



Chikungunya Virus Infection in Pre-Covid-19 and Covid-19 Era; an Observation from a Tertiary Care Hospital, the State of Uttar Pradesh

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JAMMR/2022/v34i2231595

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/92237>

Original Research Article

Received 17 July 2022
Accepted 21 September 2022
Published 24 September 2022

ABSTRACT

This study determined the impact of the covid-19 pandemic on CHIKV (Chikungunya virus) infection, data of cases that were referred for anti-Chikungunya IgM from 1st January 2018 to 31st December 2021 (four years) was analyzed retrospectively. A total of 8822 serum samples were tested of which 3125 (35.42%) were positive. Per cent positivity in Pre-covid-19 and covid-19 era was 36.5% and 33.5% respectively. Cases presenting with Acute Febrile illness had significantly lower positivity in covid time (31.11%) than pre-covid-19 time (45.29%). Finding of this study revealed a decrease in cases of CHIKV (Chikungunya virus) infection during the covid-19 pandemic.

Keywords: COVID-19 pandemic; pre-covid 19; chikungunya; chikungunya virus; anti-chikungunya IgM.

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1. INTRODUCTION

Chikungunya fever (CHIKF) is an arthropod-borne viral disease [1]. Chikungunya virus (CHIKV) belongs to the family *Togaviridae*, genus *Alphavirus*. It was first recognized as a human pathogen after its isolation from the serum of an infected patient during an outbreak of the debilitating arthritic disease in 1952 in Tanzania [2]. Infection by CHIKV typically results in mild and self-limiting disease in infected humans, characterized by fever, skin rash, myalgia, and arthralgia that can last few weeks to months [3]. Although it is a self-limiting disease and the associated fatality rate is low, chikungunya-related death has been reported in young infants, the elderly, and people with pre-existing conditions such as cardiovascular disease, diabetes, kidney disease, and chronic liver disease [4]. It can cause different sequelae like AES (acute encephalitis syndrome), AFI (Acute Febrile Illness), Arthralgia, Chronic Febrile illness, and others [5]. For the first time in 1963, CHIKV was reported in India. It re-emerged in 2005 after a 32-year-long period of quiescence and has become a global health concern affecting every part of India too [6]. The adapted virus has subsequently threatened to undergo both endemic and epidemic spread in Africa, Asia, Europe, and America [7].

Here, we are reporting our observation on CHIKV positivity in chikungunya suspected cases in Covid (2020-21) and pre-Covid (2018-19) era.

2. MATERIALS AND METHODS

VRDL (Viral Research Diagnostic Laboratory) at King George's Medical University, UP (KGMU) collects desired data of every patient who is referred to the laboratory for tests related to viral infections, on a predesigned questionnaire. Data of cases that were referred for anti-Chikungunya IgM from 1st January 2018 to 31st December 2021 (four years) was analyzed retrospectively. All cases provided consent to use their data for future research and identity was kept anonymous.

Testing for CHIKV infection was done by detecting anti-CHIKV IgM using kits manufactured and supplied by the National Institute of Virology (NIV) in Pune, India. Laboratory was under external quality assurance of the NIV throughout the study.

Data were analysed to study any shift in demography, geography, and clinical syndromes in Pre-covid (2018-19) and Covid (2020-21) era in Chikungunya positivity. For purpose of analysis, cases were divided into five clinical syndromes; AES (Acute Encephalitis Syndrome), AFI (Acute Febrile Illness), Arthralgia, CFI (Chronic Febrile Illness), and others. The State of Uttar Pradesh (UP) was divided into 5 geographical zones; **Central** (included districts; Farrukhabad, Hardoi, Kannauj, Etawah, Auraiya, Kanpur Nagar, Kanpur Dehat, Hamirpur, Unnao, Lucknow, Barabanki, Raebareli, Amethi, Fatehpur, Pratapgarh, Faizabad, Sultanpur, Ambedkar Nagar) **West** (included districts; Gonda, Siddharthanagar, Maharajganj, Basti, Sant Kabir Nagar, Gorakhpur, Kushinagar, Deoria, Azamgarh, Mau, Ballia, Jaunpur, Ghazipur, Sant Ravidas Nagar, Varanasi, Chandauli) **East** (included districts; Saharanpur, Shamli, Muzaffarnagar, Bijnor, Bagpat, Meerut, Amroha, Moradabad, Gautam Budh Nagar, Bulandshahr, Sambhal, Aligarh, Mathura, Hathras, Agra, Firozabad, Mainpuri and cases referred from other neighbouring states), **North** (included districts; Rampur, Bareilly, Budaun, Pilibhit, Shahjahanpur, Lakhimpur Kheri, Sitapur, Bahraich, Shravasti, Balrampur and cases referred from other neighbouring states) and **South** (included districts; Jalaun, Jhansi, Lalitpur, Mahoba, Banda, Chitrakoot, Kaushambi, Prayagraj, Mirzapur, Sonbhadra and cases referred from other neighbouring states) (Table 1 and Fig. 1).

