Zika Virus: Knowledge, Attitude and Preventive Practices of Medical Doctors in a tertiary health institution in northern Nigeria

Abstract

Introduction: Zika virus, is an emerging arbovirus viral infection transmitted to humans through infected female Aedes species mosquitoes such as *A albopictus and A aegypti* via blood transfusion, sexual activities and from mother to fetus. This study was aimed at assessing the knowledge, attitude and preventive practices of medical doctors at the Usmanu Danfodiyo University Teaching Hospital Sokoto.

Methodology: This was a cross-sectional descriptive study carried out amongst medical doctors at the Usmanu Danfodiyo University Teaching Hospital, Sokoto. A set of semi structured , self-administered questionnaire was used to obtain information on knowledge, attitude and preventive practices against ZIKV using a two stage sampling method. Data collected was entered into and analyzed using SPSS statistical software version 23. The research was approved by the Health Research and Ethics committee of the teaching hospital.

Results: Most of respondents in this study had good knowledge (87.5%), positive attitude (82.1%) and good practices of prevention of ZIKV (87.5%) respectively. There was a statistically significant association between attitude and knowledge of ZIKV as the respondents with positive attitude had good knowledge of the virus (p=0.002)

Conclusion: Our respondents who are physicians displayed a very good knowledge, attitude and practices towards the ZIKV infection. Physicians as front line health workers are at a greater risk of being infected with ZIKV , and this underscores the need for them to always adhere to laid down standard operating procedures and universal precautionary measures. These will go a long way in reducing the morbidity and mortality associated with this infection

Key words: Zika virus, knowledge and attitude, medical doctors, Sokoto

Introduction

Zika virus (ZIKV), an emerging RNA arbovirus of the flaviviridae family was first isolated from the Rhesus monkey in the Zika forest of Uganda in 1947 and later in humans in 1952 1,2]. The incubation period of ZIKV is between 3-14 days and majority (about 80%) of infected persons do not exhibit symptoms [3]. Zika virus is transmitted to humans through infected female Aedes species mosquitoes such as *A albopictus and A aegypti* via blood transfusion, sexual activities and from mother to fetus [4,5]. Unlike other arboviruses, such as dengue virus and Chikungunya virus, ZIKV can be transmitted either sexually or vertically during pregnancy from mother to child [6,7].

The main manifestations of the symptomatic cases are low grade fever, conjunctivitis, arthralgia, myalgia, and maculo-papular rash. Severe cases are unusual and most of them do not need hospitalization. Infection with Zika virus may be suspected based on symptoms of persons living in or visiting areas with Zika virus transmission and/or Aedes mosquito vectors. A diagnosis of Zika virus infection can only be confirmed by laboratory tests of blood or other body fluids, such as urine or semen Although infection with Zika virus is usually associated with mild symptoms, there is also the fear of neurological sequelae such as Guillain-Barre syndrome(GBS). There is currently no specific treatment available for Zika virus infection or its associated diseases, however, it can be prevented by protection against mosquito bites during the day and early evening, wearing of cloths that cover as much as the body, the use of window screens and application of insect repellents and sleeping under mosquito nets by pregnant women and children[(8].

One of the greatest public health concerns about ZIKV infection has been the congenital syndrome caused by the virus from the vertical transmission of the virus from mother to child including microcephaly, subcortical and intraocular clacifications, arthrogryposis and other varieties complications of varying severity such as hearing , visual developmental and cognitive affections [7-10]

Although more than 2000 neonates with microcephaly caused by ZIKV have been reported worldwide [9,11], no estimates of the number of newborns with congenital abnormalities that may affect vision, learning , hearing have been documented in Nigeria . Cognizant of the severity of complications associated with the ZIKV infections, the World Health Organization

(WHO) on 1st February, 2016, declared ZIKV infection as a public health emergency of international concern and in May 2016, a total of 58 territories and countries have reported continued mosquito-borne transmission of ZIKV infection most of which occurred in the Americas [12]. .

