Dengue

Dr.. Neha Phopre*, Dr. Suvarna Joshi**, Dr. Rajesh Karyakarte***

*Senior Resident of Microbiology, Government Medical College, Nagpur, Maharashtra, India,
Associate Professor, Department of Microbiology, Byramjee Jeejeebhoy Government Medical College, Pune, Maharashtra, India,*Professor and Head of department of Microbiology, Byramjee Jeejeebhoy Government Medical College, Pune, Maharashtra, India

Abstract:-
Introduction-Chikungunya is a RNA virus of genus alpha virus of family Togaviridae. It's infection is characterised by fever, joint pain with additional symptoms such as nausea, vomiting, rash, chills and headache. A variety of serological methods used for its identification.
Objectives-1.To study the burden of Chikungunya in febrile patients
2.To assess clinico demographic profile of patient with Chikungunya infection
3.To estimate co- infection of Chikungunya and Dengue
Materials and methods - Test will be perform for the presence of anti-chik IgM Enzyme Linked Immunosorbant Assay (ELISA) using National Institute of Virology (NIV) kit.
Results - Out of 1315 samples, 320 were positive for Chikungunya IgM antibodies. In the present study, majority of the Chikungunya, Chikungunya-Dengue coinfected patients i.e. 42.7%, 38.3% respectively were belonged to lower socioeconomic class. Fever is common among Chikungunya and Chikungunya-dengue patients. 250(96.2%) and 58(96.7%). Arthralgia (swollen joint) was significantly more common clinical feature among chikungunya patients .
Conclusion -Majority of Chikungunya and Chikungunya -dengue coinfected patients were belong to lower middle class. In Chikungunya patients multiple joints were involved, so classically it was polyarthritis and polyarthralgia.

Keywords:-   Chikungunya,   Dengue,   Coinfection, Chikungunya -Dengue Coinfection.

I.   INTRODUCTION

Chikungunya is an enveloped positive strand RNA virus belongs to genus Alphavirus of family Togaviridae(1,2).It is epidemic viral disease affecting African and Asian continent causing significant public health problem(3) Chikungunya infection is characterised by fever, joint pain with additional symptoms such as nausea, vomiting, rash, chills and headache (4-5).It was first detected in Makonde in 1952 United Republic of Tanzania and derives its name from kungunyala the Swahili word which is used for contorted posture because of the arthritic posture of patients. It was first discovered by Lumsden and Robinson in year 1953(6).

A variety of serological methods (ELISA, complement fixation, hemagglutination inhibition and neutralization of viral infectivity using reference serum samples) are also used to characterize the alphavirus species [7]. The most common tests used for the diagnosis of CHIKV infection are indirect ELISA (i-ELISA) for the detection of type M (IgM) and IgM antibody-capture ELISA (MAC- ELISA) and type G (IgG) immunoglobulin, respectively [8].

Dengue and Chikungunya are mosquito borne viral diseases of having great public health problem in India. As Dengue fever has a high incidence and also high mortality rate and symptomatic patients are tested only for DENV and rarely it is tested for Chikungunya viral infection. That is why Chikungunya viral infection cases go undiagnosed in dengue endemic regions and the true burden of Chikungunya viral infection is uncleared. Since the same mosquito vector can transmit dengue and Chikungunya investigation of both viruses should be done specifically in endemic region. Also, accurate and early diagnosis of co-infection will help for appropriate management. Therefore the present study is undertaken to find out Chikungunya disease burden.

II.   MATERIALS AND METHODS

Study Type: Descriptive /observational cross sectional

Sampling Methods-Purposive sampling
Sample size-200
Duration of study:1.5 year

Detailed research plan:3-5 ml blood will be collected in plain bulb(along with data sheet) detail history will be collected. Serum will be separated by centrifugation. Test will be perform for the presence of anti-chik IgM Enzyme Linked Immunosorbant Assay (ELISA) using National Institute of Virology (NIV) by using J K Mitra kit.

Selection of cases-Inclusion Criteria:
As per the NATIONAL VECTOR BORNE DISEASE CONTROL PROGRAMME guidelines will be followed for case definition

Suspected case-acute onset, high fever,7days duration, severe headache, myalgia, severe arthralgia, with or without rash

Probable case-suspected case of chikungunya, high vector density, presence of confirm case in area

Confirmed case- Serological test positive for IgM antibody after 5th day of illness

Exclusion Criteria

-Patient who are already diagnosed as chikungunya positive

-Those who are not willing to participate

Study population-Patients attending the Medicine outpatient department (OPD) at our institute with acute febrile illness were included as the study population . Written informed consent (translated in Marathi) was obtained from each patient at the beginning of the study. The study protocol was approved by the institutional ethics committee. Only those patients who fulfilled the eligible criteria were included in the study.

