

## AN OUTBREAK OF CHIKUNGUNYA FEVER IN DHAKA CITY: CLINICAL PRESENTATION AND SHORT TERM OUTCOME

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### ABSTRACT

**Objective:** Clinical manifestations of chikungunya fever are variable and ranges from abrupt onset fever, skin rashes, arthralgia, arthritis, vomiting, diarrhea, minor haemorrhages to severe manifestations like encephalitis, optic neuritis, seizures, acute flaccid paralysis etc. In 2017, Bangladesh experienced a large outbreak of Chikungunya just in early-monsoon in March when there was unexpected rainfall. This original article is published to give an idea about this recent outbreak. **Methods:** The study was carried out during a fever outbreak between early April to September 2017 in Dhaka city of Bangladesh. The data, sample collection, and clinical examination of 257 Chikungunya fever positive patients were included in this study. **Results:** Out of 257 cases, 167(65%) were female and 89(35%) were male. Majority 23.34% patients were in 3rd floor in their residence followed by 20.62% on the 1st floor. 39.29% patients presented to the doctor on the 4th day of fever, 29.18% on the 3rd day, 18.28% on the 5th day. Skin rashes were present in 67% of cases. Backache was in 24% of cases. Highest recorded temperature was 103<sup>0</sup>F in 36% cases, followed by 104<sup>0</sup>F in 34%. 56.03% patients presented with the involvement of both small and large joints, 37.35% presented with only large joint involvements and 6.61% only small joints involvements. They also had associated other features like; Headache in 79.37%, nausea & vomiting in 77.43%, lymphadenopathy in 5.44%, cough in 5.05% and pain abdomen in 1.5% cases. 131(50.97%) presented with sub-acute phase, 124(48.24%) acute phase and only 1(0.38%) chronic phase. The outcome of joint pain after 6 months showed 156(61%) have no residual joint pain but 94(36%) patients presented with persistent joint pain. Of these 257 patients, 7(3%) patients died within this periods. **Conclusion:** This study was carried out to characterize the epidemiological, clinical parameters along with outcomes in all cases of chikungunya positive patients during 2017 epidemic of chikungunya in Dhaka city. We think it will help to study further about this infectious disease.

**KEYWORDS:** Chikungunya fever, arthralgia, arthritis, Bangladesh, Dhaka city.

### INTRODUCTION

Chikungunya fever is an emerging viral disease transmitted to humans by mosquitoes. Chikungunya Virus (CHIKV) is an arbovirus of the alphavirus genus (Togaviridae family). The *Aedes aegypti* and *Aedes albopictus* mosquitoes are the main vectors responsible for transmission of Chikungunya.<sup>[1]</sup> A high vector density is seen in the post-monsoon season that enhances the transmission. Chikungunya fever is characterized by fever, nausea, fatigue, myalgia, headache, rashes, prolonged joint pain, and arthritis. The name was derived from the Makonde word meaning “that which bends up” in reference to the stooped, posture developed as a result of arthritis.<sup>[2,3]</sup>

Chikungunya fever displays interesting epidemiological profiles: major epidemics appear and disappear cyclically, usually with an inter-epidemic period of 7-8 years and sometimes as long as 20 years.<sup>[1]</sup> This virus was first identified during an epidemic of febrile polyarthralgia in Tanzania in 1953.<sup>[3,4]</sup> Since then, CHIKV has been reported to cause several large-scale outbreaks in Africa, India, Southeast Asia, Western Pacific and Americas.<sup>[4,5]</sup> Before 2000, chikungunya outbreaks were mostly sporadic and limited. But thereafter, the virus has been frequently causing severe forms of epidemics imposing heavy economic burden and productivity loss. chikungunya has re-emerged in devastating form of epidemics in and around the Indian Ocean in 2005. Millions of chikungunya cases have been reported across more than 60 countries, and this virus is responsible for devastating epidemics across the globe.<sup>[6]</sup>

