



EVALUATING BIOCHEMICAL PARAMETER IN ACTIVE CHIKUNGUNYA CASES.

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ABSTRACT This study investigated the hematological and biochemical parameters of the patients who presented in Medicine OPD of Gajra Raja Medical College, Gwalior with Clinical features of fever, arthralgia and rash. Although, 187 patients presented with symptoms in 4 months, 100 were found to be positive for Chikungunya IgM assay which were included in the study. Their hematological and biochemical parameters were evaluated using hematological analyzer and automated chemistry analyzer. In 60% patients with chikungunya, low hemoglobin was found but no significant association was observed thus it can be an incidental finding. Total leukocyte count was found to be raised in 20% patients. Creatine phosphokinase was found to be raised in 20% and inorganic phosphorus was raised in 50% of the patients.

KEYWORDS : Chikungunya; Clinical Features; Hematological parameters; Biochemical parameters

INTRODUCTION

Chikungunya fever, is mosquito borne arboviral disease, is caused by mosquito-transmitted Chikungunya virus (CHIKV). This virus transmitted by mosquito vectors, is an alphavirus belonging to the Togaviridae. It is small spherical enveloped viruses, with a 60- 70 nm diameter.¹

Chikungunya virus was first isolated in Tanzania during 1952-1953 epidemic.[2] In latter half of 20th Century, epidemics of Chikungunya virus were seen in Asia and Africa.[3] In 2004, virus crossed Indian ocean and re-emerged in India. In 2013, virus spread to France, Italy and eventually Caribbean islands in America.[4] Chikungunya virus has caused several epidemics, with millions of cases mainly centred around the Indian Ocean.[6]

Chikungunya virus was endemic in India at least since 1958 and probably caused periodic outbreaks much earlier, causing epidemics every two to three decades with relatively few cases reported during interepidemic periods.[7] The states affected are Andhra Pradesh, Karnataka, Maharashtra, Madhya Pradesh, Tamil Nadu, Gujarat and Kerala. In 2019, a total of 12,205 cases were confirmed with diagnosis of CHIKV in India. The changing disease pattern, and adaptation of CHIKV from *Aedes aegypti* to another mosquito vector, *Ae. albopictus*, are important new features that impact public health.

Chikungunya fever is characterized by acute fever coupled with incapacitating, often chronic, arthralgia when symptomatic (85-90% cases). These group of symptoms can evolve into chronic and debilitating inflammatory rheumatism. The normal course of the disease is benign and self-limiting. Although this disease has low fatality rate (~0.1%), but infection can impact substantially, clinically and socially, due to long-term complications such as chronic arthritis. Various atypical presentations have been reported in association with chikungunya. Neurological manifestations including myositis are seen in 25% of cases, among which are encephalitis, myelitis, Guillain-Barre syndrome and optic neuritis.[8]

Therefore, improvement in knowledge of Chikungunya virus infection and its rheumatologic manifestation is required. In this study, we will identify clinical and biological markers for severity along with associated diseases in Chikungunya infection patients which are serologically positive.[9] Primary objective of this study is to find out complete blood count with relevant biochemical parameters.

Material and Methods

This is a prospective observational study and was conducted in the Department of Microbiology, at Gajra Raja Medical College, Gwalior during the month of July' 2022 to October 2022. Patients presenting with symptoms of fever and arthralgia along with joint pain and

swelling, and rash were included in the study.

Approx. 5 ml of blood was collected from each patient and divided in K2 EDTA and plain vial. Blood sample collected was allowed to clot at room temperature followed by centrifugation following standard procedure.

Serum of the patients were then tested for Chikungunya virus-specific Immunoglobulin M (IgM) by ELISA method.

Haematological parameters of seropositive Chikungunya patients were tested by Hematology analyser. Serum was also tested for biochemical parameters such as Creatine Phosphokinase using optimised IFCC method, Inorganic phosphate using phosphomolybdate methodology, Calcium by modified Arsenazo III method and creatinine by enzymatic method.

Result

Out of 187 patients who reported in Medicine OPD with symptoms of fever, arthralgia, joint swelling with/without rash, 100 patients were positive for Chikungunya IgM antibody. Patients age ranged from 4 yrs to 80 yrs of age, among them 6 patients were less than 18 yrs of age, 33 patients were between the age of 18 to 50 yrs and 67 patients were above 50 yrs of age.

Female preponderance was seen among Chikungunya IgM positive patients with 64 females being affected out of 100 and we found 36 males being affected.

