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The Risk Factors of Chikungunya Fever among Family Member at Kassala Locality 2019

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Abstract *Aedes Aegypti* and *Aedes Albopictus* are responsible vectors for Chikungunya Virus *transmission*. CHIKV outbreaks are characterized by rapid spread and infection rates as high as 75%. A combination of health system efforts and healthy behavior practices by the community is essential for effective control. The study **aimed** to identify the risk factors of Chikungunya fever among family member at Kassala locality 2019**. Methodology: -** This was Descriptive cross-sectional community based study conducted in kassala State (Eastern Sudan) 2019. 386 participants were chosen. Data were collected using designed interview questionnaire. **Result:** - The prevalence of Chikungunya disease was very high during Kassala outbreak (90.9%). Occupation (χ2=7.478, p=.048), cover of water containers (χ2=10.647, P=.003), frequent of time covered water containers (χ2=10.677, P=.014), use of any insect repellents (χ2=4.150, P=.049, OR=2.5 (1.0-6.1), attended nutrition education about disease (χ2=32.98, P=.000, OR=9.6 (3.9-23.9), diagnosed of infection by doctor (χ2=222.9, P.000, =OR=3.4 (7.0-15.8), knowledge about chickungunya fever (χ2=35.1, p=.000, OR=10.4 (4.1-26.1) were found significantly associated risk factors of chikungunya infection. The study Concluded that using repellents, cover the water containers, attended nutrition education about disease, rain season and poor knowledge about the disease vector were found as major risk factors of chikungunya infection. **Recommendation: -** Mosquito control, use of insect repellent and mosquito nets, cover all water containers should be applied to interrupt transmission of disease. Health education should be considered to increase the awerance of the community for the prevention and control Chikungunya outbreaks.

Keywords: *fever, Chikungunya, health, community-Sudan*

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1. Background

Chikungunya is an infection caused by the Chikungunya virus CHIKV [1]. Chikungunya fever is an acute febrile illness caused by an arthropod-borne alpha virus, Chikungunya virus CHIKV [2]. CHIKV was first recognized as a human pathogen during the 1950s in Africa, and since then, cases have been identified in many countries in Africa and Asia. The virus is spread between people by two types of mosquitoes: *Aedes albopictus* and *Aedes aegypti*. [1]. Several other mosquito-borne alpha viruses, Chikungunya virus causes a fever-rash-arthralgia syndrome in humans, the name Chikungunya derives from the debilitating joint pain noted by local populations during an outbreak in 1952-53 in Tanzania. *Aedes aegypti* and *Aedes albopictus* are responsible for the spread of Dengue, Chikungunya, West Nile, Yellow fever and Zika virus [3].

Vector borne diseases, outbreaks were mainly reported during the rainy season, when the density of mosquitoes is maximal [4]. High disease attack rates were reported in areas such as in the Dominican Republic, (41%) or Suriname (90.4%), and the transmission peak was reached within 3 months [5].

In 2004, massive urban outbreaks producing considerable morbidity in a widening geographical area have occurred throughout the topical and sub-tropical world [6]. We will explore the complex interplay of entomological, virological, and sociological factors contributing to its emergence, speculate on future epidemiological trends, and outline the possibilities for control [7].

Increasing age was found to be a significant risk factor for chronic CHIKV, with those in the 25- to 44-year-old age group at the highest risk [8]. Studies conducted in similar settings that age was found to be risk factor for chronic CHIKV infection [9]. Travel and rapid urbanization are important factors that have contributed in expansion of disease endemic by introducing the vector population to exotic surroundings.

The virus isolated during an outbreak in Tanzania, characterized by fever, rigors, arthralgia and myalgias. The virus is transmitted by hematophagous mosquitoes of the Aedes group. Human primates are not the main reservoir of infection in Africa, while in Asia *Aedes*

Aegyptusis responsible for maintaining a human to human cycle. The incubation period is short 2-3 days. Antibody surveys have shown that subclinical infections are common 20-90% of a given population may be immune [10].