In Bangladesh, the first recognized outbreak of chikungunya was reported in 2008 at Rajshahi in two villages in the northwest part of the country adjacent to Indian border.<sup>[7]</sup> Two small-scale outbreaks were documented in rural communities Dohar near Dhaka city in 2011.<sup>[8]</sup> and Palpara in 2012.<sup>[9]</sup> In 2017, Bangladesh experienced a large outbreak of Chikungunya just in early-monsoon in March when there was unexpected rainfall. From the onset of the outbreak in April 1, 2017, to Sept 7, 2017, the Bangladeshi Ministry of Health reported 984 cases confirmed by real-time PCR assay and more than 13 176 clinically confirmed cases in 17 of 64 districts.<sup>[9,10,11]</sup> A major outbreak has been observed in the capital, Dhaka, which is home to more than 18 million people.<sup>[10]</sup> This original article is published to give an idea about this recent outbreak.

## MATERIALS AND METHODS

The study was carried out during a fever outbreak between early April to September 2017 in Dhaka city. The data, sample collection, and clinical examination of 257 consecutive patients with an acute febrile illness and signs or symptoms compatible with Chikungunya fever (fever, joint pain, or rash) were included in the study. A blood sample was taken and tested on the same day from each patient, Data was only collected from patients who presented with fever and joint pain and in whom we had ruled out Dengue by doing Dengue NS1 antigen done within 5 days of the start of a fever. The diagnosis of Chikungunya was confirmed by doing either PT-PCR for Chikungunya (done within 5 days of onset of fever) or by doing Rapid Diagnostic Test (RDT) SD Biosensor (sensitivity 100%, Specificity 97.7%) equivalent to ELISA, manufactured by Republic of Korea on formula of MT promoted GmbH, Germany, for Chikungunya serology (IgM) after 10 days of fever onset, although it is said that sero-conversion occurs after 7 days, we did serology after 10 days to reduce the possibility of false negative results. In follow up visit phases of disease categorized as Acute phase (less than 3 weeks), Sub-acute phase (3weeks to 3 months), Chronic phase (more than 3 months) according to WHO guideline. Institutional standard guidelines of the ethical committee

were followed for the collection of patients' blood samples after their written informed consent for involvement in the study was obtained. All data were analyzed with SPSS 17 software.

## RESULT

The study was carried out during a fever outbreak between early April to September 2017 in Dhaka city. Out of 257 cases, 167(65%) were female and 89(35%) were male (Table-1). Age distribution of the patients were 10-19 yrs (6.61%), 20-29 yrs (16.73%), 30-39 yrs (19.45%), 40-49 yrs (21.40%), 50-59 yrs (15.17%), 60-69 yrs (14.78%), 70-79 yrs (4.28%) and 80-89 yrs (1.55%) (Table-1). 23.34% patients were in 3rd floor in their residence followed by 20.62% on 1st floor, 16.34% on 2nd floor, 12.84% on the 4th floor, 12.45% were ground floor, rest of them were in 5th and above 5th floor (Table-1). 39.29% patients presented to the doctor on the 4th day of fever, 29.18% on the 3rd day, 18.28% on the 5th day, 9.72% on the 2nd day and 3.50% on the 1st day (Table-2). 56.80% patients did not have any previous comorbidities but 28.01% had HTN, 20.23% had DM, 3.50% had Hypothyroidism, 2.72% had CKD and 2.33% had IHD (Table-1). Skin rashes were present in 56.80% cases (Table-2). Backache was in only 24.12% cases (Table-2). Highest recorded temperature was 103<sup>o</sup>F in 36% cases, followed by 104<sup>o</sup>F in 34%, 102<sup>o</sup>F in 20%, 101<sup>o</sup>F in 5%, 105<sup>o</sup>F in 3% and 100<sup>o</sup>F in 2% cases (Fig-1). 56.03% patients presented with the involvement of both small and large joints, 37.35% presented with only large joint involvements and 6.61% only small joints involvements. They also had associated other features like; Headache in 79.37%, nausea & vomiting in 77.43%, lymphadenopathy in 5.44%, cough in 5.05% and pain abdomen in 1.5% cases (Table-2). In 6 months follow up periods 131(50.97%) presented with sub-acute phase, 124(48.24%) acute phase and only 1(0.38%) chronic phase (Figure-2). The outcome of joint pain after 6 months showed 156(61%) have no residual joint pain but 94(36%) patients presented with persistent joint pain (Figure-3). Of these 257 patients, 7(3%) patients died within this period (Figure-3).

