

Knowledge and attitude of women with high-risk pregnancy about the Zika virus transmission

Clea Adas Saliba Garbin (<https://orcid.org/0000-0001-5069-8812>)¹

Gabriela Peres Teruel (<https://orcid.org/0000-0003-2686-589X>)¹

Tânia Adas Saliba (<https://orcid.org/0000-0003-1327-2913>)¹

Suzely Adas Saliba Moimaz (<https://orcid.org/0000-0002-4949-529X>)¹

Artênio José Ísper Garbin (<https://orcid.org/0000-0002-7017-8942>)¹

Abstract *Objective was to analyze the knowledge and attitude of high risk pregnant women about zika. This is a cross-sectional study, quantitative, with a sample of 201 high risk women who perform prenatal the Ambulatory Medical Specialties. A self-administered instrument, was applied after consultation with the doctor. Inclusion criteria were the presence of pregnant women on the day of the interview and their consent to participate. Exclusion criteria were those who did not agree to participate and were not performing prenatal care during the study period. For the data analysis we used chi square and fisher exact, in software Epi info 7.1 and Bioestat 5.0. Of the pregnant women, 76% believed that their neighborhood was likely to be infected by the virus and used measures to control mosquito proliferation, such as not leaving standing water (n = 154). In relation to knowledge, there was an association between Zika and microcephaly (p ≤ 0.0001) and the need for more information (p = 0.0439). To prevent infection, 76% took no action, there was an association between the need for knowledge about the subject and the actions taken to combat the virus (p = 0.0049). We conclude that pregnant women's knowledge and attitude about zika is failed.*

Key words *Pregnant women, Public health, Zika virus*

¹ Programa de Pós-Graduação em Odontologia Preventiva e Social, Departamento de Odontologia Infantil e Social, Faculdade de Odontologia de Araçatuba, Universidade Estadual de São Paulo. R. José Bonifácio 1193, Vila Mendonça. 16015-050 Araçatuba SP Brasil. cgarbin@foa.unesp.br

Introduction

The evolution of pregnancy mostly occurs without complications, only causing physical, hormonal, psychical or social interaction changes in mothers' body and daily life. It is a physiological phenomenon in some women's life^{1,2}. However, some women can present clinical complications that increase risks of a series of adverse results, such as preeclampsia, gestational diabetes, and preterm labor. Every pregnancy brings some risk to the mother and the fetus, but it is expected to pass without complications, since this is a natural process, despite the changes³.

In high-risk pregnancies, the mother and/or the fetus have health problems or some complications, with higher probability of an unfavorable evolution of pregnancy. This can occur due to several reasons, and one of them is the transmission of the Zika virus during pregnancy^{3,4}.

Zyka is a viral disease transmitted by the mosquito *Aedes aegypti*. The fast propagation of this virus has drawn attention of national and international health authorities to execute actions to diagnose and quickly intervene in patients, mainly pregnant women, infected by the virus. This concern is mainly due to the connection between the virus and severe neurological disorders in newborns from mothers exposed to the Zika virus during pregnancy⁵⁻⁷.

This disease, which possibly migrated to Brazil in 2014, has spread in the Brazilian Northeast and in the Americas^{7,8}. Scientific results have contributed to increase the global concern about the virus, since, besides being transmitted through the bite of an infected mosquito, Zika can be congenitally or vertically transmitted, and some evidence indicate a significant potential of transmission through sexual contact⁸⁻¹⁰.

With the spread of the Zika virus, the World Health Organization issued a warning and declared international public health emergency due to the increase in the incidence of microcephaly in endemic zones^{8,11}. Six months after the beginning of the virus outbreak, there was an unusual increase in the number of newborns with microcephaly in Brazil¹², which led the Brazilian Ministry of Public Health to associate this malformation with the Zika virus and the mother-to-child transmission^{10,12,13}.

Microcephaly is a severe, irreversible neurological condition that can be caused by the infection of the Zika virus during pregnancy. It causes a reduction in the cephalic perimeter, usually due to improper development and/or destruction

of neural cells. It can be detected by ultrasound scans, tomography, or measurement of the cephalic perimeter¹⁴.

In 2016, the Ministry of Health reported an alarming number of 7,438 suspect cases of microcephaly during the 18th epidemiological week of 2016. Among these cases, 1,326 were confirmed as mother-to-child infection. Most of the microcephaly cases (5,706) have been reported in the Northeast region¹⁴.

