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Epidemiological Markers of Chikungunya Virus in Non-Malaria Fébrile Patients in The Ouaddaï and Biltine Provinces of Chad.

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Abstract: Chikungunya is an infectious disease caused by the virus of the same name, transmitted mainly by the Aedes aegypti and Aedes albopictus mosquitoes, which are widespread in our environment. Following several reported outbreaks in various countries, knowledge of this disease remains limited in Chad, which explains the relevance of our study. The aim of this study was to establish the epidemiological and clinical profile of chikungunya in the towns of Abèche and Biltine, located in the east of the country.
This was a cross-sectional analytical study conducted from 20 August to 26 October 2025. The study population comprised individuals attending health facilities in Abéché and Biltine who presented with symptoms of malaria but tested negative for the parasite. These negative blood samples were collected to test for IgM and IgG antibodies against the chikungunya virus. Of the 206 samples analysed, 38 tested positive, representing a prevalence of 18.45%. Those most affected were individuals aged 25 to 64, accounting for 14.08% of this age group, as well as women, who accounted for 11.16% of cases. The results also indicate that the majority of infected patients were married (75.73%), and that 77.67% of them lived near areas of stagnant water. The majority of patients were housewives (46.11%) and 67.96% had not attended school, suggesting increased vulnerability increased prevalence in this population.
These findings highlight the urgent need to step up prevention and awareness-raising activities regarding chikungunya in these regions, in order to better protect the population against this disease.
Keywords: Chikungunya, antibodies, epidemiology, patients, Chad.

INTRODUCTION

Chikungunya is an infectious disease caused by the Chikungunya virus (CHIKV). This small, spherical, enveloped virus belongs to the Togaviridae family and the Alphavirus genus (Guerquin, 2015 ; Godaert, 2017). It is an arbovirus transmitted by arthropods, and its genome consists of a positive-sense single-stranded RNA. To date, two complete nucleotide sequences of CHIKV have been identified, corresponding to the Ross and S27 strains (Guerquin, 2015).

The virus causes a debilitating disease called chikungunya, whose name derives from the Makonde term—a language spoken by the Makonde ethnic group in southeastern Tanzania and northern Mozambique—meaning "that which causes one to bend," in reference to the stooped posture of people suffering from painful joint pain (CDC and PAHO, 2011 ; Guerquin, 2015 ; Sciensano, 2018 ; Rua, 2015 ; Jaffar-Bandjee, 2010). Outbreaks involving fever, rash, and joint pain similar to those seen in chikungunya were first reported as early as the 1770s (CDC and PAHO, 2011). However, it was not until 1952–1953, during an outbreak in Tanzania, that the virus was isolated from mosquito serum (CDC and PAHO, 2011). Since 2004, chikungunya outbreaks have been observed in Africa, Asia, the islands of the Indian Ocean, and Europe (Rua, 2015). Unlike these regions, the Americas had so far appeared relatively spared, despite the dense presence of vector mosquitoes and several instances of the virus being imported by travelers returning from countries where transmission was active (Rua, 2015).

CHIKV, primarily transmitted by Aedes aegypti and Aedes albopictus mosquitoes, poses à major public health challenge. It causes an acute infection characterized by high fever, joint pain, muscle pain, headaches, and a rash (Jupp and McIntosh, 1988 ; Johnston and Peters, 1996). Polyarthralgia, a typical clinical symptom, is very painful. The majority of cases resolve spontaneously within one to ten days, but in some patients, this pain may persist for months or even years (Jupp and McIntosh, 1988). In addition, minor hemorrhagic signs such as epistaxis or gingival bleeding have been observed in some patients (Jupp and McIntosh, 1988). Starting in March 2005, severe forms

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of the infection—including cases with neurological symptoms or fulminant hepatitis requiring intensive care were reported (Pastorino *et al.*, 2004).

In Chad, between August 14 and October 2, 2020, an outbreak was declared, with 34,052 cases reported and one death recorded, primarily in the cities of Abéché and Biltine (MSP and WHO, 2020). The most affected age group was 15 years and older, with a predominance among the female population. The majority of patients presented with high fever, headaches, debilitating joint pain, and approximately one-third developed pruritic maculopapular rashes (MSPP and WHO, 2020). Recently, on August 15, 2023, the Ministry of Public Health and Prevention (MSPP) issued an alert regarding a dengue outbreak in the Abéché district, in the province of Ouaddaï. According to the statement, the majority of patients presented with symptoms such as high fever, headaches, muscle and joint pain, nausea, vomiting, and skin rashes.