In 2005, an outbreak on the Island of Reunion was the largest one, with an estimated 266,000 cases on an Island with a population of approximately 770,000 [11]. in a 2006 outbreak, India reported 1.25 million suspected cases [12]. Chikungunya was recently introduced to America. From 2013-2014 about 1,118,763 suspected but only 24,682 cases were reported [13].

CHIKV is an African virus that circulates enzootically in sylvatic cycle between arboreal, canopy-dwelling mosquitoes and non-human primates [14]. In Africa, *A. aegypti* is present in two genetic forms [15]: (I) Dark and Sylvatic A. *aegypti*formosus, found in forest as habitat and using tree holes for larval development sites [16]. (II) Pale and domestic A. aegyptiaegypti, which is widespread in the tropics and subtropics and used artificial larval habitat. [17]

Zika virus (ZIKV), typically transmitted in urban settings by A. *aegypti*, and *A. albopictus*, both of them expanding distributed circulation of CHIKV and ZIKV [18]

Addition to *Aedes albopictus* an aggressive Asian tiger mosquito (human-biting mosquito) has been spread globally from international trade [19]. Unlike *Aedes aegypti*, which exists in tropical and subtropical areas, Aedes albopictus can thrive in temperate regions [20]. Potentially introducing chikungunya virus to new ecology [21].

Mechanisms for CHIKV's remain unknown [22]. Co-morbidities such as cardiovascular disease, hypertension, concomitant osteoarthritis, obesity, and diabetes have been identified to increasing the severity of CHIKV disease [23].

Between July and November of 2014, outbreak of CHIKV occurred in Grenada with conservative estimates of attack rate at approximately 60% of the population [24].

More than 11,000 people in Sudan's Eastern State of Kassala have been infected with Chikungunya [25].

In November 2018, over 200,000 people in 18 States of Sudan's have been affected by heavy rains and flash floods between June and early November. During this season some States infected with Chikungunya. The worst affected States were Kassala (47,480), Sennar (33,830), West Kordofan (33,175), Al Gadarif (23,975), Red Sea (19,100), Northern (16,450), Central Darfur (14,200), and White Nile (13,645) [26].

1.1. Problem Statement

Disease surveillance system in Sudan reported a total of 48,763 cases of Chikungunya fever during the period between 31 May 2018 and 30 October 2018 [25].

October 2018, seven States (Kassala, Red Sea, Al Gadarif, River Nile, Northern State, South Darfur, and Khartoum) have been affected with a total of 13 978 cases of chikungunya, 95% of which are from Kassala State. No hospital admission or death has been officially reported. Approximately 7% of the reported cases and 60% were females [27].

1.2. Justification

Globally 3.6 billion people living in 124 countries are at high risk of chikungunya with infection rates reported up to 75 % [28]. In 2018, 13 978 cases infected with chikungunya, 95% of them are from Kassala State. [27]. 19 89 cases of Chikungunya in Kassala State reported with a 50% mosquito density [25].

1.3. General Objective

To study the risk factors of Chikungunya fever among family member at Kassala locality 2019.

1.4. Specific objectives

1- To identify the risk factors related toChikungunya fever.

2- To identify prevalence rate of chikungunya infection.

3- To identify the association between the risk factors and the prevalence

2. Methodology

2.1. Study Design

Descriptive cross-sectional community based study conducted in Kassala State (Eastern Sudan) 2019.

2.2. Study Area

Kassala is one of the 18 States of Sudan. It has an area 36,710 km^2 and estimated population of approximately 419,030. Kassala is capital of the State. Kassala locality included "6 Administrative" kassala, Aroma, Hamashkoraib, Halfa El gadida, Khashmelgirba and Telkuk [29]. Kassala Administrative consists of Units. B. Panat one of the Units selected randomly.