**Table 1: Distribution of the Socio-demographic characteristics and other related variables. (n=257).**

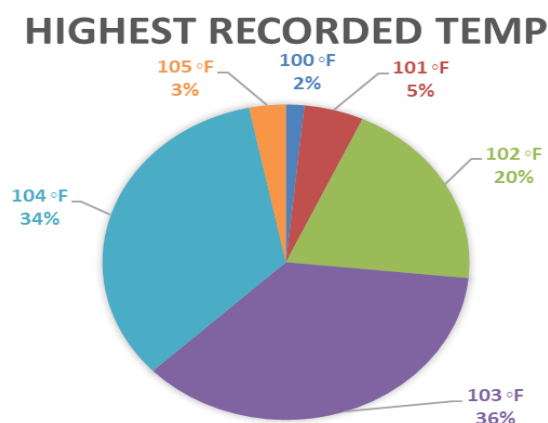
Variables	Number of Respondents (n)	Percentages %
<b>Sex</b>		
Male	89	35%
Female	167	65%
<b>Age</b>		
10-19 yrs	17	6.61%
20-29 yrs	43	16.73%
30-39 yrs	50	19.45%
40-49 yrs	55	21.40%
50-59 yrs	39	15.17%
60-69 yrs	38	14.78%
70-79 yrs	11	4.28%
80-89 yrs	04	1.55%

<b>Floor distribution of patient's resident</b>		
Ground floor	32	12.45%
1 <sup>st</sup> floor	53	20.62%
2 <sup>nd</sup> floor	42	16.34%
3 <sup>rd</sup> floor	60	23.34%
4 <sup>th</sup> floor	33	12.84%
5 <sup>th</sup> floor	17	6.61%
>5 <sup>th</sup> floor	19	7.39%
<b>Other Comorbidities</b>	(Multi-responder)	(Multi-responder)
Nil	146	56.80%
HTN	72	28.01%
DM	52	20.23%
CKD	07	2.72%
IHD	06	2.33%
Hypothyroidism	09	3.50%
Other	21	8.17%

\*Note: HTN-hypertension, DM- diabetes mellitus, CKD- chronic kidney diseases, IHD- ischaemic heart diseases.

**Table 2: Distribution of various clinical profiles (n=257).**

<b>Variables</b>	<b>Number of respondents (n=257)</b>	<b>Percentages %</b>
<b>Reporting to doctors on the day of presentation</b>		
Day 1	09	3.50%
Day 2	25	9.72%
Day 3	75	29.18%
Day 4	101	39.29%
Day 5	47	18.28%
<b>Distribution of joint involvements</b>		
Small joints of hands and feet	17	6.61%
Large joints	96	37.35%
Both small and large joints	144	56.03%
<b>Distribution according to Skin Rash</b>		
Present	146	56.80%
Absent	111	43.19%
<b>Distribution according to the presence of backache</b>		
Present	62	24.12%
Absent	195	75.87%
<b>Associated other features</b>		
Pain abdomen	04	1.5%
Lymphadenopathy	14	5.44%
Nausea and vomiting	199	77.43%
Headache	204	79.37%
Cough	13	5.05%