Unfortunately, chikungunya remains little known in Chad, both among the general public and among medical personnel, as its symptoms were initially mistaken for those of malaria during the early stages of the outbreak (MSP and WHO, 2020). No previous studies have been conducted on the prevalence, specific symptoms, or treatments for this disease in the cities of Abéché and Biltine.

MATERIALS AND METHODS

This is an analytical cross-sectional study conducted in the cities of Abéché and Biltine, located in eastern Chad. Blood samples were collected at five health centers, as well as at the Abéché University Hospital for the city of Abéché. For the city of Biltine, samples were collected exclusively at the Provincial Hospital. The health centers involved in Abèche included Kamine, Salamat, Djitinié, Ahmat Al Badawi, and the Catholic Health Center. These facilities were selected for sample collection and clinical analysis because they served patients from various neighborhoods of the city who sought care at least one of these six health facilities. In Biltine, the Provincial Hospital was the only facility capable of collecting and analyzing patient samples. Study Period and Population.

This study was conducted from August 20 to October 26, 2020. The study population included individuals who had sought out patient care at various health facilities in Abéché and Biltine (hospitals and health centers) or who exhibited signs of malaria but had received a negative result on a malaria screening test.

Survey Data Collection

Data were collected using a data collection form developed with Sphinx V5 Plus software, which was distributed to all outpatients. Information was collected during individual interviews, with the patient's prior consent. For physically incapacitated or very young patients, accompanying persons provided the responses. Interviews were conducted face-to-face, respecting the patient's privacy and their right to end the interview at any time if they wished.

Patients and Samples

Samples from Abéché were collected at the Abéché University Hospital (CHU) as well as at five health centers (Kaminé, Salamat, Djatinié, Ahmat Albadawi, and the Catholic center) ; for the town of Biltine, samples were collected exclusively at the Provincial Hospital. All analyses were performed at the laboratory of the Chad-China Friendship Hospital (HATC).

Collection and Processing of Blood Samples

The samples collected were exclusively venous blood. Venipuncture, performed at the antecubital fossa or from other visible veins in the forearm, was used to collect blood into an EDTA-containing tube. After collection, the sample was centrifuged at 3,000 revolutions per minute for 5 minutes to extract the serum. The serum was then carefully removed and stored in cryotubes.

All cryotubes containing the serum were placed in tube racks and then stored in freezers equipped with ice packs to ensure they remained cold during transport to N'Djamena for rapid chikungunya testing.

Detection of Chikungunya IgG/IgM

Test Principle (according to Hangzhou All Test Biotech Co., Ltd.)

The STANDARD Q Chikungunya IgM/IgG Test Kit features "M" and "G," and a control line "C." Anti-human monoclonal IgM and anti-human monoclonal IgG are immobilized on two separate test lines (M and G lines) on the nitrocellulose membrane. The IgM line in the result window is located near the sample well and is followed by the IgG line. Inactivated Chikungunya virus in the antigen buffer and anti-Chikungunya monoclonal IgM or IgG in the patient sample. If human anti-Chikungunya IgM or IgG is present in the patient's serum, capillary whole blood, plasma, or venous whole blood, a visible band appears on the respective test line, forming a complex with the anti-human IgM/IgG, inactivated Chikungunya virus, and anti-Chikungunya E1-gold, indicating a positive test result. The purple line in the control region should always appear if the test is performed correctly.

In the six selected districts of the city of Abéché, 350 peoples were tested for malaria using the P.f. test, 150 of whom were also tested for chikungunya. The total population of Abéché is estimated at approximately 200,000 inhabitants.

In the city of Biltine, which has a population of approximately 11,840, 100 peoples were tested for

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malaria, of whom 56 were selected for chikungunya testing. Data were collected through direct interviews with patients using survey forms designed for this purpose. The questionnaires used were closed-ended.

The study included anyone who presented at the various healthcare facilities (University Hospital, Provincial Hospital, Health Center) with symptoms of malaria and tested negative for malaria.

Statistical Analysis of the Data

The data were entered using Microsoft Word and Excel 2010. They were analyzed using SPSS 20.0.

RESULTS

A total of 450 samples from patients with fever were analyzed for malaria diagnosis using the P.f test, including 350 from Abéché and 100 from Biltine. Of these, 150 out of 350 malarias negative samples underwent rapid Chikungunya testing in Abéché, and 56 out of 100 in Biltine.