Kassala State which is characterized by a semi-arid region of the tropical countries, the rainy season starts in May and end in October, with an annual rainfall between 4.5inches in August, but this rate is influenced by climatic changes which affect the central part of the Sudan during the last few decades. Summer season is characterized by higher temperature degree. The temperature typically varies from 69F to 105 °F or above 109°F / 35°C. The average of relative humidity is about 39% with an average hourly wind speed of 5.8 miles per hour [29].

The solid waste in the area was collected by municipality from house to house method, then the solid waste transported to final dumping with distance about 5 km from the City. Regarding solid waste the most methods prevalent were pit latrine in addition to septic tanks. The majority of buildings are from bricks and cement.

The educational services are good in the study area where all educational phase are found starting from basic school (8 schools for boys and 5 schools for girls), secondary school (2 schools for boys and one school for girl). AL Sharg university is only university at Kassala locality.

There was great problem of drinking water, approximately the half of the area are drinking from the

public networks while the rest drinking through tankers, this problem make most of the population to store water in different containers for long period that favor breeding of *Aedes* mosquito inside water containers.

2.3. Study Population

The target population was selected from community of kassala Locality (Administrative Unit B. Panat) with the 11511 total populations.

2.4. Sample Size

A total of 386 populations were determined using the following statistical formula.

Sample size;

$$\mathbf{n = M / \left[S^2 x (M - 1) / PQ \right] + 1} (Ryan,\ 2013)$$

Where: S = Standard normal variable corresponding to level of significances of 0.05% (1.96).
n = sample size
P= 0.05
q=1-p
Standard errors 0.5

$$11511 / \left[0.000625 x (11510 / 0.25) \right] + 1 = 386 \qquad (1)$$

n =386

2.5. Sample Size Selection

The sample distributed accordingly by multistage selection; the stage one selection of the Banat area using simple random sample from the list of the Blocks of affected area by the chikingunya disease; the Stage two selection of the sample size and stage the Selection of the family member using a systematic simple random sampling by determined the interval as follows;

$$The\ interval = \frac{No.\ of\ population}{Sample\ size} \qquad (2)$$

$$= 11511 / 386 = 29.8 \approx \mathbf{30}$$

In stage four, the first house was randomly selected from a list of households' member from (1-386), then the second member selected by adding the number of the first household member to interval and so on till we were completed the selection of 386 household member.

2.6. Data Collection

Questionnaire was carefully prepared, tested and directed to obtain data regarding the risk factor of CHIK fever among family member at Kassala locality 2019.

2.7. Data Analysis

Data were analyzed using software computerized programmer Statistical Package for Social Sciences (SPSS) Version 24.0. Chi-square test was used to find associations between the Chikingunya disease and risk factors, p-value considered significant at less than 0.05 levels.

2.8. Ethical Considerations

Ethical clearance was obtained from the Ministry of Health, Department of Epidemiology/University of Bahri. The objective of the study was explained to participants, privacy and confidentiality of collected information was ensured at all level.

3. Results

Table 1 showed the socio-demographic characteristic among the populations

Age		
Response	Frequency	%
20-40	111	28.8
41-60	250	64.7
61-80	25	6.5
Total	**386**	**100.0**
Sex		
Male	54	14.0
Female	332	86.0
Total	**386**	**100.0**
Marital status		
Marriage	228	59.1
Single	81	21.0
Divorce	77	19.9
Total	**386**	**100.0**
Education level		
Illiterate	76	19.7
Khalawa	79	20.5
primary	44	11.4
Secondary	65	16.8
University	122	31.6
Total	**386**	**100.0**
Occupation		
Un-Employer	94	24.4
Worker	135	35.0
Employer	149	38.5
Student	8	2.1
Total	**386**	**100.0**
Family number		
1-3	100	25.9
3-6	174	45.1
6-9	84	21.7
> 9	28	7.3
Total	**386**	**Total**
Income		
<2000 SDG	245	63.5
2000 – 3000 SDG	129	33.4
3000-4000SDG	10	2.6
>4500	2	.5
Total	**386**	**100.0**

As shown in Table 1, that the majority of respondents were females (86%). More than two thirds (64.7%) of respondents their aged between 41-60 years old, (59.1%) of respondents were married, More than one third (31.6%) of respondents education level was University level. Regarding occupation, 38.5% were employees. In terms of

family number, 44.7% of the respondents have 3-6 members. Family monthly income, 63.5% of the respondents have less than 2000 SDG, which consider low income according the Ministry of Finance, chapter one, wages law 2000/Sudan.