The Chi-square test was applied to study the association between CHIKV positivity and different variables in the pre-covid and covid eras.

3. RESULTS AND DISCUSSION

From 1st January 2018 to 31st December 2021, a total of 8822 serum samples were tested for anti-CHIKV IgM by ELISA of which 3125 (35.42%) were positive. Table 1 shows the positivity in different groups in the pre-covid and covid eras. The number of cases in the Pre-covid era was 5720 representing a percent positivity of 36.45% compared to the covid era when the number of references was 3102 with a per cent positivity of 33.52%. The number of references in covid era dropped significantly. There was no significant difference in case of positivity rate among different age groups and gender groups during pre-covid and covid eras. On syndrome-wise analysis of case positivity, cases presenting with

Table 1. Positivity of CHKV in pre-covid-19 (2018-19) and covid-19 (2020-21) era analyzed in various groups

	Jan 2018- Dec19	Jan 2020- Dec 21	χ^2 statistic	P-value
Total cases positive for CHIKV/total tested	2085/5720(36.45)	1040/3102(33.52)	7.51	0.006
Positivity Of Chikungunya virus				
Age -Groups				
0-20	897/2634(34.05)	360/1164(30.92)	3.56	0.059
>20-40	666/1681(39.61)	364/990(36.76)	2.13	0.143
>40-60	364/943(38.60)	216/647(33.38)	3.27	0.070
60 & above	158/462(34.19)	100/301(33.22)	0.07	0.780
Gender				
Male	1209/3377(35.80)	595/1806(32.94)	4.22	0.039
Female	876/2343(37.38)	445/1296(34.33)	3.36	0.066
Syndromes				
Acute febrile illness	732/1616(45.29)	383/1231(31.11)	59	0.000
AES	1161/3467(33.48)	572/1682(34.00)	0.13	0.711
Arthralgia	43/121(35.53)	9/14(64.28)	4.37	0.036
Chronic febrile illness	55/184(29.89)	32/70(45.71)	5.63	0.017
Others	94/332(28.31)	44/105(41.90)	6.82	0.009
Geographical zone				
Central UP	1313/3451(38.04)	661/1949(33.91)	9.16	0.002
East UP	353/1028(34.33)	171/505(33.86)	0.03	0.853
North UP	394/1147(34.35)	184/567(32.45)	0.61	0.433
South UP	21/66(31.81)	11/36(30.55)	0.01	0.895
West UP	4/28(14.28)	13/45(28.88)	2.06	0.151

Table 2. Showing mean and median of different age groups tested for anti-chikungunya-IgM during pre-covid-19 (2018-19) and covid-19 (2020-21) era analyzed in various groups

Age (In Years)	2018-19				2020-21								
	Total	Male	Female	Total	Range	Mean ± Std. Dev.	Median	Male	Female	Total	Range	Mean ± Std. Dev.	Median
0-20	3798	1621	1013	2634				712	452	1164			
>20-40	2671	893	788	1681				554	436	990			
>40-60	1590	562	381	943				359	288	647			
>60-80	763	301	161	462				181	120	301			
Total	8822	3377	2343	5720	.07-95.00	30.62 ± 20.65	27.00	1806	1296	3102	.02-95.00	27.12 ± 20.593	22.00