Thus, the study population at the study sites consisted of 206 patients.

Sociodemographic profiles

Distribution of patients by borough

Table 1: Distribution of patients by borough

Borough	Abéché n (%)	Biltine n (%)
1er	25 (16,67)	04 (7,14)
2ème	32 (21,33)	05 (8,92)
3ème	28 (18,67)	26 (46,42)
4ème	08 (5,33)	03 (5,35)
5ème	09 (6,00)	15 (26,78)
6ème	17 (11,33)	0 (0)
Others (outlying villages)	31 (20,67)	03 (5,35)
Total	**150 (100 %)**	**56 (100 %)**

Legend : n = number of patients examined ; (%) = percentage

Table 1 shows that of the 150 samples collected in Abéché, the 2nd district was the most represented, accounting for 21.33%, whereas the 4th district was the least represented, accounting for 5.33%. Meanwhile, among the samples collected in Biltine, the 3rd district was the most represented, accounting for 46.42%, and the 4th district was the least represented, accounting for 5.35%.

Répartition des patients selon le genre, l'âge et le statut matrimonial

Table 2: Répartition des patients selon le genre, l'âge et le statut matrimonial

Characteristics	Cities		Total
Sex	**Abéché n (%)**	**Biltine n (%)**	**n (%)**
Féminine	79 (52,67)	33 (58,92)	112 (54,37)
Male	71 (47,33)	23 (41,08)	94(45,63)
Total	**150 (100)**	**56 (100)**	**206 (100)**
Age groups	**Abéché n (%)**	**Biltine n (%)**	**Total n (%)**
Under 15	07 (4,67)	08 (14,29)	15 (7,29)
]15 – 24]	30 (20,00)	14 (25,00)	44 (21,36)
]25 – 64]	84 (56,00)	32 (57,14)	116 (56,31)
> 64	29 (19,33)	02 (3,57)	31 (15,04)
Total	**150 (100)**	**56 (100)**	**206 (100)**
Marital Status	**Abéché n (%)**	**Biltine n (%)**	**Total n (%)**
Singles	29 (19,33)	15 (26,79)	44 (21,36)
Married	116 (77,33)	40 (71,42)	156 (75,73)
Widowers	5 (3,33)	01 (1,79)	6(2,91)
Total	**150 (100)**	**56 (100)**	**206 (100)**

Legend : n = number of patients examined ; (%) = percentage

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According to Table 2, of the total number of patients examined in the two cities—206 patients— 112 were female (54.37%) and 94 were male (45.63%). The sex ratio is 1.2 in favor of females. This table also shows that among the patients examined, the 25–64 age group is predominant, accounting for 56.31%, followed by the 15–25 age group, accounting for 21.36%. The least represented age group is those under 15, at 7.29%. The distribution by marital status shows that nearly three-quarters of the patients are married (75.73%), followed by singles and widowers at 21.36% and 2.91%, respectively.

Distribution of patients by educational level and the presence of standing water near their homes.

Table 3: Distribution of patients by educational level and the presence of standing water near their homes

Features	**City**		**Total**
Level of education	**Abéché n (%)**	**Biltine n (%)**	**N (%)**
Not enrolled in school	89 (59,33)	51 (91,07)	140 (67,96)
Elementary	22 (14,67)	3 (5,36)	25 (12,13)
High school	24 (16,00)	2 (3,57)	26 (12,62)
Academic	15 (10,00)	0 (0,00%)	15 (7,29)
Total	**150 (100)**	**56 (100)**	**206(100)**
Presence of standing water near the Home	**Abeché n (%)**	**Biltine n (%)**	**Total n (%)**
Presence of standing water	125 (83,33)	35 (62,5)	160 (77,67)
No standing water	25 (16,67)	21 (37,5)	46 (22,33)
Total	**150 (100)**	**56 (100)**	**206 (100)**

Légende : n = nombre des patients examinés ; (%) = pourcentage

Table 3 shows that: Those without a formal education were the most represented group, accounting for 67.96%, while university graduates were the least represented, at 7.29% ;

More than three-quarters, or 77.67%, of patients lived near stagnant water, compared to 22.33% who lived in a less humid environment.