Physicians as gate keepers in the health care delivery system play a key role in the dissemination of important health messages, which invariably are considered to be the most authentic source of health and other related information. The ZIKV infection has the potential to cause a pandemic and this underscores the need for health workers to be well equipped with appropriate and sufficient knowledge to be able to handle any outbreaks in their work place settings. It is not uncommon to see health workers fall victims to outbreaks as witnessed during Ebola and Covid-19 infections, hence it has become imperative to determine the knowledge and practices of health workers towards ZIKV infections and gaps identified could form the basis for further interventions that will shape policy decisions and programs.

World Health Organization (WHO) had hitherto identified gaps in the knowledge about ZIKV, potential complications and came up with a resource information pack of knowledge, attitudes and practices survey for ZIKV disease and potential complications [13].

This study was therefore aimed at determining the knowledge, attitude and practices of medical doctors regarding ZIKV infection in a tertiary health institution, findings of which can be used to nip in the bud the menace posed by this potential pandemic disease.

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Methodology

Study Area

Sokoto State is one of the states in Northwestern Nigeria, with its capital Sokoto, near the confluence of the Rima and Sokoto rivers. The 2021 projected population of the state was 5,313,527 based on the 2006 general population census. The State is located between longitude 11’30°, 13’50° East and latitude 4’to 6’0° North of the Equator. It is bordered to the North by

Niger Republic, Zamfara State to the East, while Kebbi State borders most of the South and Western parts. The state has an average annual temperature of 28.3° C (82.9° F) and one of the hottest cities in the country. The annual rainfall ranges between 500mm – 1,300mm, starting late around June and ends in September with a peak in August. Dry season sets in during harmattan from November to February which is characterized by very cold temperatures and dust laden winds and often accompanied by thick fog. The hot periods start from March and ends around May during which the recorded environmental temperatures are in the range of 38^0C – 42^0C with an average humidity of less than 20%.

Usmanu Danfodiyo University Teaching Hospital (UDUTH) Sokoto is a tertiary hospital with over 800 bed capacity and serves as a referral center for many peripheral hospitals within and outside the state. It offers both general, preventive, curative and specialized services to patients.

Study design

The study utilized a descriptive cross- sectional design

Study population

This comprised all Medical doctors working in Usmanu Danfodiyo University Teaching Hospital, Sokoto for a period not later than six months prior to the commencement of the study

Sample size determination

The minimum sample size (n) for the study was determined using the formula [14]

$$n = \frac{Z^2 p q}{d^2}$$

Where;

n= minimum sample size to be determined

Z =standard normal deviate corresponding to 5% level of significance = 1.96

p = Proportion of doctors with fair knowledge of Zika virus infection (36.2%) [5] = 0.362

q = Complementary probability of p = 1- p = 1 – 0.362 = 0.638

d = Precision (or margin of error) = 5% = 0.05

$$\frac{(1.96\times1.96) \times 0.362 \times 0.638}{(0.05 \times 0.05)}$$

n = 354.90 = 355

Considering the population of doctors in the hospital to be less than 10,000, the formula;

$$\mathbf{n_f} = \frac{n}{1+\frac{n}{N}}$$

Where $\mathbf{n_f}$ = Desired sample size for population less than 10,000

n = Minimal sample size for population greater than 10,000

N = Population of doctors in UDUTHS (obtained from hospital management) = 332

$$\frac{355}{1+\frac{355}{332}}$$

= 172

$\mathbf{n_f}$ **=** 172

Allowing for a response rate of 90% $\frac{172}{0.9}$ = 191

Sampling technique

- A line list of all doctors in the hospital was obtained to get the sampling frame Proportionate allocation was done to know the total number of study subjects to be enrolled in each department PA = $\frac{\text{Total number of doctors in one department}}{\text{Total number of doctors in all department}}\times$ Sample size (191)

A two staged sampling technique was then used to select the study subjects.

Stage I: Doctors in each department were stratified into 3 groups

a. House officers

b. Medical officers and resident doctors
c. Consultants

Stage II: A systematic sampling technique was used to enroll the respondents into the study.