Table 2 shows that there was no association between respondents age and prevalence of chikungunya, P=.927. No association was found between Chikungunya infection and gender, p> 0.630. Female were more infected compared to males (86.3% vs.13.7%). Chikunguna infection was not significantly associated with marital status (60.1%), p< 0.387. The infection with chikungunya was not significantly associated with education level p< 0.101.

Table 3 shows that there was no association found between family number and chikunguna infection, p> 0.333. Infection with chikungunya was not significantly associated among those who have 3-6 members. P< 0.333 but there was association between occupation and chikungunya infection, p< 0.05.

Table 2. Distribution of chikungunya fever according to socio-demographic characteristics of the respondents – age, gender, marital status and education level (N=386)

		Infected with fever		Total	χ2	P-value
		Yes	No			
Age	20-40	100 (28.5%)	11 (31.4%)	111 (28.8%)	.152	0.927
	41-60	228 (65%)	22 (62.9%)	250 (64.8%)		
	61-80	23 (6.6%)	2 (5.7%)	25 (6.5%)		
	Total	351 (100%)	35 (100%)	386 (100%)		
Gender	Male	48 (13.7%)	6 (17.1%)	54 (14%)	.318	0.362
	Female	303 (86.3%)	29 (82.9%)	332 (86%)		
	Total	351 (100%)	35 (100%)	386 (100%)		
Marital status	Married	211 (60.1%)	17 (48.6%)	228 59.1%)	1.937	0.380
	Single	71 (20.2%)	10 (28.6%)	81 (21%)		
	Divorced	69 (19.7%)	8 (22.9%)	77 (19.9%)		
	Total	351 (100%)	35 (100%)	386 (100%)		
Education level	Illiterate	65 (18.5%)	12 (34.3%)	77 (19.9%)	7.767	0.101
	Khalwa	71 (20.2%)	9 (25.7%)	80 (20.7%)		
	Primary	40 (11.4%)	3 (8.6%)	43 (11.1%)		
	Secondary	61 (17.4%)	2 (5.7%)	63 (16.3%)		
	University	114 (32.5%)	9 (25.7%)	123 (31.9%)		
	Total	351 (100%)	35 (100%)	386 (100%)		

Table 3. Distribution of chikungunya fever according to socio-demographic characteristics of the respondents-family member, occupation and family income (N=386)

		Infected with fever		Total	χ2	P-value
		Yes	No			
Family number	1-3	89 (25.4%)	11 (31.4%)	100 25.9%)	3.404	.333
	3-6	157 (44.7%)	17 (48.6%)	174 (45.1%)		
	6-9	77 (21.9%)	7 (20%)	84 (21.8%)		
	>9	28 (8%)	0 (0.0%)	27 (7.3%)		
		351 (100%)	35 (100%)	386 (100%)		
Occupation	unemployed	79 (22.5%)	15 (42.9%)	94 (24.4%)	7.478	.048**
	workers	128 (36.5%)	9 (25.7%)	137 (35.5%)		
	employee	137 (39%)	10 (28.6%)	147 (38.1%)		
	Student	7 (2%)	1 (2.9%)	8 (2.1%)		
		351 (100%)	35 (100%)	386 (100%)		
Family income per month	< 2000	219 (62.4%)	26 (74.3%)	245 (63.5%)	2.204	.531
	2000-3000	121 (34.5%)	8 (22.9%)	129 (33.4%)		
	>3000	9 (2.6%)	1 (2.9%)	10 (2.6%)		
		351 (100%)	35 (100%)	386 (100%)		

**p-value considered significant at less than 0.05 levels.

Table 4. Association between prevalence of chikungunya infection and covering the water containers (N=386)