- CENTRAL UP : FARRUKHABAD, HARDOL, KANNAUJ, ETAWAH, AURAIYA, KANPUR NAGAR, KANPUR DEHAT, HAMIRPUR, UNNAO, LUCKNOW, BARABANKI, RAEBARELI, AMETHI, FATEHPUR, AMETHI, PRATAPGARH, FAIZABAD, SULTANPUR, AMBEDKAR NAGAR
- NORTH UP : RAMPUR, BAREILLY, BUDAUN, PILIBHIT, SHAHJAHANPUR, LAKHIMPUR KHERI, SITAPUR, BAHRACH, SHRAVASTI, BALRAMPUR
- SOUTH UP : JALAUN, JHANSI, LALITPUR, MAHOBA, BANDA, CHITRAKOOT, KAUSHAMBI, PRAYAGRAJ, MIRZAPUR, SONBHADRA
- EAST UP : SAHARANPUR, SHAMLI, MUZAFFARNAGAR, BIJNOR, BAGPAT, MEERUT, AMROHA, MORADABAD, GAUTAM BUDDH NAGAR, BULANDSHAHR, SAMBHAL, ALIGARH, MATHURA, HATHRAS, ETAH, AGRA, FIROZABAD, MAINPURI
- WEST UP : GONDA, SIDDHARTHANAGAR, MAHARAJGANJ, BASTI, SANT KABIR NAGAR, GORAKHPUR, KUSHINAGAR, DEORIA, AZAMGARH, MAU, BALLIA, JAUNPUR, GHAZIPUR, SANT RAVIDAS NAGAR, VARANASI, CHANDAULI

Fig. 1. Division of Uttar Pradesh into Central, North, East, West and South zone for the convenience of analysis