Regarding the consequences of the congenital Zika, brain changes appear in the second and third quarters of pregnancy. Other dysmorphic features, such as severe protuberance of the occipital bone, closed fontanelles in birth, excess skin and/or skin folds on the scalp, and umbilical hernia, are often observed in newborns of mothers infected by the virus^{15,16}.

Current evidence on the natural evolution of the disease and its pathogenesis is strong enough to establish a causal relationship between the infection by the Zika virus during pregnancy and the increase in the frequency of miscarriages, stillborn babies, and early mortality, besides microcephaly¹⁵⁻¹⁷. Therefore, the Zika virus is a growing public health problem in the whole world, mainly due to its power of dispersion and adaptability to new hosts and environments, its possibility to cause large epidemics, the universal susceptibility, and the large number of severe neurological cases¹⁸.

Due to the aforementioned dimensions of this problem, this study aimed to analyze the knowledge and attitude of women with high-risk pregnancies about the Zika virus, for they are more susceptible to this problem. This analysis is important because of the need for pregnant women to act in order to prevent the virus infection. Such prevention can only occur through a process of knowledge acquiring about the disease and its risks, which must rise from a notion of respect to beliefs already developed by pregnant women about the issues at stake.

Methods

This cross-sectional, quantitative study assessed a sample of 201 women with high-risk pregnancy that attended prenatal care at the Outpatient Clinic of Specialties (AME). All of them have the same socioeconomic condition and have prenatal follow-up in Basic Health Units (UBS) in their neighborhoods. The AMEs are a reference in the health field and they are in several regions of the

state of São Paulo. They are outpatient diagnostic centers regulated by the Brazilian Unified Health System (SUS), which provide medical specialties focused on the needs of the basic health care.

This study was conducted in the AME of Araçatuba-SP, Brazil, which provides health care to Regional Health Departments (DRSII), including 28 cities from the northwest of São Paulo. Every month the AME of Araçatuba records around 80 pregnant women with high-risk pregnancy. The sample comprised of all pregnant women with high-risk pregnancy during 30 days that met the inclusion criteria: to be present on the day of interview and their consent to participate in the study.

The exclusion criteria were those who did not agree to participate in the research and were not performing prenatal care during the study period.

For data collection, a self-applied instrument approached subjects related to knowledge and attitude of pregnant women with high-risk pregnancy about the Zika virus based on questionnaires from the World Health Organization. The questionnaires had only multiple-choice questions and they were applied in the AME after an appointment with a gynecologist, without the interference of any employees and in an isolate place.

For data analysis, we used descriptive statistics, chi-square and Fisher's exact test in the software programs Epi info 7.1 and Bioestat 5.0, considering a significance level of 5% for all analysis. Incomplete questionnaires were considered losses ($n = 32$).

This research was approved by the Ethics and Research Committee. All ethical procedures were followed. Pregnant women younger than 18 years old signed the Informed Consent and were accompanied by a guardian.

Results

The sample comprised of 201 women with high-risk pregnancy, average age of 27.4 years, with complete high school ($n = 121$), complete higher education ($n = 14$), complete elementary school ($n = 21$), and incomplete elementary school ($n = 6$). Most women available for answering the questionnaire were in the second trimester of pregnancy ($n = 91$) (Table 1).

According to pregnant women's answers, 25% did not know that the mosquito transmitting the Zika virus is the *Aedes aegypti*, the same vector

of dengue fever (Table 2). During the study, 76% answered they believed that infection by the Zika virus was possible in their neighborhoods. This same number of participants reported that the responsibility to avoid the increase in the number of cases is of all citizens ($n = 153$) and that they perform measures to control the breeding of mosquitoes, such as cleaning pots with standing water ($n = 154$), maintaining a clean garden ($n = 139$) and using pesticides ($n = 131$) (Table 2).

When questioned about the main symptoms of Zika, the most mentioned were headache ($n = 102$), fever ($n = 93$) and joint pain ($n = 76$). Seventy-five participants stated they did not know the symptoms of Zika (Table 2). Regarding virus transmission, most participants ($n = 108$) did not know the virus can be transmitted through means other than the mosquito. Further, 79% were not satisfied with the information about the disease (Table 2).