To obtain the sampling interval, the sampling frame for each department (representing 'N' the population) was divided by the sample size proportionally allocated to each department (representing 'n').

The Sampling interval = N/n = k

This was subsequently calculated for all the departments to get their sampling interval.

By balloting the first study subject was randomly selected and subsequently study subjects were enrolled by adding the value of the sample interval to the serial number of the previously enrolled study subject.

A Semi-structured pretested self -administered questionnaire was used to assess the knowledge, attitude and preventive practices of Zika fever amongst the respondents . The questionnaire contained four sections: **Section A**: Socio-demographic characteristics of the respondents,**Section B:** Knowledge of epidemiology and symptoms of Zika fever, **Section C**: Attitude towards Zika fever and **Section D:** Prevention of Zika fever.

Resident Doctors from the Departments of Community Medicine were recruited as research assistants and trained on the objectives and conduct of the study, and interpersonal communication.

At the end of data collection, the questionnaire were checked for completeness and accuracy and then entered into the Statistical Package for Social Sciences (IBM SPSS) version 25. The data was summarized using frequencies, percentages, mean and standard deviation (SD) and presented as tables and charts. Appropriate inferential statistics were computed with p- value set at $p < 0.05$.

Correct answers to questions on knowledge and practices were scored one (1), incorrect answers and no response, nil (0) and converted to percentages. Scores ≥50% were graded as good knowledge and appropriate practices respectively while scores<50% were graded as poor knowledge and inappropriate practices respectively.

Each question on attitude was scored using a 5point Likert scale ranging from strongly agree (5) to strongly disagree (1) as follows:1 = Strongly disagree, 2 = disagree, 3 = don't know, 4 = agree, 5 = strongly agree . Ratings of one and two were considered disagree, rating of three as indifferent while ratings of four and five were considered agree.

Correct answers to questions on practices were scored one (1) point , incorrect ones and no response, nil (0) and converted to percentages. Scores <50, 50-64 and ≥65% were graded as poor, fair and good prevention practices respectively.

Ethical consideration

Approval to carry out the study was sought from the Research Ethics Committee of the Usmanu Danfodiyo University Teaching Hospital Sokoto and permission was obtained from various heads of departments. Verbal informed consent was also obtained from each study participant after thoroughly explaining the objectives of the study.

Results

Table 1: Sociodemographic characteristics of respondents

Variable	Frequency	Percent
Age (years)		
20-29	26	16.1%
30-39	80	49.7%
40-49	48	29.8%
50-59	7	4.3%
Mean SD	36.70±7.09	
Gender		
Male	111	66.5%
Female	56	33.5^

Rank		
House Officer	19	11.4%
Medical Officer	15	9.0%
Resident doctor (Registrar)	48	28.7%
Resident doctor (Senior Registrar)	61	36.5%
Consultant	24	14.4%
Years of practice		
1-5	47	30.9%
6-10	46	30.3%
11-15	38	25.0%
16-20	16	10.5%
>20	5	3.3%

The mean age of the respondents was 36.70±7.09. Majority 80(49.7%) of the respondents were in the 30-39years age group. The number of male respondents,111(66.5%) was twice that of their female counterparts,56(33.5%). Resident doctors had the highest proportion of respondents 109 (65.2%) though, the number of the senior registrars was slightly higher 61(36.5%) than that of the Junior registrars 48 (28.7%). In terms of years of work experience, those in the 1-5years and 6-10years categories had the higher proportion of respondents , 47(30.9%) and 46(30.3%)respectively(Table 1)

Table 2: Respondents with correct responses regarding knowledge of Zika virus

Variable	Frequency N=168	Percent
Zika is linked to birth defects	146	86.9
Zika Virus is transmitted by mosquitoes	150	89.3
The breeding site for the vector is Standing water	117	69.6
The usual incubation period for Zika virus infection is 3-12 days	27	16.1
Zika infection in pregnancy also results in pregnancy complications such as fetal loss, stillbirth and preterm birth	149	88.7
About 75% of patients present with symptoms	67	39.9
Zika can be transmitted by a person who has no symptoms	98	58.3
Headache is a symptom	135	80.4