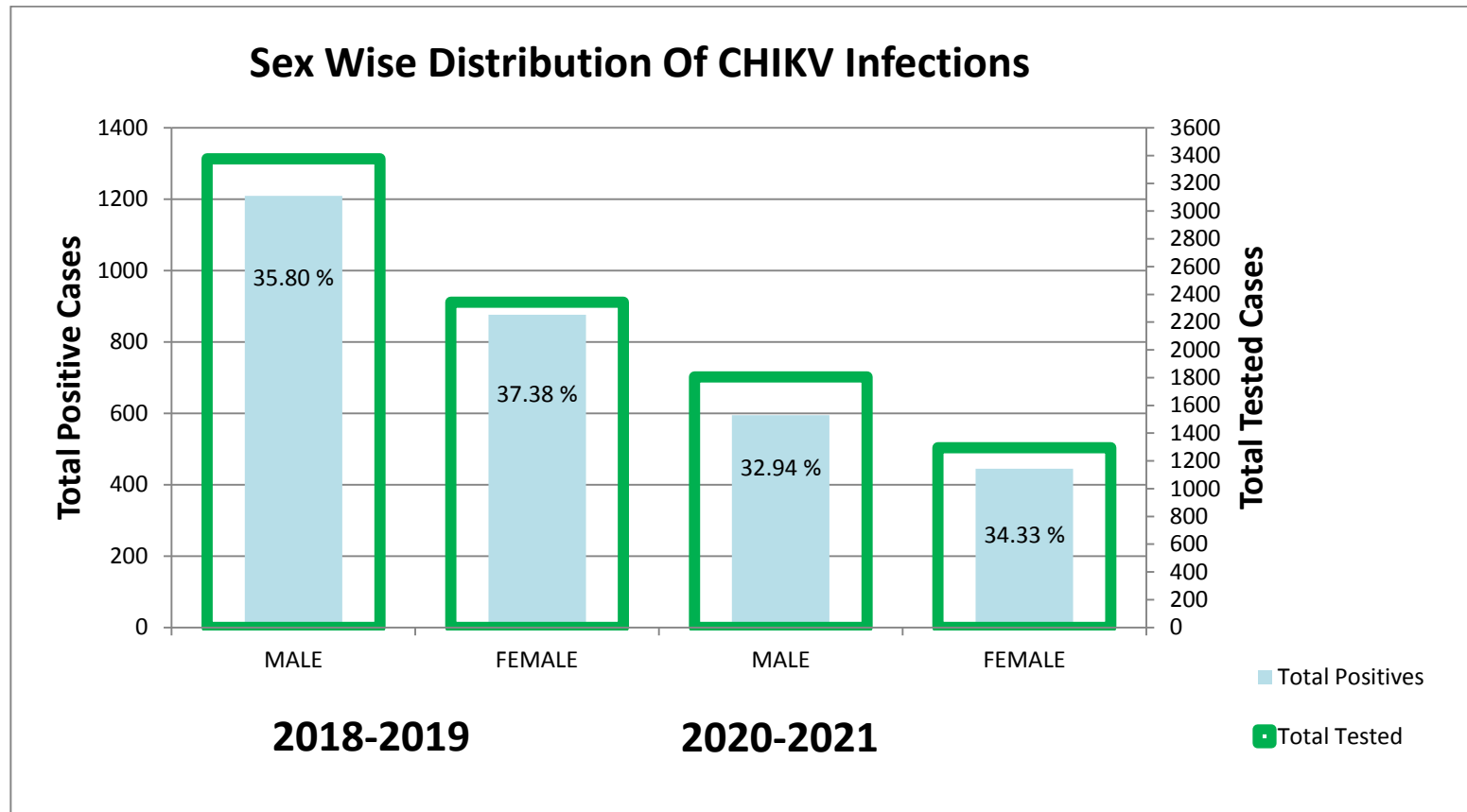


Fig. 2. Graph shows percent positivity and total tested and positive cases of chikungunya among male and female patients during pre-covid and covid eras