Regarding knowledge about this issue, the Zika virus was associated with microcephaly ($p < 0.0001$) and the lack of knowledge was associated with the need for more information about the virus ($p = 0.0439$) (Table 3). When questioned about any actions the participants carried out to avoid infection by the Zika virus during pregnancy, 76% answered they did not take any measures. There was also an association between the need for knowledge about the subject and the actions carried out to fight the virus ($p = 0.0049$) (Table 3). Regarding information about the Zika virus, most participants ($n = 121$) obtained information through the social networks Facebook and Instagram.

Discussion

As highlighted previously, the concern about the Zika virus infection has increased due to the epidemics in Latin America. This concern has increased because the disease causes brain defects in newborns, such as microcephaly¹⁹⁻²¹.

The mosquito is more common in urban areas, and breeding is more intense in the summer, when temperatures are higher and rains are more frequent^{22,23}.

The mosquito has caused many deaths from dengue fever, which shows that Brazil has had problems with the *Aedes aegypti*²². The dengue virus has severely affected the Brazilian population for many decades, but there has not been any proper social, political or sanitary response to handle vector control of this disease²³. The en-

Table 1. Percentage and numeric distribution of participants' personal data.

Variables	n	%
Age		
14-20	33	16
21-34	132	66
Older than 34	36	18
Schooling		
Incomplete Higher Education	0	0
Complete Higher Education	14	7
Incomplete High School	39	19
Complete High School	121	60
Incomplete Elementary School	6	3
Complete Elementary School	21	11
Gestation period		
First trimester	58	29
Second trimester	91	45
Third trimester	52	26
Total	201	100

demic situation of these diseases reveals the inefficacy of preventive and vector control actions and highlights problems in urbanization, use of soil, and social inequalities, which demand structural changes with effective measures to fight the Zika virus^{23,24}.

The Zika virus is a pathogenic microorganism of the family *Flaviviridae*, genus *Flavivirus*. The disease caused by this virus is a great public health issue not only by the infestation of the mosquito *Aedes aegypti*, but also by the population increase in Brazil and the lack of public policies of basic sanitation and lack of raising the population's awareness^{23,25}. Therefore, it is necessary to raise awareness not only to clarify topics on preventing infestations, but also to indicate the consequences caused by diseases transmitted by this mosquito²⁵. The result of this study can illustrate this lack of information, where 25% of pregnant women did not know the vector of the Zika virus is the same as dengue's.

The most frequent symptoms of Zika mentioned by the participants were headache, fever, and joint pain. On the other hand, 35.7% of participants answered they did not know the symptoms. According to Maguinã et al.²⁶ and Cruz et al.²⁷, the viral incubation period ranges from 3 to 12 days, and 80% of those affected by the virus do not have symptoms; therefore, only 25% have

Table 2. Numeric distribution of pregnant women's perception about the Zika virus and its transmission.

Variables	n
Measures for controlling the mosquito	
Using pesticides	131
Keeping the lights on	19
Not leaving any standing water	154
Not having animals at home	16
Changing bed sheets	29
Maintaining a clean garden	139
Installing nets on windows	25
I do not know	18
Zika symptoms	
Pain	102
Rash	68
Diarrhea	73
Vomiting	57
Joint pain	76
Fever	93
Hemorrhage	25
I do not know	75
Where I received information about the virus	
Family	14
Radio	6
Physician	21
Social networks	10
Friends	5
Nurse	10
Television	121
Health care unit	55
Surgeon dentist	1
Zika virus vector	
<i>Aedes aegypti</i>	149
I do not know	52
Virus transmission can occur in the neighborhood where you live	
Yes	153
No	48
Total	201

light fever, rash, conjunctivitis (a typical symptom of high prevalence), headaches and joint pain^{26,27}.

Besides transmission by the *Aedes aegypti*, some evidence indicate a significant possibility that global Zika outbreaks increase through sexual transmission – including the longstanding presence of the virus in the semen –, blood transfusion, and placenta^{10,18,26-32}, as it occurs with the

Table 3. Association between pregnant women's knowledge, attitude, and information about the Zika virus.