Infected with fever	Cover water container always		Total	χ2	P-value	OR	95% (Lower-Upper)
	yes	No					
Yes	24 (7.2%)	41 (78.8%)	351 (90.9%)	10.647	0.003**	3.5	1.6-7.6
No	310 (92.8%)	11 (21.2%)	35 (9.1%)				
Total	334 (100%)	52 (100%)	386 (100%)				

**p-value considered significant at less than 0.05 levels.

Table 4 shows that there was association between chikungunya infection and those who cover water containers, P=.003. The risk of infected with chikungunya was significantly reduced by 3.5 times among those who covered water containers compared to those who didn't covered (OR=3.5, CI (1.6-17.6).

Table 5. Association between prevalence of chikungunya infection and time when the water containers cover (N=386)

Infected with fever	Times of use cover				Total	χ2	P-value
	Everyday	Twice a week	Weekly	No specific time			
Yes	11 (16.7%)	48 (87.3%)	186 (95.4%)	62 (88.6%)	307 (79.5%)	10.677	0.014**
No	55 (83.3%)	7 (12.7%)	9 (4.6%)	8 (11.4%)	79 (20.5%)		
Total	66 (100%)	55 (100%)	195 (100%)	70 (100%)	386 (100%)		

**p-value considered significant at less than 0.05 levels.

Table 5 shows that there was association between chikungunya infection and time when the water containers cover, P=.014. 79.5% of the study group was cover water containers.

Table 6. Association between prevalence of chikungunya infection and mosquito close to water (N=386)

Infected with fever	Notice mosquito close to water		Total	χ2	P-value
	Yes	No			
Yes	317 (91.4%)	34 (87.2%)	351 (90.9%)	0.741	0.389
No	30 (8.6%)	5 (12.8%)	35 (9.1%)		
Total	**347 (100%)**	**39 (100%)**	**386 (100%)**		

**p-value considered significant at less than 0.05 levels.

Table 6 shows that there was no association between chikungunya infection and noticed of mosquito close to water, p=.389. (91.4% of the participants were seeing the mosquito close to water sources.

Table 7. Association between prevalence of chikungunya infection and using mosquito net (N=386)

Infected with fever	Use mosquito net		Total	χ2	P-value
	Yes	No			
Yes	33 (9.2%)	25 (92.6%)	58 (15.0%)	0.097	0.548
No	326 (90.8%)	2 (7.4%)	328 (85.0%)		
Total	359 (100%)	27 (100%)	386 (100%)		

**p-value considered significant at less than 0.05 levels.

Table 7 shows that there was no association between chikungunya infection and those who used mosquito net, p=0.548. The chikungunya infection was not significantly among those who used mosquito net (9.2%) or those who did not used mosquito net (90.8%).

Table 8. Association between prevalence of chikungunya infection and insect repellent (N=386)

Infected with fever	Use any of insect repellents		Total	χ2	P-value	OR	95% (Lower-Upper)
	Yes	No					
Yes	319 (91.9%)	7 (17.9%)	326 (84.4%)	4.150	0.049**	2.5	1.0-6.1
No	28 (8.1%)	32 (82.1%)	60 (15.6%)				
Total	347 (100%)	39 (100%)	386 (100%)				

**p-value considered significant at less than 0.05 levels.

Table 8 shows that there was association between chikungunya infection and used of insect repellents, P=.049. The chikungunya infection was significantly among those who used mosquito repellents (91.9%) and those who did not used mosquito net (8.1%). The risk of developed chikungunya was significantly reduced 2.5-fold when used insect repellents.

Table 9. Association between prevalence of chikungunya infection and knowledge about the disease (N=386)

Infected with fever	Know the vector of disease?		Total	χ2	P-value
	Yes	No			
Yes	32 (8.6%)	10 (76.9%)	351 (90.9%)	3.202	0.104
No	341 (91.4%)	3 (23.1%)	35 (9.1%)		
Total	**373 (100%)**	**13 (100%)**	**386 (100%)**		

**p-value considered significant at less than 0.05 levels.

Table 9 shows that there was no association between chikungunya infection and knowledge about disease, P=.104. The chikungunya infection was not significantly association with knowledge about the disease vector (8.6%)

Table 10. Association between prevalence of chikungunya infection and health education about disease (N=386).