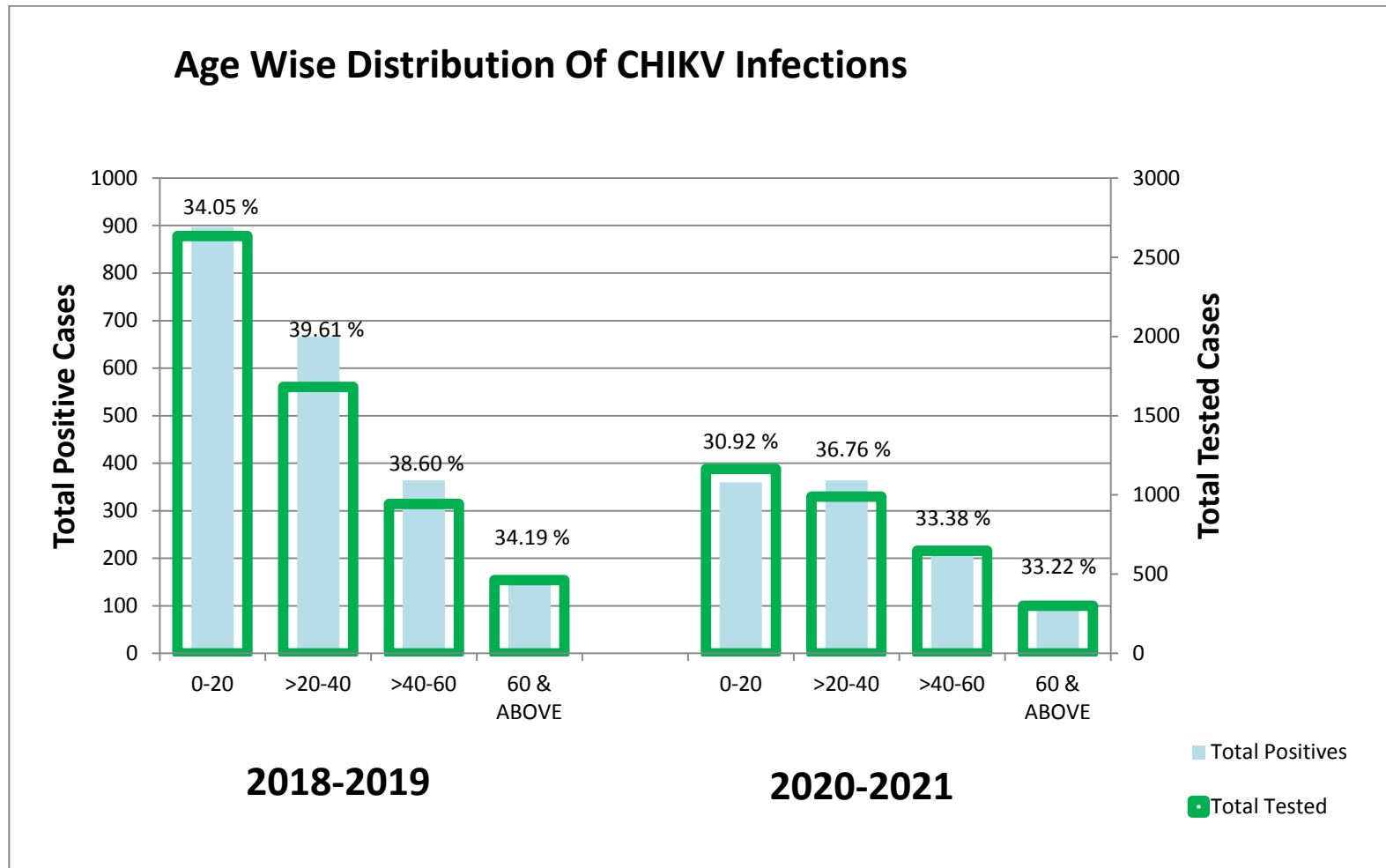


Fig. 3. Graph shows percent positivity and total tested and positive cases of chikungunya in different age group patients during pre-covid and covid eras