Variables		Knowledge and attitude of women with high-risk pregnancy about the Zika virus		Test	p-value
		No n	Yes n		
Do you think there is any association between the Zika virus and microcephaly?					
No		38	15	Chi-square	0.0001
Yes		40	108		
Would you like to have more information about the Zika virus?					
No		12	8	Fisher's exact test	0.0439
Yes		146	35		
Have you taken any measure to avoid infection by the Zika virus?					
No		127	25	Chi-square	0.0049
Yes		31	18		

*Significance level of 5%.

HIV virus. In Brazil, epidemiological data show that until June 2005 around 83.7% of children younger than 13 years old that have the HIV virus were infected via mother-to-child transmission. In this study, most pregnant women did not know that the Zika virus could be transmitted via means other than the mosquito³³.

Regarding knowledge, there was significance in the association between Zika and microcephaly ($p \leq 0.0001$). The intrauterine period is a critical stage for growth and development of fetal organs and tissues, so injuries suffered in this stage interfere with this process. Pregnant women infected by the Zika virus can transmit it vertically through the placenta^{12,18,34,35}. The mother-to-child transmission of Zika has already been demonstrated, because, in Brazil, the virus has been detected in the amniotic fluid of two pregnant women with babies with microcephaly. Thus, in November 11, 2015, the Ministry of Health recognized the association between the epidemics of Zika and the increase in the number of cases of microcephaly, characterized by a skull measure or cephalic perimeter lower than 2 (-2) and standard deviations below the specific average for the baby's sex and the gestational age^{12,18,34,35}.

Therefore, it is worth resuming the words by Chan et al.³⁵, who indicated the sudden expan-

sion of the epidemics by the virus as one of the main causes of neuropsychomotor disorders and disabilities in a generation of newborns with microcephaly following their mothers' infection by the Zika virus. Therefore, the situation studied is a great burden to the families involved and a high socioeconomic onus to the countries affected by the disease^{33,35}.

Regarding the information about this subject, according to Gonçalves et al.³⁶, there is some difficulty in changing people's behavior in the short term, either in the collective or individual level, because perceptions and habits are internally entrenched and they are automatically passed on through generations³⁶. That is why it is necessary to invest in raising awareness as a process rather than isolated actions about the disease. A large part of people involved in research, for example, has a good level of knowledge about the disease, but some predatory attitudes that can increase the number of cases persist³⁶.

According to Gonçalves Neto et al.²⁸, control and breeding of *Aedes aegypti* happen mainly in the collective context and requires an effort from the whole society. Thus, the population of areas with occurrence of transmission needs information to change their attitude, in order to prevent and control the disease. On this matter, this study identified the association between the

lack of knowledge about the virus and the actions performed to fight the mosquito ($p = 0.0049$): 76% of participants did not take any measures to prevent the infection by the Zika virus during pregnancy.

Therefore, the actions of epidemiological surveillance have been essential to monitor the evolution of the Zika virus epidemics in Brazil and to enhance comprehension about the manifestation of the disease and its possible consequences, both in pregnant women and their babies and in adults^{37,38}. However, public policies are necessary to improve information about the virus because, as pointed out in this study, there is an association between the lack of knowledge and the need for more information about the Zika virus ($p = 0.0439$), which puts pregnant women at risk.

Regarding information about the Zika virus, most pregnant women ($n = 121$) obtained it through the social networks Facebook and Instagram, which corroborates studies by Camilo *et al.*³⁹ and Gonçalves Neto *et al.*²⁸ They observed that the media provides clarifying information and encourages social mobilization; television and radio have an important role because they are easily accessible broadcast means^{28,39}.

Conclusion

The knowledge of pregnant women about the Zika virus is still poor. Therefore, it is necessary to raise awareness about this subject, mainly through social networks, because, as demonstrated in this study, this is the most used platform by pregnant women to access information about the subject. It is also necessary to invest in public policies that mobilize communities and provide guidelines about the importance of collective actions to fight diseases transmitted by *Aedes aegypti*.

This analysis corroborated this need considering the scenario of answers studied in this research, which indicated lack of necessary precaution against virus transmission. Therefore, preventing the disease and following up pregnant women probably infected by the Zika virus are very important considering the possible consequences of congenital infection, mainly microcephaly and other neurological anomalies.

Collaborations

The authors CAS Garbin, GP Teruel, TA Saliba, SAS Moimaz and AJI Garbin worked equally on the design and writing of the article.

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