Fever is a symptom	156	92.9
There is conjunctivitis	131	78.0
Patient with Zika virus infection has rashes	108	64.3
Arthralgia is a symptom	138	82.1
Only males can have Zika virus infection	142	84.5
Only females can have Zika virus infection	145	86.3
Everyone is susceptible to Zika virus infection	127	75.6
Zika virus infection can be gotten through sexual intercourse	86	51.2
Zika virus infection can be gotten through Blood transfusion	124	73.8
Zika virus infection can be transmitted from mother to child	144	85.7
A pregnant woman with Zika virus infection stands the chance of the baby having microcephaly	149	88.7
There is no vaccine available for Zika virus infection	108	64.3

Most of the respondents knew that Zika virus is transmitted by mosquitoes 150(89.3%), Zika virus infection in pregnancy can lead to birth defects and still births 149 (88.7%), Fever is one of the symptoms of Zika virus infection156(92.9%), infection can be transmitted vertically144(85.7%). More than half of the respondents reported the fact that Zika virus infection can be transmitted from person to person,98(58.3%), patients with Zika virus infection can have rashes,108(64.3%), there is no vaccine available for Zika virus infection,108(64.3).Only 27(16.1%) of the study subjects knew the incubation period of Zika virus infection and 86(51.2%) of the respondents knew that Zika virus infection can be transmitted sexually (Table 2).

Table 3: Attitude of respondents towards Zika virus infection

Variable	**Response**				
	SD n(%)	**D n(%)**	**N n(%)**	**A n(%)**	**SA n(%)**
Zika virus infection is an important Public Health infection	5(3.0)	4(2.4)	3(1.8)	100(60.6)	53(32.1)
Zika is an Environmental health concern	4(2.5)	8(4.9)	5(3.1)	91(55.8)	55(33.7)
Zika virus infection is a personal responsibility	32(19.6)	47(28.8)	16(9.8)	50(30.7)	18(11.0)
Zika virus infection is a community responsibility	2(1.2)	10(6.1)	5(3.0)	87(53.0)	60(36.6)
Zika virus infection is a government responsibility	6(3.7)	10(6.1)	7(4.3)	80(49.1)	60(36.8)
Doctors should not attend to patients with Zika virus infection	86(52.4)	47(28.7)	13(7.9)	5(3.0)	13(7.9)

With personal protective wears doctors can attend to patients with Zika virus infection	11(6.9)	9(5.6)	8(5.0)	70(43.8)	62(38.8)

SD= strongly disagree; D= disagree; N=neutral;A=agree; SA=strongly agree

About two thirds, 100(60.6%) agreed that Zika virus infection is an important public health problem while 91(55.8%) also agreed that the infection is an environmental health problem. About half,87(53.0%) of the respondents agreed that community has a major role to play in the prevention of Zika virus infection. Less than half of the respondent agreed that doctors should attend to patients with Zika virus infection if provided with the correct PPE (Table 3)