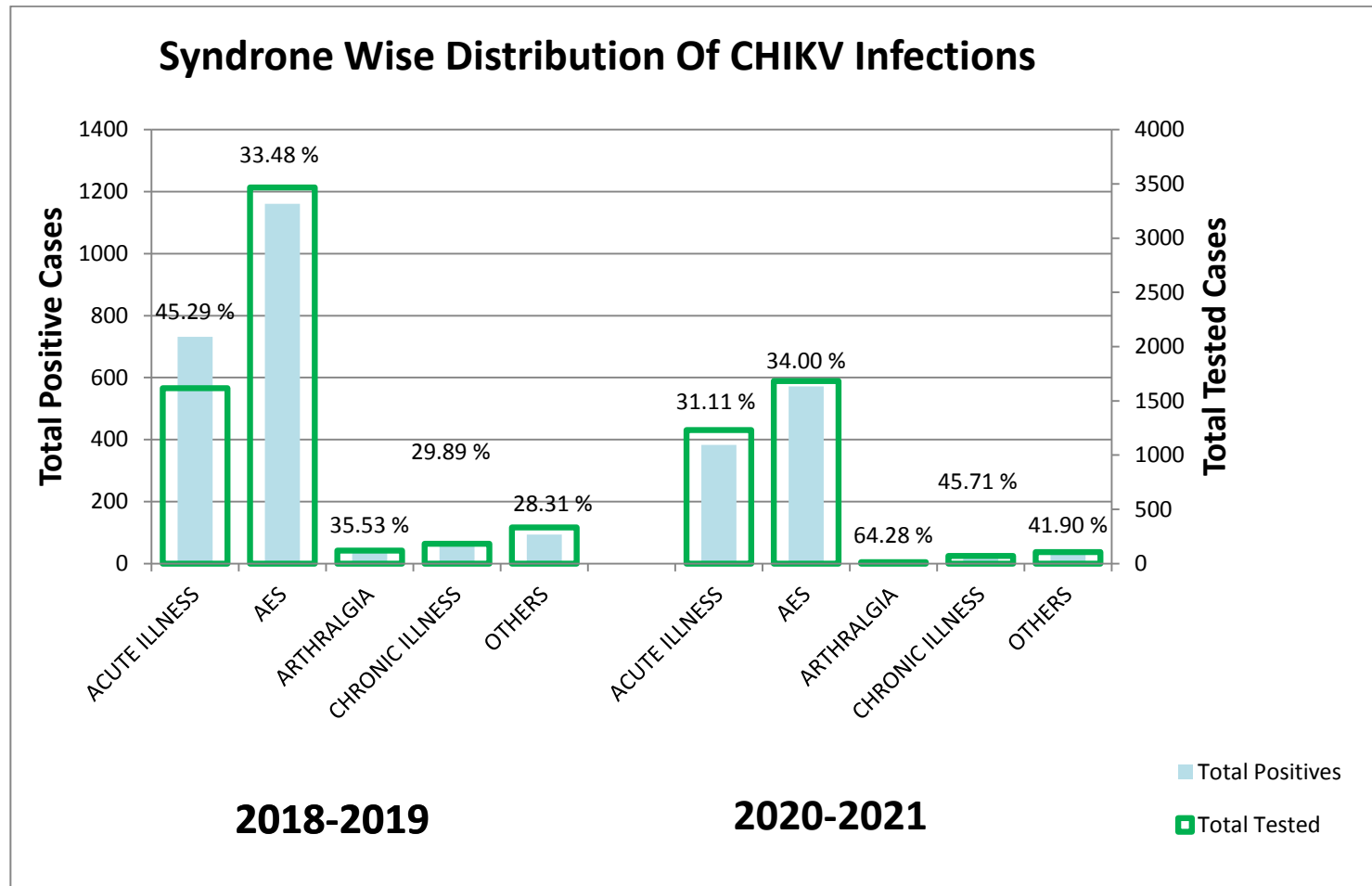


Fig. 4. Graph shows percent positivity and total tested and positive cases of chikungunya among different syndromes patients during pre-covid and covid eras

AFI had significant lower positivity in covid time (31.11%) than pre-covid time (45.29%). Besides, cases presenting with Arthralgia showed a significant increase in positivity (64.28%) during the covid era. Cases presenting with chronic febrile illness and undefined syndromes also showed a mild rise in positivity. Needless to state that cases of CHIKV tested during the covid period were much fewer than those tested during the pre-covid era (Table 1). On observing the zone wise data, the central zone has maximum a enrolment of cases due to the location of the laboratory in the central zone. Districts located far from the laboratory referred to a lower number of cases than those situated geographically closer to the laboratory. Positivity from the central zone dropped during covid-19 period while from the rest of the state positivity in the covid and pre-covid eras was comparable.

(Table 2) shows basic demographic details of patient enrolled (mean, median, standard deviation and vice versa) for testing.

The impact of covid 19 pandemic on the enrollment of chikungunya cases revealed that references of cases reduced drastically during the covid era (2020-21) as compared to the pre-covid era (2018-19). Finding of this study however, showed significant difference between case positivity for CHIKV during covid-19 and pre-covid-19 eras among different variables in (Figs. 2, 3 and 4) respectively. The result showed that the covid-19 pandemic had a positive impact on acute febrile illness of CHIKV as the positivity decreased. The case positivity of CHIKV infection although increased among patients presented with Arthralgia, chronic febrile illness, and other symptoms. The number of CHIKV infection in these groups, however, were less. Lockdown or lack of hospital admission of noncovid-19 illness during the pandemic time may have contributed to the lower number of hospital references. Even outdoor services were limited to covid-19 cases only. Most of the general hospitals were converted as into Covid-19 facilities. An earlier study reported a CHIKV outbreak in Uttar Pradesh, India in 2016 [8]. Inflammatory polyarthrititis was the most common long-term sequelae to occur with chikungunya infection [9]. The Department of Health Research (DHR), Ministry of Health and Family Welfare, Government of India, is constantly making effort to establish and strengthen the network of laboratories across the country for timely diagnosis of viruses causing outbreaks [10]. The

mobility restriction during pandemic has affected the health-seeking behaviour of people [11]. Similar studies that were conducted in countries endemic to Chikungunya show that CHIKV continued to circulate and cause disease during the COVID-19 pandemic [12] with possible co-infections [13]. Due to the lack of specific clinical presentation for CHIKV infection, efficient and accurate diagnostic methods are necessary for the proper management [14,15].

4. CONCLUSION

The 2020-21 covid-19 pandemic decreased the CHIKV cases enrolment in the State of Uttar Pradesh. Percent positivity in the Pre-covid-19 and covid-19 eras were 36.5% and 33.5% respectively.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

Approval from the Human ethical committee of KGMU was given.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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