Statistical Analysis: All the data was entered using SPSS Statistical software package, Version 23.0.0.0(IBM Corporation). Continuous variables were expressed as mean ± standard deviation. Pearson chi-square test was done for categorical test was done to find a correlation. A 2-sided P value ≤0.05 was considered statistically significant

III. RESULTS

In the present cross sectional study during our study period, total 1315 febrile illness patient's sample we have tested, for Chikungunya, Dengue and for mixed infection. Out of 1315 samples, 320 were positive for Chikungunya IgM antibodies. Among these 260/320 (81.25%)were chikungunya positive alone while 60/320 (14.6%) showed presence of both Dengue and Chikungunya IgM antibodies indicating co-infection(Chik/Denv).

Table1. Showing Disease wise distribution of clinically suspected patients

Diagnosis	Number (n)	Percentage (%)
Chikungunya	**260***	**81.3**
Dengue	80	6.0
Chikungunya-Dengue co-infection	**60***	**18.8**
Malaria	35	2.7
Others	880	67

*% is from out of 320 for Chikungunya and co-infection

In the present study, out of total 1315 patients,260/320(81.3%)were detected as chikungunya patients, dengue 80/1315(6.0%) and 60/320(18.7%) as Dengue-Chikungunya co-infected patients. Malaria 35/1315(2.7%), and 880/1315(67%) were of other febrile illness patients.

Table 2.Distribution of patients according to gender

Gender	Chikungunya	Chikungunya- Dengue coinfection
	No. (%)	No. (%)
Male	146(56.1)	37(61.7)
Female	114(43.8)	23(38.3)
Total	260	60

χ^2=0.60; df=1; p=0.43

In the present study, majority of the patients were males. In chikungunya 56.1% were males and among coinfected 61.7% were males and there was no significant difference between the groups with respect to gender (p>0.05).

Table 3. Distribution of patients according to Prasad scale for socioeconomic class*.

Socioeconomic class	Per capita income	Chikungunya N-260	Chikungunya- Dengue coinfection N-60
		No. (%)	No. (%)
Upper class	7008 & above	09(3.5)	01 (1.7)
Upper middle class	3504-7007	14(5.4)	06(10.0)
Middle class	2102-3503	57(21.9)	12(20.0)
Lower middle class	1051-2101	69 (26.5)	17 (28.3)
Lower class	Below 1050	111 (42.7)	23(38.3)
Total	--	260	60

χ^2=2.03; df=4; p=0.73

In the present study, majority of the Chikungunya, Chikungunya-Dengue coinfected patients i.e. 42.7%, 38.3% respectively were belonged to lower socioeconomic class followed by lower middle class and there was no significant difference between the groups with respect to socioeconomic class (p>0.05).

Table 4. Distribution of patients according to address.

Address of the patient	Chikungunya	Chikungunya- Dengue coinfection
	No. (%)	No. (%)
Urban area	235(90.4)	48(80.0)
Semi-urban area	25(9.6)	12(20)
Total	260	60

$\chi^2=5.14$; df=1;p=0.02

In the present study, majority of the patients (Chikungunya 90.4% and Chikungunya-Dengue 80.0 %) were from within that is urban area **specifically from crowding and slum areas** and least from outside the city. There was no statistical significance difference between the groups with respect to address.

Table 5. Distribution of patients according to clinical features and diagnosis

Clinical features	Chikungunya N=260	Chikungunya-Dengue coinfection N=60	(P value)
	No. (%)	No. (%)	
Fever	250(96.2)	58 (96.7)	0.8
Headache	106 (40.77)	26 (43.3)	**0.7**
Abdominal distension	03 (1.2)	00 (0.0)	1*
Abdominal distension	03 (1.2)	00 (0.0)	1*
Abdominal pain	03 (01.2)	00 (0.0)	1*
Joint pain (arthritis)	107 (41.2)	12 (20.0)	**0.002***
Swollen Joint (arthrlgia)	88 (33.8)	00 (0.0)	**0.0001***
Rash	07 (02.7)	11 (18.3)	**<0.001**
Fatigue	07 (2.7)	08 (13.3)	**<0.001**
Diarrhoea	03 (01.2)	00 (0.0)	1*
Myalgia	40 (15.4)	21 (35)	**<0.001**
Nausea	02 (0.8)	00 (0.0)	1*
Vomiting	03 (01.2)	00 (0.0)	1*
Gum bleeding	01 (0.4)	00 (0.0)	1*
Petechial petechiae	01 (0.4)	00 (0.0)	1*
Purpura	01 (0.4)	00 (0.0)	1*
Hematemesis	02 (0.8)	00 (0.0)	1*
Retro-orbital pain	21 (8.1)	05 (8.3)	<0.001

*Fischer exact test

In the present study we have found that polyarthritis, polyarthralgia, were significant complaints. Fever is common among Chikungunya and Chikungunya-dengue patients 250(96.2%) and 58(96.7%). Arthralgia (swollen joint) was significantly more common clinical feature among chikungunya patients and it was reported by 88 (33.8%) patients and chikungunya-dengue 0(0). (p<0.05) .