**Figure 1: Distribution of highest recorded temperature.**

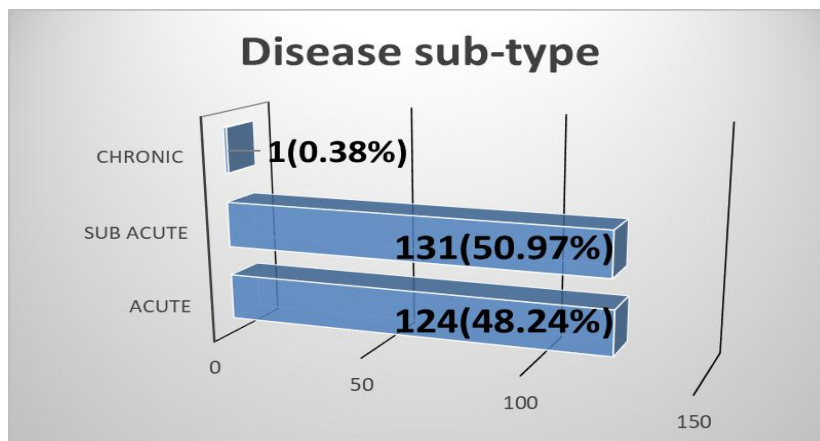


Figure 2: Distribution according to the clinical course of the disease.

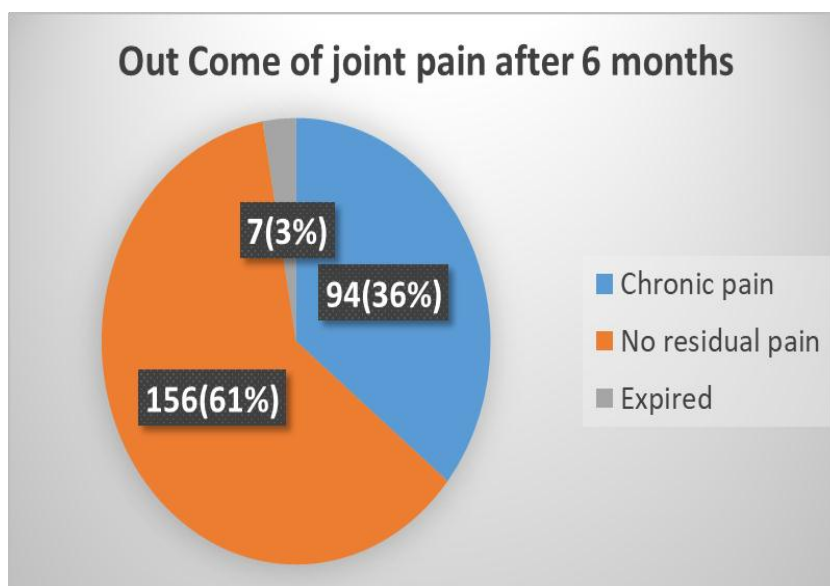


Figure 3: Distribution according to the presence of joint pain after 6 months.

## DISCUSSION

A chikungunya outbreak in Bangladesh was anticipated because of the distribution of the aedes vector, suitable climatic conditions, and unusual, excessive rainfalls from January to March 2017. According to this study, people of middle age group were mostly infected by CHIKV during this outbreak (76%), while the very young and elderly persons were less affected (14%). Females (65%) were mostly infected than males (35%). The findings are a little far from some other studies that state Chikungunya fever affecting all age groups and both genders are equally affected.<sup>[12,13,14]</sup> but in Bangladesh, some research work showed this type of age and sex differentiation.<sup>[15]</sup>

A single floor measures 12-14 feet (2.27-3.67 meter) high on average. Our study shows that most persons infected by CHIKV were resident of 1<sup>st</sup> to the 3<sup>rd</sup> floor of the multi-storied building which supports the fact of flight range studies that suggest that most female *Ae. Aegypti* may spend their lifetime in or around the houses where they emerge as adults and they usually fly an

average of 400 meters.<sup>[16]</sup> Reliable information could not be found whether people leaving at ground level are less affected by *Aedes* mosquitos yet this study supports this.