Breakdown of patients by profession

Table 4: Breakdown of patients by occupation

Occupation	**Abéché n (%)**	**Biltine n (%)**	**Total n (%)**
Carpenter	1 (0,67)	0 (0,00)	1 (0,48)
Driver	2 (1,32)	0 (0,00)	2 (0,97)
Retailer	5 (3,33)	0 (0,00)	5 (2,44)
Cultivator	30 (20)	11 (19,64)	41 (19,90)
Student	24 (16)	11 (19,64)	35 (16,99)
Breeder	6 (4)	2 (3,58)	8 (3,88)
Civil servant	8 (5,33)	0 (0,00)	8 (3,88)
Blacksmith	1 (0,67)	0 (0,00)	1 (0,48)
Marabout	4 (2,67)	0 (0,00)	4 (1,95)
Mechanic	1 (0,67)	0 (0,00)	1 (0,48)
Housewife	63 (42)	32 (57,14)	95 (46,11)
Soldier	1 (0,67)	0 (0,00)	1 (0,48)
Welder	3 (2)	0 (0,00)	3 (1,47)
Talibé	1 (0,67)	0 (0,00)	1 (0,48)
Total	**150 (100)**	**56 (100)**	**206 (100)**

Légende : n= patients examinés ; **(%) =** pourcentage

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The summary in Table 4 shows that housewives make up the largest group at 46.11%, followed by farmers at 19.90%, while talibés, soldiers, mechanics, and carpenters are the least represented, each accounting for 0.48%.

Clinical variables

The clinical variables for this study were : fever, headache, joint pain, fatigue, muscle pain, and diarrhea.

Distribution of patients by clinical variables

Table 5: Breakdown of patients by symptoms

Variables	Abéché n (%)	Biltine n (%)	Total n (%)
Fever			
No	12 (8,00)	4 (7,14)	16 (7,77)
Yes	138 (92,00)	52 (92,86)	190 (92,23)
Total	**150 (100)**	**56 (100)**	**206 (100)**
Headaches			
No	6 (4,00)	3 (5,36)	9 (4,37)
Yes	144 (96,00)	53 (94,64)	197 (95,63)
Total	**150 (100)**	**56 (100)**	**206 (100)**
Joint pain			
No	10 (6,67)	4 (7,14)	14 (6,80)
Yes	140 (93,33)	52 (92,86)	192 (93,20)
Total	**150 (100)**	**56 (100)**	**206 (100)**
Fatigue			
No	7 (4,67)	4 (7,14)	11 (5,33)
Yes	143 (95,33)	52 (92,86)	195 (94,67)
Total	**150 (100)**	**56 (100)**	**206 (100)**
Muscle pain			
No	9 (6,00)	16 (28,58)	25 (12,13)
Yes	141 (94,00)	40 (71,42)	181 (87,87)
Total	**150 (100)**	**56 (100)**	**206 (100)**
Diarrhea			
No	88 (58,67)	29 (51,79)	117 (56,80)
Yes	62 (41,33)	27 (48,21)	89 (43,20)
Total	**150 (100)**	**56 (100)**	**206 (100)**

Legend : n = number of patients examined ; (%) = percentage Table 5 shows that the most common clinical symptoms among patients in both cities were headache (95.63%), fatigue (94.67%), joint pain (93.20%), fever (92.23%), muscle pain (87.87%), and diarrhea (43.20%).

Breakdown of patients by level of knowledge about the disease

Table 6: Breakdown of patients based on their knowledge of Chikungunya

Variables	Abéché n (%)	Biltine n (%)	Total n (%)
Have you heard of Chikungunya ?			
No	125 (83,33)	38 (67,86)	163 (79,12)
Yes	25 (16,67)	18 (32,14)	43 (20,88)
Total	**150 (100)**	**56 (100)**	**206 (100)**
Media outlet			
Media	87 (58,00)	18 (32,14)	105 (50,98)

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Oral source	63 (42,00)	38 (67,86)	101 (49,02)
Total	**150 (100)**	**56 (100)**	**206 (100)**
Mode transmission			
No	142 (94,67)	55 (98,21)	197 (95,63)
Yes	8 (5,33)	1 (1,79)	9 (4,37)
Total	**150 (100)**	**56 (100)**	**206 (100)**
Preventive measures			
Non	142 (94,67)	56 (100)	198 (96,11)
Oui	8 (5,33)	0 (0,00)	8 (3,89)
Total	**150 (100)**	**56 (100)**	**206 (100)**

Legend : n = number of patients examined ; (%) = percentage

Table 6 shows that 79.12% of patients had never heard of Chikungunya, compared to 20.88% who were aware of the disease. In the same table, regarding the source of information, 50.98% obtained the information through the media, compared to 49.02% who heard about it through word of mouth ; 95.63% of patients do not know how the disease is transmitted, compared to 4.37% who do ; 96.11% do not know how to prevent the disease, while 3.89% do.