Arthritis (Joint pain) was significantly most common complaint among 107 (41.2%)Chikungunya and chikungunya-dengue infection 0(0) (p<0.05)

In Chikungunya patients multiple joints were involved, so classically it was polyarthritis and polyarthralgia.

Rash was significantly most prevalent among Dengue chikungunya co-infection patients and it was reported by 11(18.3%) patients (p<0.05)

So in our study headache, polyarthritis and polyarthalgia were the differentiating clinical features among Chikungunya patients.

In the current study, out of total 1315 patients, 260(18.5%) were chikungunya patients.

Similar findings are reported by following authors.

Clinical Features	B.M.C. Randika Wimalasiri-Yapa et al[19]	Our study%	Gianandrea Borgherin et al[9].%	Philippe Renault al[10].%	A.Chopra .et al [11]
Fever	54.7	96.2	89	96.3	100
Rash	56.3	2.7	40.1	-	36.2
Headache	51.6	40.7	47.1	71.2	51.6
Myalgia	46.9	15.4	-	61.6	66.7
Arthritis	26.6	41.2	-	96.6	86

IV. DISCUSSION

The clinical differentiation of Chikungunya from dengue is very difficult as both diseases share similar clinical signs and symptoms leading to misdiagnosis of Chikungunya in areas where dengue is endemic therefore the present study is undertaken focusing Chikungunya clinical profiling.

Total 1315 samples collected from patients with clinical suspicion of chikungunya were tested for Chikungunya infection by IgM ELISA. Out of which 320/1315(24.3%) sero-positive having 260/320(81.3%) chikungunya positive and 60/320(18.7%) were found to be Coinfected(Chik/Denv).

A. Gender Distribution

In the present study, male preponderance was observed. In Chikungunya 56.1% were males, and among coinfected 61.7% were males and there was no significant difference between the groups with respect to gender (p>0.05). Similar findings were seen in Mohammad Sorowar Hossain et al in their study found it was that majority were males. Also in Juarez P. Dias et al and Graham Simmons et al studies found that majority were males[12,13]. But this finding is in contrast to Juan C. Rueda et al who reported that majority (54.5%) patients were female in their study and Marcus Panning et al who also found majority were females[14,15].

B. Socioeconomic Class Distribution

Based on annual income of the patient they were classified into various group as upper, upper-middle, middle, lower middle class according Prasad scale for socioeconomic class[16].

In the current study, majority of the Chikungunya, Chikungunya-Dengue coinfected patients i.e. 42.7%, 38.3% respectively were belonged to lower socioeconomic class followed by lowermiddle class 26.5%,28.3% and there is no significant difference between the groups with respect to socioeconomic class (p>0.05). Similar finding reported by Juan C. Rueda et al i.e. majority (68.4%) patients belonged to lower class[14]. Contrast finding noted by Mohammad Sorowar Hossain et al who reported that majority patients belonged to higher socioeconomic class[17].

C. Area Wise Distribution

In the present study, majority of the patients Chikungunya 90.4%; and Chikungunya Dengue 80 % were from Urban area(specifically crowded places and slum areas)as this areas have stagnant waters, ponds in significant numbers which promotes vector borne diseases like chikungunya fever and least from outside the city(Semi-urban area) that is 9.6% and 20% respectively. There is no significant difference between the groups with respect to address. This finding is pointing to that being a vector borne diseases, Chikungunya and Co-infection mainly the problem of urban areas. In Muthusamy Santosh et al findings noted that Chikungunya infection were in Urban area 40.2% and 11.5% in semi-urban areas[18].

D. Clinical Features

Fever was the commonest complaint but it did not differ significantly as it was common amongst all the two groups of patients that is 96.2% for chikungunya and 96.7% for Dengue-chikungunya infection.

Arthralgia (swollen joint) was significantly more common clinical feature among chikungunya 88 (33.8%) patients while in coinfection patients 0(0) (p<0.05).

Arthritis (Joint pain) was also a significantly most common complaint among Chikungunya 107(41.2%), co-infected patients 12 (20%) (p<0.05)

In our study ,amongst Chikungunya patients rather than single, multiple joints were

Involved, so classically it is polyarthritis and polyarthralgia.

In this study headache, polyarthritis and polyarthalgia were the differentiating clinical features among Chikungunya patients.

Similar findings are reported by following authors.

Clinical Features	B.M.C. Randika Wimalasiri- Yapa et at[19]	Our study%	Gianandrea Borgherin et al[9].%	Philippe Renault al[10].%	A.Chopra et al[11]
Fever	54.7	96.2	89	96.3	100
Rash	56.3	2.7	40.1	-	36.2
Headache	51.6	40.7	47.1	71.2	51.6
Myalgia	46.9	15.4	-	61.6	66.7

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