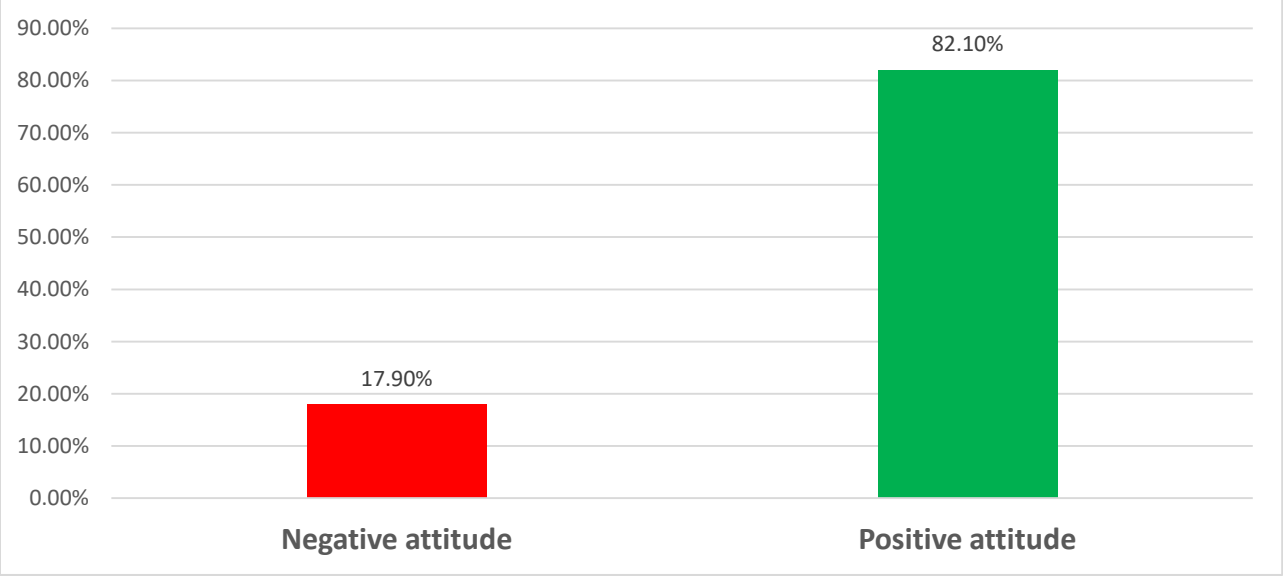

Figure 1: Overall attitude of respondents towards Zika virus infection

Majority 138(82.1%) of the respondent have positive attitude towards Zika virus infection while only 30(17.90%) of the respondent have negative attitude toward s the infection (Figure 1)

Table 4: Proportion of respondents with correct responses regarding Prevention of Zika virus infection

Variable	Frequency	Percent
In order to prevent Zika virus infection from spreading, its necessary to reduce mosquito bites	152	94.4
Zika virus infection can be prevented by using mosquito repellents or spray	157	96.9
Mosquito coils can be used to keep the vector away	146	91.8
Wearing covering clothes can prevent bites of the vector	153	94.4
Window screens can put away the vectors for Zika virus	151	96.8
Zika virus infection can be prevented by removing standing /stagnant water	157	98.7
Prevention of Zika virus infection can be achieved by putting covers over water storage containers	130	84.4
There is no vaccine available for Zika virus infection	108	64.3

Over 90.0% of the respondent have correct responses in respect to preventive practice against Zika virus infection with 152(94.4%) of the respondent that reported the need to prevent

mosquitoes bite as a measure to prevent the transmission of the disease. Also the use of mosquito repellants, mosquito coil, wearing of long sleeve clothing and screening of the windows as some of the measures to prevent Zika virus transmission was reported by 157(96.9%),146(91.8%),153(94.4%), and 151(96.8%) respectively. The unavailability of vaccine against Zika virus infection was reported by 108(64.3%)of the respondents (Table 4)