Serological markers

Table 7: Infection Rates by Gender

Ville	Sexe	Chikungunya	
		N' (%)	**n''** (%)
Abéché (n = 150)	Homme	14 (9,33)	57 (38,00)
	Femme	18 (12,00)	61 (40,67)
Biltine (n = 56)	Homme	1 (1,79)	22 (39,28)
	Femme	5 (8,93)	28 (50,00)
	Total (n = 206)	**38 (18,45)**	**168 (81,55)**

Légende : n= patients examinés ; **n'=** nombre des patients infectés ; **n'' =** nombre des patients testés négatifs ; **(%) =** pourcentage

Table 7 summarizes the infection rates by gender at the study sites. In Abéché, of the 150 patients examined, 18 women and 14 men tested positive for Chikungunya, representing 12% and 9.33%, respectively. In Biltine, out of a total of 56 patients examined, 5 women and 1 man tested positive for Chikungunya, representing 8.93% and 1.79%, respectively. For dengue, only 1 man (0.67%) and 1 woman (0.67%) in Abéché tested positive.

Table 8: Rates by Age Group

Ville	Tranches d'âge	Chikungunya	
		n'(%)	**n''**(%)
Abéché (n = 150)	□ Moins de 15 □	2 (1,33)	5 (3,33)
	□ 15 – 25□	5 (3,33)	25 (16,68)
	□ 25 – 64 □	23 (15,33)	61 (40,66)
	□ Plus de 64 □	2 (1,33)	27 (18,00)
Biltine (n = 56)	□ Moins de 15 □	0 (0,00)	8 (14,28)
	□ 15 – 25□	0 (0,00)	14 (25,00)
	□ 25 – 64□	6 (10,72)	26 (46,43)
	□ Plus de 64 □	0 (0,00)	2 (3,57)
Total (n = 206)		**38 (18,45)**	**168 (81,55)**

Legend : n = number of patients examined ; n'= number of infected patients ; n'' = number of patients who tested negative ; (%) = percentage

The summary in Table 8 shows that, for the city of Abéché, the age group most affected by Chikungunya is 25 to 64 years old, and the age group most affected by dengue is 15 to 25 years old, with rates of 15.33% and 1.33%, respectively. In Biltine, only the 25–64 age group was infected with Chikungunya, at a raté of 10.72%.

Table 9 : Breakdown of results by place of residence in the cities of Abéché and Biltine

Arrondissement	Abéché (n = 150)		Biltine (n = 56)	
	Chikungunya		Chikungunya	
	n' (%)	n'' (%)	n' (%)	n'' (%)
1er Arrondi	7 (4,67)	18(12,00)	2 (3,57)	2 (3,57)
2ème Arrondi	5 (3,33)	27 (18,00)	3 (5,36)	2 (3,57)
3ème Arrondi	5 (3,33)	23 (15,33)	1 (1,78)	25 (44,65)
4ème Arrondi	4 (2,67)	4 (2,67)	0 (0,00)	3 (5,36)
5ème Arrondi	3 (2,00)	6 (4,00)	1 (1,78)	14 (25,00)
6ème Arrondi	5 (3,33)	12 (8,00)	0 (0,00)	0 (0,00)
Autres	1 (0,67)	30 (20,00)	0 (0,00)	3 (5,36)
Total (n = 206)	**30 (100)**	**120 (100)**	**7 (100)**	**49 (100)**

Legend : n = number of patients examined ; n'= number of infected patients ; n'' = number of patients who tested negative ; (%) = percentage

Table 9 shows that patients from the 1st District of the city of Abèche had the highest infection rates for Chikungunya and Dengue, at 4.67% and 0.67%, respectively ; and for Biltine, patients from the 2nd District had the highest infection rates for Chikungunya, at 5.36%.

DISCUSSION

This study was conducted at healthcare facilities in the city of Abéché (five health centers and the University Hospital) and at the Biltine Provincial Hospital during the period from August 20 to October 26, 2022. It enabled us to analyze two hundred six (206) blood samples from patients who tested negative for malaria using the TDR test, ranging in age from 10 to 94 years.