Infected with fever	Take any advice about disease		Total	χ2	P-value	OR	95% (Lower-Upper)
	Yes	No					
Yes	25 (6.9%)	14 (58.3%)	39 (10.1%)	32.98	0.000	9.6	3.9-23.9
No	337 (93.1%)	10 (41.7%)	338 (89.9%)				
Total	**362 (100%)**	**24 (100%)**	**386 (100%)**				

**p-value considered significant at less than 0.05 levels.

Table 10 shows that there was association between chikungunya infection and attending health education sessions about the disease, P=.000. (58.3%) of the participants are not attended health education about disease chikungunya infection. The risk of getting chikungunya infection was significantly reduced by 9.6 folds among those attended health education about disease chikungunya infection. (OR=9.6, CI (3.9-23.9).

Table 11. Association between prevalence of chikungunya infection and confirm of diagnosed of the infection (N=386)

Infected with fever	Diagnosis the infection		Total	χ2	P-value	OR	95% (Lower-Upper)
	Doctor	Other					
Yes	349 (96.7%)	2 (8%)	351 (90.9%)	222.9	0.000	3.4	7.0-15.8
No	12 (3.3%)	23 (92%)	35 (9.1%)				
Total	361 (100%)	25 (100%)	386 (100%)				

**p-value considered significant at less than 0.05 levels.

Table 11 shows that there was association between Chikungunya infection and confirm of diagnosed of the infection=0.000. (96.7%) of the participants infected by Chikungunya are diagnosed by doctors. The prevalence of chikungunya infection was confirmed by doctor by 3.4 folds (OR=3.4, CI (7.0-15.8).

4. Discussion

Chikungunya was significantly higher among people aged 41-60 years old (65%) This indicated that most of affected participants were young (Table 1). However, other study conducted confirms that elderly patients (41- 64 years) can experience more severe acute infections than younger patients. But not agreed with a study conducted by Gerardin *et al*, 2013 where the age was found to be a significant risk factor for chronic CHIKV, with those in the 25- 50-year-old. [8].

86.3% of the participants are females infected with chikungunya infection. This study agrees with [9] who stated that females to be at higher risk for infection than male. 59.1% of respondents were married (Table 1) Females are consider a vulnerable group.

32.5% of the study group their level of education is university level (Table 1). There no evidence from other studies to confirm that level of education is factor risk for Chikungunya infection.

Regarding occupation, 38.5% of the participants are employees (Table 1). There no evidence from other studies to confirm that level of occupation is factor risk for Chikungunya infection.

44.7% of the participants infected with chikungunya were among those who have family member [3,4,5,6]. This may be due to overcrowd that encourage spread of transmission among families. The finding agree with a study conducted in Srilanka, which found that the infection had affected more adults than children and a concurrent sharp rise of the incidence within households of big families [30] (Table 1).

63.5% of the respondents have less than 2000 Sudanese Pound (SDG), which consider low income according the Ministry of Finance [31], chapter one, wages law 2000/Sudan (Table 1). This applicable to Siqueira state "low income and living in or traveling to endemic areas have been singled out as risk factors for Chikungunya infection" [32].

There was no significant association between respondents age and prevalence of chikungunya, P=.927. No association was found between Chikungunya infection and gender, p> 0.630. Female were more infected compared to males (86.3% vs. 13.7%). Chikunguna infection was not significantly associated with marital status (60.1%), p< 0.387 (Table 2).

Moreover, no significant association was found between family number and Chikunguna infection (Table 3). Infection with Chikungunya is more prevalent among those who have 3-6 members P< 0.333. This result disagree with "CHIKF tended to impact the poorest communities living in overcrowded areas" stated in study by [33].