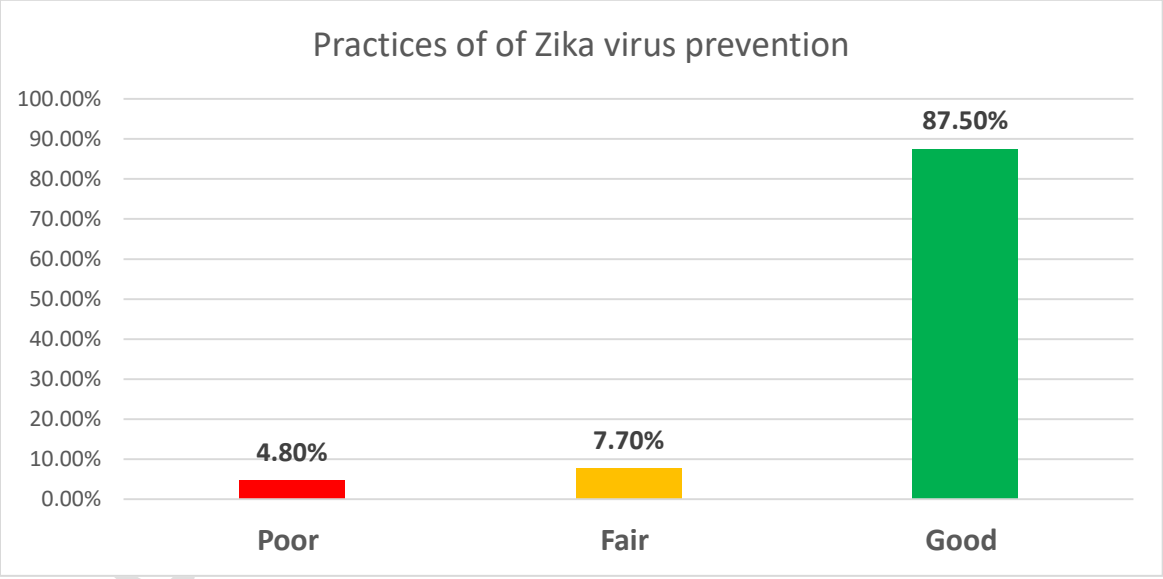

Figure 2: Proportion of respondents with poor, fair and good knowledge of Zika virus prevention

Majority,147(87.5%) of the respondents have good practices of Zika virus infection while 13(7.7%) and 8(4.8%) of the respondents have fair and poor practices of Zika virus infection respectively (Figure 2)

Table 5: Association between sociodemographic variables of the respondents and their knowledge of Zika virus infection

Variable	Knowledge categories			Level of significance
	Poor Knowledge	Fair knowledge	Good knowledge	
Age categories				
20 to 29	0(0.0%)	4(15.4%)	22(84.6%)	
30 t0 39	6(7.5%)	6(7.5%)	68(85.0%)	Fisher exact = 0.514
40 to 49	2(4.2%)	2(4.2%)	44(91.7%)	
50 to 59	0(0.0%)	0(0.0%)	7(100%)	
Rank				
House officers	0(0.0%)	3(15.8%)	16(84.2%)	
Medical officers	1(6.7%)	2(13.3%)	12(80.0%)	
Junior registrars	4(8.3%)	1(2.1%)	43(89.6%)	Fisher exact = 0.165
Senior registrars	2(3.3%)	7(11.5%)	52(85.2%)	
Consultants	1(4.2%)	0(0.0%)	23(95.8%)	
Gender				
Male	4(3.6%)	9(8.1%)	98(88.3%)	Fisher exact =

				0.646
Female	4(7.1%)	4(7.1%)	48(85.7%)	
Years of work experience				
1-5yrs	3(6.4%)	3(6.4%)	41(87.2%)	
6-10yrs	2(4.3%)	3(6.5%)	41(89.1%)	
11-15yrs	1(2.6%)	3(7.9%)	34(89.5%)	Fisher exact = 0.975
16-20	1(6.3%)	0(0.0%)	15(93.8%)	
Above 20yrs	0(0.0%)	0(0.0%)	5(100%)	

Though, there were differences in the proportions with knowledge of Zika virus infection among the various sociodemographic characteristics of the respondents, there was however no statistically significant association between their knowledge of Zika virus infection and their sociodemographic characteristics (Table 5).

Table6: Association between knowledge and attitude of ZIKV

Attitude categories	**Knowledge categories**			**Level of significance**
	Poor knowledge	**Fair Knowledge**	**Good knowledge**	
Negative attitude	5(16.7%)	4(13.3%)	21(70.0%)	**Fisher exact = 0.002**
Positive attitude	3(2.2%)	9(6.5%)	126(91.3%)	

There was a statistically significant association between attitude and knowledge as the respondents with positive attitude had good knowledge of the virus (p= 0.002) (Table 6)

Discussion

Medical doctors as gate keepers in the health care delivery system play a vital role in the dissemination of important health messages, which invariably are considered to be the most authentic source of health and other related information backed by informed knowledge.

Therefore, it can be presumed that lack of sufficient knowledge can result in possible transmission of diseases [15-20].

