

## Zika Virus: Are College Students Aware?

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### Abstract

Mosquitos carrying the Zika virus have been found in both Florida and Texas, making it an immediate health concern in the United States. To determine if educational efforts have been successful, a survey was conducted at a Hispanic serving university in South Texas (N=245). Knowledge about Zika virus was better than expected. While 62.13% were aware the virus had been found in Miami, only 19.15% knew it has also been found in Brownsville, TX. 57.45% knew that the virus can be transmitted in multiple ways and 78.72% of those surveyed were aware of the danger to pregnant women posed by the disease. Even though 67.09% agreed there is no cure for Zika virus, most believed they could safely travel to Zika infected areas by getting a vaccine (51.06%). Finally, only 11.06% knew that the best way to prevent spreading the disease after traveling to an area with Zika virus is to abstain from sexual contact for several months (CDC, 2018). Knowledge is also lacking in the areas of treatments, vaccines, and tests for the virus. Since medical knowledge about this disease continues to change, continuing education is critical.

**Key words:** Zika virus, disease prevention, disease treatment, vaccines

### 1.0 Introduction

Zika virus (ZIKV) is not a new disease, but it is an emerging disease in the United States. In 1947, the virus was found in the blood of a rhesus monkey in the Zika Forest of Uganda (Petersen, et al, 2016). It was reported in humans in Africa as early as 1951, and has been a problem there on and off since that time. The disease has also been found in several countries in Asia, with an outbreak on Yap Island of Micronesia in 2007, an outbreak in French Polynesia in 2013, and in Thailand in 2014 before it was first reported in Brazil in 2015 when it became international news because of the Olympic Games (Haira, Bandyopdhay&Haira, 2016). The first confirmed case of Zika virus in the Americas was in February 2014 on Easter Island. In 2015, Brazil had 16 confirmed cases, and since that time, 22 countries and territories in the Western Hemisphere have had confirmed cases (Yacob& Walker, 2016). Worldwide, ZIKV is found in more than 72 countries and territories (Rather, et al, 2017). In 2018, the United States mainland has had 427 symptomatic cases of the disease, with 4 of those cases acquired from local mosquito transmission; two in Florida and two in Texas. 6 cases have been acquired sexually, and 1 through a laboratory (CDC case counts, 2018). ZIKV is the first major infectious disease linked to human birth defects that has been discovered in over 50 years (Petersen, et al, 2016).

The incubation period for the transmission of Zika virus via mosquito bite is 3-12 days, and only about 20% of those infected have any symptoms at all (Haira, Bandyopadhyay&Haira, 2016). Symptoms are usually mild, self-limiting, and nonspecific. The most common symptoms are rash, fever, arthralgia, myalgia, fatigue, headache, and conjunctivitis.

These symptoms usually resolve within 2 weeks without intervention. Since no specific treatment or vaccine is available for Zika virus, treatment is supportive includes rest, fluids, antipyretics and

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analgesics(Plourde& Bloch, 2016). The reason that Zika virus is of such concern is because of the severe complications that are possible. The most reported complication is to the fetuses of pregnant women. Infection with Zika virus during pregnancy has been related to microcephaly in infants. The other, less reported, complications are neurologic and include meningitis, meningoencephalitis and Guillan-Barre syndrome (Plourde& Bloch, 2016). Even though deaths from Zika virus are rare, deaths from Guillan-Barre syndrome are 5% even in countries with advanced medical systems ().

Because of the more than 4000 cases of microcephaly and neurological disorder, The World Health Organization (WHO) declared Zika a public health emergency of international concern in 2016 (Haira, Bandyopdhyay&Haira, 2016).

Most ZIKV infections are transmitted by infected mosquitos, however, transmission has also been documented through sexual contact, blood transfusion, laboratory exposure, and both intrauterine and intrapartum means (Paz-Baily, et al., 2017). Men are infectious for much longer than women (>180 days vs less than 20 days) and because of this are significantly more likely to transmit ZIKV to their female sexual partners. More than 70% of sexual contacts between infected males and uninfected females led to transmission, and in trials with mice, 100% of - exposures led to infection compared to 50% of vaginal exposures (Allard et al, 2017). Current guidelines recommend that men use condoms or abstain from sex for 6 months after ZIKV exposure, even though a study conducted by the CDC showed that for 95% of the men studied, SIKV had cleared from the semen after only 3 months. The first sexual transmission in this country was in two American scientist working in Senegal in 2008. They both became ill after they returned to their homes in Northern Colorado. The wife of one of scientists became ill about a week later and was diagnosed with ZIKV even though she had not traveled to ZIKV infested areas (Foy et al., 2011).