Most common presenting feature of Chikungunya infection that was observed was fever and arthralgia. Out of 100 cases, arthralgia in 83 patients (83%). fever was reported in 75 patients (75%). Onset of pain was reported within initial 1-3 days in infected patients. 80% patients complained of myalgia along-with arthralgia.

Joint swelling, redness, was reported in 43 patients (43%) and Cutaneous symptoms such as rashes was observed in 24 patients out of 100 (24%).

From haematological analysis done, haemoglobin level was found to be low in 60 patients out of 100 (60%) of which 80% of them were females and children. We couldn't correlate that if low haemoglobin was in relation to chikungunya infection per se or it was an incidental finding. In our study, the total count was usually normal except few cases where, either neutropenia or lymphopenia was present.

In our study, inorganic phosphate was found in range of 4.69 – 5.98 and was raised in 50% of the patients (50 out of 100). Creatine phosphokinase was found in range of 35.5 – 200.6 U/L and was raised in 20 patients out of 100 patients (20%).

Rest of the biomarkers tested (creatinine, SGPT and calcium) for associated systemic manifestations were found to be within normal limit.

Table – 1: Symptoms of patients with Chikungunya Infection

Symptoms of patients with Chikungunya Infection	No. of patients (n=100)
Fever	75
Arthralgia	83
Myalgia	65
Redness and swelling of joint	43
Rash	24
Headache	30

Table – 2: Biochemical parameters of patient with Chikungunya Infection

Biochemical parameters	Range	Normal value
Inorganic phosphate	4.69 - 5.98	2.5-4.5 mg/dl
Calcium	9.18 - 10.32	8-11 mg/dl
Creatine Phosphokinase	35.5 - 200.6	145-171 U/L
Creatinine	0.69 - 0.84	0.74-1.35 mg/dl

Table – 3 Haematological parameters of patients with Chikungunya Infection

Haematological parameters	Range
Haemoglobin	9.0 - 12.4
Total Leukocyte count	6200 - 14300
Lymphocyte	20 - 54.4%
Neutrophil	41.4 - 65.3%

Discussion

Total of 187 patients were symptomatic with fever, arthralgia, joint redness, swelling and rash, out of which, 100 came out to be Chikungunya positive.

In our study, female preponderance was seen among Chikungunya positive cases with 64 females (64%) being affected out of 100 and 36 males (36%) affected. In another study conducted by Saeed Anwar et al. [10] for Chikungunya outbreak in Bangladesh a higher percentage of cases was observed in adult females (56.7%) than males (38%) which is in accordance with our findings. [11, 12] No association with sex was noted in other studies.

In our study, arthralgia was reported in 83 cases (83%) and fever was reported in 75 patients (75%) out of 100 patients. This data is in concordance with the previous studies that has been published (83.3 to 98%), though the values were less in case of the children. [13-16]

As per haematological parameters, in our study, haemoglobin was found low mostly in females and no significant drop in lymphocytes and neutrophils was found. This outcome is not in concordance with other studies conducted such as outbreak in Ahmedabad, Kandy outbreak in Sri Lanka and study conducted by Khaled Said et al. in Yemen. [17-20] As per these studies conducted these parameters became normal after 5 days of illness, but in our case the patients presented with fever after 5 days of illness. That can result in normal haematological parameters in these patients.

Inorganic phosphate was found to be raised in 50% of Chikungunya IgM positive patients and Creatine phosphokinase (CPK) was found to be raised in 20% cases. As it is rare finding not much study was found with this association. Although elevated levels of Creatine phosphokinase were found, no association with rhabdomyolysis could be made. In case of rhabdomyolysis, creatine phosphokinase level should be more than 5000 U/L which was not found in our study. None of the cases had laboratory parameters that indicated acute kidney injury as well. More elaborate studies should be done to further find the significance of association between the two, as these may be associated with sequelae due to chikungunya.

Conclusion

Chikungunya virus has globally emerged as major epidemic. Its symptoms such as severe arthralgia may persist for several years. Evaluation of its laboratory parameters that indicates muscle breakdown and kidney injury needs to be explored further. The acute

infection of chikungunya is self-limiting, but may cause fatality if there is neurological and cardiovascular involvement. Chronic debilitating arthritis is an important issue in terms of long-term morbidity. The findings in this study can be used as baseline data to plan another large cohort study in case of an outbreak or an epidemic.

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