In this study, about half (49.7%) of our respondents belonged to the age group 30-39years and this figure is higher than what was obtained from similar studies amongst health care workers in Ace Indonesia and Mexico [21-22]. The high proportion of our study subjects in the age group 30-39 years may not be unrelated to the fact that more than 65% of them are resident doctors undergoing specializations in various areas of medicine which takes longer period of time. However, most of our respondents (30.9%) had practiced between 1-5years. This is in contrast with other studies where most of their study subjects had between 5-10 years or more of practice [23-25]. The difference in study location could have been responsible for the wide margin in the years of practice as ours is a teaching hospital that attracts medical doctors for specialization at the end of which they take up employment in other settings

There are notable variations in ZIKV knowledge amongst our study subjects; only 16% of the doctors knew that the usual incubation period for ZIKAV is between 3-12 days. This is appalling as the knowledge of the incubation period can provide very important information during outbreaks, including when individuals can be symptomatic and most probably spread the disease. This poor knowledge of the incubation period was also observed among Dental Practitioners in the Tricity area of India [24]. Similarly the knowledge of sexual transmission of ZIKAV was fair as about half(51%) of the Doctors could identify this route of transmission. Poor knowledge of sexual transmission of ZIKAV has also been observed in other studies [25-31]. The low knowledge of sexual transmission of ZIKAV and the consequences during pregnancy in this study and others could be attributable to the fact that this mode of transmission is not very common with other arboviral infections commonly seen in Nigeria and other parts of the world and thus could easily be ignored by health workers/

Although the knowledge of sexual transmission of ZKAV is fair amongst our study subjects, most of them (87%) were able to correctly identify that the infection is linked with birth defects and this is in tandem with the findings from other studies elsewhere [25,27].
In this study, the overall knowledge of ZIKV among the doctors was good (87.5%) and this finding is in agreement with the findings from other studies [27,32]. In contrast to our findings, some other studies have documented mostly poor knowledge of ZIKV [15, 26,31,33].

Concerning the physicians attitude towards ZIKV, although more than half of them strongly disagreed that physicians should not attend to patients with ZIKV infections, a sizeable proportion opined that with the use of personal protective equipment (PPE), physicians can attend to patients with ZIKV. In most health facilities in developing countries the lack or inadequate supply of PPEs had been the albatross to the effective care of patients with diseases that are highly contagious as seen during outbreaks of other arboviral infections. In this study, 82% of our study subjects had positive attitude towards ZIKV infection. Good knowledge and positive attitude are a good panacea for effective preventive measures. The high proportion of the physicians in this study with positive attitude to ZIKV is comparable to the study in Saint Kits and Nevis, where 72.6% of their respondents had good attitude towards ZIKV. In contrast to our study, other studies elsewhere found lower levels of positive attitude to ZIKV infections [21,25,33]. Findings from our study showed that there was a significant association between attitude and knowledge of ZIKV infection as respondents with positive attitude had good knowledge of the infection (P=0.002).

Amongst the preventive practices adopted by our respondents were the use of mosquito repellants or spray and mosquito coils to keep the vectors away. Similar findings were observed in the study by Huang and colleagues [34]. A greater majority (98.7%) of the physicians opined that the infection can be prevented by putting covers over water storage containers and this practice was re-echoed by participants in a study from New York City [35].

Overall, 87.5% of the physicians exhibited good practices towards the prevention of ZIKV. This is not surprising considering that they equally had good knowledge and attitude towards the infection. These attributes may not be unrelated to the fact that Nigeria has had its fair share of outbreaks of other arboviral infections in recent past hence the alertness of the medical doctors.

Similar good practices were observed in other studies elsewhere [22,32,33] although study subjects in another study in Uttar Pradesh showed lots of practice incompetence [23]

Conclusion

Zika virus infection is an emerging viral infection with global public health outcomes hence the need to address and nip it in the bud. Our respondents who are physicians displayed a very good knowledge, attitude and practices towards the ZIKV infection. Physicians as front line health workers are at high risk of contracting the infection hence must always adhere to laid down standard operating procedures and universal precautionary measures. These will go a long way in reducing the morbidity and mortality associated with this infection

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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