Diagnosis of Zika virus is contingent on laboratory testing that is not widely available, so prevention is the current priority. The CDC recommends use of reverse transcriptase-polymerase chain reaction (RT-PCR). ZIKA RNA is detectable in serum 7 days after symptom onset and can still be detected 62 days after onset. Urine sample, however, may be an easier way to diagnose ZIKV (Rather, et al, 2017). To control this virus, the Pan American Health Organization (PAHO), has recommended reduction of the mosquito population, removal of potential breeding sites of mosquitos and use of personal protection (Haira, Bandyopdhyay&Haira, 2016). For prevention of sexual transmission of the disease, the CDC has recommended that men who live in or visit a ZIKV infected area should use condoms during sex with pregnant and non-pregnant partners. Blood used for blood transfusions is now screened for ZIKV (CDC, 2018). The CDC recommends serum and urine sample testing within 14 days of symptom onset and that women who have been infected or exposed to ZIKV wait at least 8 weeks from the last exposure before attempting preganancy (Paz-Bailey, et al., 2017). A study conducted in Kentucky among women of childbearing age found that more that 90% knew the virus could be transmitted by mosquitoes and caused birth defects, but only 56% were aware that the virus could be transmitted sexually in spite of numerous press releases, media events and a Zika education page on the Kentucky Department for Public Health website. Only 22% of those surveyed noted condom use or abstinence as an infection prevention method. This study noted that those least informed were younger and of Hispanic heritage (Keitzinger, K, et al., 2018).It is still not known whether virus, which is present in body fluids like saliva and urine can be transmitted by them.

Zika virus is transmitted primarily by the *Aedes aegypti* mosquito which ranges in the United States as far north as New Jersey and from the east coast all the way to California (CDC, 2017). The disease is spread by the aggressive female mosquito which show a preference for human blood to get the protein they need to develop their eggs. Several methods for mosquito control have been implemented. One method is the introduction of a bacteria, *Wolbachia*, into the mosquito population. Mosquitos infected with this bacteria reduces transmission by causing eggs to either not hatch (if the male mosquito is infected), or hatch with mosquitos that carry the bacteria (if the female mosquito is infected). Another technique is to genetically modify the mosquitos to create a population of mosquitos whose offspring do not survive (Rather, et al, 2017).

Pharmaceutical firms in India, Japan, France, the United States and other countries are trying to create a vaccine (Rather, et al., 2017). Until they find one, prevention is the best way to combat this virus, and education is key to prevention.

Education efforts have been ongoing in this hemisphere since the acceleration of the disease in Central and South America in 2015-2016. In 2016 a study was conducted using a representative sample of women of child-bearing age living in the Southern United States. This study showed that 78% of the U.S. population was aware of domestic Zika transmission with over half of those being willing to delay a pregnancy in response to a public health warning. 1/3 of those surveyed wanted a vector-control strategy that included government provided indoor spraying and 2/3 thought the government should provide free abortions to those at risk of a Zika-related birth defects. Those less aware of the virus were younger, had a lower income, self-identified as Democratic or Independent or were Hispanic (Piltch-Loeb, R. et al., 2017). A second study in New York city among women who traveled to Zika infested areas while pregnant discovered that 1/3 were unaware of a government travel advisory and almost 1/2 were unaware that they were pregnant at the time they traveled. This survey highlighted the importance of raising awareness among women of child-bearing age about the risk of Zika infection during travel and about the necessity of waiting before getting pregnant after a Zika exposure so that they can make better decisions (Whittemore, K., et al., 2017). A study conducted to determine knowledge of ZIKV prevention among women along the US-Mexico border found that while 75.3% had heard about ZIKV, only 9.5% found the information helpful (McDonald et al, 2018). TV and radio were the primary sources of Zika information followed by print news sources. When the information came from health care providers preventative measures were more likely to be followed (Piltch-Loeb, et al., 2018).