Presenting within 5 days of onset of fever was an inclusion criterion of this study. Most presented after the 3<sup>rd</sup> day of high fever with a maximum on 4<sup>th</sup> (39.29%), 3<sup>rd</sup> (29.18%) and 5<sup>th</sup> (18.28%) day of febrile illness. This is similar to the other epidemiological studies on CHIKV describing presentation as abrupt and sudden with high-grade fever (usually 102-105 °F)<sup>[12,13,14]</sup> But least number of patients presenting in the first day may be due to the fact that fever varies from low grade to high grade, lasting for 24 to 48 hours,<sup>[17]</sup> or may indicate an escalation of the severity of symptoms that yet not have been observed. 96% patient presenting with initial temperature within 102-104 °F strongly supports previous study findings.<sup>[12,14,16,18]</sup>

56.80% presenting with body rash along with fever but only 24.12% presented with a low backache resembles data of other studies.<sup>[12,13,14,16,19]</sup> Like some other studies results, more than fifty percent of patients presented with

skin rash which reflect body rash to be very common presentation as some studies claim.<sup>[20,21]</sup> but the portion of individuals with the rash is highly variable between studies.<sup>[22,23]</sup> Rash appearing all over the body in maximum patients affecting body/ trunk is similar to studies done before.<sup>[22,23]</sup>

Majority of patients with arthritic manifestation in this study showed polyarthritis affecting both large and small joints (56.03%) which supports data of many studies that claim “The joint pains are usually symmetric and occur most commonly in wrists, elbows, fingers, knees, and ankles but can also affect more-proximal joints”.<sup>[24]</sup> But it has dissimilarities with few other studies that state that “The Chikungunya viral polyarthropathy frequently involves the small joints of the hand, wrist”,<sup>[15,19]</sup> which we have found only 6.61% cases. In our study 37.35% of patients presented with only large joint arthritis.

The additional symptoms of CHIKV infection in acute phase in this study included headache (79.37%), nausea and vomiting (77.43%), back pain, cough (5.05%), lymphadenopathy (5.44%) and abdominal pain (1.5%). Other study also support this finding,<sup>[25]</sup> but rarer neurovirulence and neuroinvasiveness.<sup>[14,17]</sup> were not found in this study. Hemorrhagic manifestations were not found though some studies claim that these are more frequently encountered in Asian subcontinent.<sup>[14,17]</sup>

Majority 56.8% of patients did not have any comorbid diseases but Hypertension (28.01%) and Diabetes mellitus (20.23%) are the most common comorbid diseases. In our study after 6 months of follow up visit, most of the patients presented with sub-acute (50.97%) and acute (48.24%) phase. Only 0.38% presented with chronic phase (Fig-2). Among 257 patients 7(3%) of them died. But regarding joint pain evaluation after 6 months; 36% of patients still having joint pain (Fig-3) but most of them having no sign of inflammation.

## CONCLUSION

Thus the virus can cause acute, sub-acute or chronic disease. Most patients recover fully, but in some cases, joint pain may persist for weeks, several months, or even years. Complications are not common, but in older people, the disease may lead to the cause of death. The disease shares some clinical signs of dengue can be misdiagnosed in areas like Bangladesh. The treatment is focused on relieving the symptoms only with analgesic, antipyretic, antihistamine, optimal fluids and by bed rest. In Asia chikungunya affected areas overlap with dengue epidemic areas and provide opportunities for the mosquitoes to become co-infected with both the viruses resulting in significant co-infection. In our study, we have shown the epidemiological, clinical and prognostic pattern of last year (2017) Chikungunya outbreak. We think it will help to study further about this infectious disease.

**Conflict of interest:** We have no conflict of interest.

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