During this study, we recorded 206 admissions consisting of patients who presented with malaria symptoms and tested negative on the malaria TDR test, who then underwent the Chikungunya rapid test. Of these patients who underwent the Chikungunya rapid test, 38 tested positive, representing a prevalence of 18.45% for Chikungunya (Table 7). This result is lower than that reported by Ndiaye Oumar, who found a prevalence of 54.13% in a study of Chikungunya seroprevalence in the Kédougou region of Senegal in 2008 (Ndiaye, 2008). This difference may be due to the fact that our study took place two (2) years after the 2020 epidemic in the cities of Abèche and Biltine in Chad. Although the prevalence is low, this study highlights the presence and circulation of the Chikungunya virus at the study sites. This low prevalence may be attributed to the fact that the 2020 epidemic allowed the indigenous population to develop natural immunity due to their repeated exposure to arboviruses ; according to the work of Diallo *et al.* (2014), prior exposure leads to the acquisition of immunity.

However, in this study, the age group most affected by Chikungunya in the cities of Abéché and Biltine was 25 to 64 years old, accounting for 15.33% and 10.72%, respectively.

(Table 8). The age range was from 10 to 94 years. Women were more level to be infected than men, with rates of 12.00% in Abéché and 8.93% in Biltine.

(Table 7). As in the rest of Africa, in Chad, according to the final results of the RGPH2, women and youth under 15 remain the majority, accounting for 50.6% of the population, and the population of these two regions consists largely of young people, with females predominating (RGPH2 2018). The majority of patients examined in this study belong to this age group. Our study confirms the results obtained by the WHO and MST in 2020, which found that the most affected age group is those over 15 years of age, and that females are the most infected, with a prevalence of 54%.

With regard to place of residence, the 1st District of the city of Abéché had the highest rates of Chikungunya infection, at 4.67% for Chikungunya, while for Biltine, patients from the 2nd District of the city of Biltine had the highest Chikungunya infection rates, with a proportion of 5.36% (Table 9). The high incidence of infection in the 1st District of Abéché could be explained by the high population density and, above all, the lack of sewage systems, which leads to stagnant water near homes. This situation is conducive to the proliferation of mosquitoes, thus exposing residents to

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bites from mosquitoes that transmit Chikungunya. According to studies conducted in Mayotte and Réunion, seroprevalence surveys have highlighted the importance of social vulnerability and host-vector promiscuity (Sissoko *et al.*, 2008 ; Gérardin *et al.*, 2008).

In terms of social status, housewives had the highest infection rate at 46.11% (Table 4). This result is lower than that reported by Ndiaye (2008), who found a raté of 56.37%. This result could be explained by socioeconomic factors that leave these women to perform household chores in the evening, or by the A. albopictus vector, which is diurnal with peak activity at the beginning and end of the day (Bernard *et al.*, 2023).

Regarding the most common clinical symptoms observed in patients, these were headache (95.63%), fatigue (94.67%), arthralgia (93.20%), fever (92.23%), myalgia (87.87%), and diarrhea (43.20%) (Table V). These results are consistent with the literature (Karine and Thibaut, 2010), indicating that the clinical signs are the same, although our prevalence rates for certain symptoms are lower and for others higher compared to the findings of Karine and Thibaut, who reported the following rates : joint pain, 95.2% ; headache, 75.8% ; muscle pain, 64.5% ; and diarrhea, 21% in the Réunion epidemic (Karine and Thibaut, 2010).

CONCLUSION

Our study on the epidemiological and clinical profile of Chikungunya in the cities of Abéché and Biltine allowed us to determine the seroprevalence of the Chikungunya virus, identify the socioeconomic groups most affected, and assess the participants' knowledge of the virus. The results of this study suggest that the diagnostic capacity of health facilities should be strengthened.

Of the 206 patients from the two cities, 38 tested positive for the Chikungunya virus, representing 18.45%. Females were the most affected by the Chikungunya virus. A high proportion—77.67% of patients—had standing water near their homes. Housewives were the most represented group among patients, accounting for 46.11%.

Several factors contribute to the spread of the Chikungunya virus among residents of the two cities, such as inadequate living conditions and a lack of awareness. It would be valuable to carefully analyze the various levels of exposure to vectors and methodically study their breeding sites in order to identify opportunities to eradicate them or at least limit their spread. Ongoing public awareness campaigns could help reduce the risk of exposure to vectors and thus limit the spread of the Chikungunya virus among the population.

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