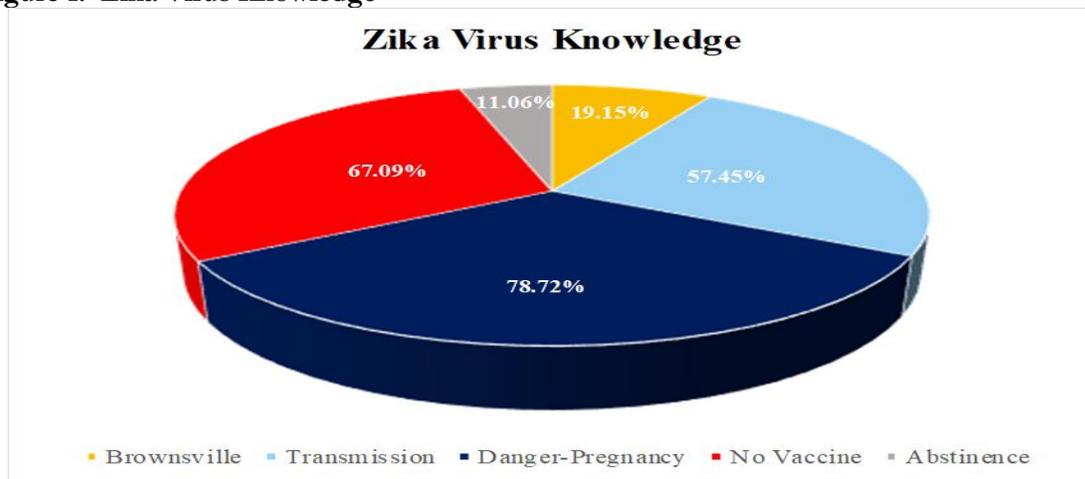
## 2.0 Methods

To determine if educational efforts have been successful and if the messages about Zika virus are being received, a survey was conducted at a university in rural South Texas. Upon IRB approval, a questionnaire regarding the virus and its prevention and control was posted on SurveyMonkey®. Students were invited to complete the survey and 245 students (females=162, males=79, 4 non-report) participated. There were 121 Kinesiology majors and 124 non-majors with a 79% Hispanic participation.

## 3.0 Results

The number of students aware of the basic facts about Zika virus varied. While 62.13% were aware the virus had been found in Miami, only 19.15% knew it has also been found in Brownsville, TX. A surprising 57.45% knew that the virus can be transmitted in ways other than via mosquito, and 78.72% of those surveyed were aware of the danger to pregnant women posed by the disease. Even though 67.09% of those surveyed agreed there is no cure for Zika virus, most believed they could safely travel to Zika infected areas by getting a vaccine (51.06%), even though there is currently no vaccine available. Finally, only 11.06% knew that the best way to prevent spreading the disease after traveling to an area with Zika virus is to abstain from sexual contact for several months (CDC, 2018). A Chi-Square test was performed and no relationship was found between *Score* and *Major*,  $X^2(1, 241)=2.879$ ,  $p=.09$  which was surprising. Also the average pass rate of 32.4% was of concern.

3.1 Figure 1: Zika Virus Knowledge



3.2 Table 1: Chi-Square Tests

Chi-Square Tests					
	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	2.879 <sup>a</sup>	1	.090		
Continuity Correction <sup>b</sup>	2.431	1	.119		
Likelihood Ratio	2.887	1	.089		
Fisher's Exact Test				.100	.059
Linear-by-Linear Association	2.867	1	.090		
N of Valid Cases	241				

#### 4.0 Discussion

Even though most students were aware of Zika virus and appear to be informed about how Zika is spread, many lack information about availability of treatments, vaccines, and tests for the virus. Dissemination of information is crucial for disease prevention. Emerging diseases are a risk to uninformed populations. Because not a lot is known about these diseases initially, and because the information continues to change as more is scientifically discovered and verified, it is difficult to know what information to release and when to release it. Multiple and diverse channels of information also complicate this problem. Which methods will reach the most vulnerable people? During the Zika scare, TV and radio were the primary sources of information, followed by print news (Piltch-Loeb, Merdjanoff, & Abramson, 2018). In the future the best means of communication may be through social media or other sources. Zika is no longer big news regardless of the source. There was not a reemergence of the disease during mosquito season in 2018 in the United States. There is evidence that herd immunity has provided protection. This does not mean that Zika is gone. Past infection may not provide lifelong immunity. Reinfections have been found with other viruses as immunity wanes over time (Cunningham, 2017).

## 5.0 Conclusion

Of concern in this study was the lack of information about the virus when infections have been found only 2 hours from the campus surveyed. Over half of those surveyed assumed that the disease was not threat to them and that they could just get a vaccine. Very few knew that the best way to prevent transmission after exposure was sexual abstinence. This is problematic in a population that lives in an at-risk area and is sexually active. It was thought that majors in the Department of Health and Kinesiology might be better informed than the general student population due to the nature of their studies. In this study, that was not the case. Kinesiology majors' knowledge of Zika virus was similar to non-majors. Because these data are limited to a small sample size of 245 college students at one university, additional research is needed. It will be important to understand how information about diseases is reaching people and how much they know, since Zika virus is probably not the last virus the United States will face.

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