The infection with Chikungunya was not significantly associated with education p< 0.101. But there was significantly association between occupation and chikungunya infection, p< 0.05. There is no evidence on other studies.

There was association between Chikungunya infection and those who cover water containers, p=.003 (Table 4). And there was association between Chikungunya infection and times of covered water containers, P=.014. 79.5% of the study group was cover water containers (Table 5). The risk of infected with chikungunya was significantly reduced by 3.5 times among those who covered water containers compared to those who didn't covered (OR=3.5, CI (1.6-17.6). This result agree with the study conducted in India reported uncovered container as risk factors for chikungunya infection [34]. What every the time cover the water containers is useful to reduce the infected with Chikungunya infection.

There was no association between Chikungunya infection and those who found mosquito close to water, p=.389 (Table 6). Actually, this may be because vector of

Chikungunya prefers breeding indoor and definitely more transmission was spread among those who have mosquito indoor. This study agrees with study conducted in Reunion Island [35].

Furthermore, there was no association between Chikungunya infection and those who used mosquito net (Table 7). This result disagree with WHO reported that using mosquito nets, mosquito repellents or wearing full dresses to avoid mosquito bites are risk factors for chikungunya infection [36].

There was significant association between Chikungunya infection and used of insect repellents, P=.049 (Table 8). The Chikungunya infection was reported among those who used mosquito repellents (91.9%) compared to those who did not used mosquito net (8.1%) The risk of developed Chikungunya was significantly reduced 2.5-fold among those who used insect repellents compared to those who did not use any of insect repellents. Similar findings obtained from outbreak in Ethiopia, in that outbreak investigation the odds of being affected by chikungunya fever is 21 times higher among peoples who did not used bed net during day time sleep compared to those used bed net [37]. Also the findings were supported by studies done in Malaysia, South India and Central Nepal, Not using full body cover clothes, not using mosquito net. using insect repellant or cream, and using mosquito net to avoid mosquito are risk factors for chikungunya infection, Also the finding was agree with reported by WHO using mosquito nets, mosquito repellents or wearing full dresses to avoid mosquito bites are risk factors for chikungunya infection [36].

The Chikungunya infection was not significantly association with knowledge about the disease vector (8.6%) Table 9 this result was not compels with the stated by Fritzell, etal, 2016 “knowledge of a disease is believed to drive attitudes, beliefs and practices towards better protection” [38]. In this study most of respondents were educated (University level) and defiantly the education has a role of in raising knowledge and awareness of infected. In Pakistan study reported that 18.8% of healthcare professionals had never heard of the disease [39].

There was association between Chikungunya infection and attending health education sessions about the disease, P=.000. (58.3%) of the participants are not attended health education about Chikungunya infection disease. The risk of getting Chikungunya infection was significantly reduced by 9.6 folds among those attended health education about disease Chikungunya infection. (OR=9.6, CI (3.9-23.9) (Table 10). Health education is equally important in the prevention of vector borne diseases [40]. Consequently, proper health education for the populations in regions at risk of mosquito illnesses is imperative in integrating community cooperation in vector control strategies [41].

All the participants infected by Chikungunya are diagnosed by a doctor (96.7%). The prevalence of Chikungunya infection was confirmed by doctors and consider very high (Table 11). This finding showed that the prevalence rate was higher than reported in other countries. Some studies indicated that if the positivity rates of CHIKV among suspected cases ranges from 12.9% to 75% it consider as health problem [42,43].

5. Conclusion

The prevalence of Chikungunya disease was very high at Kassala Locality. The occupation, cover of water containers, frequent of time covered water containers, use of any insect repellents, taking advice about disease, diagnosed of infection by doctor and Knowledge of respondents about disease and disease vector were found significantly associated risk factors of chikungunya infection.

6. Recommendations

Due to high prevalence of the disease, Mosquito control, use of insect repellent and mosquito nets, cover all water containers in and around the house should be applied to interrupt transmission of disease. Health education should be held to increase the awerance of the community to prevent and control chikungunya outbreaks.

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