

## Emerging Problems in Infectious Diseases

# Physicians' knowledge, attitudes and practices towards Zika virus infection in Jordan

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### Abstract

**Introduction:** Zika virus (ZIKAV) disease is a public health problem of international concern. Recent evidence has documented imported ZIKAV cases into the Middle East and the existence of ZIKAV-transmitting mosquitoes in Jordan. However, limited data exist on the role of physicians in public awareness in this regard. This study aimed to assess ZIKAV knowledge, attitudes and counseling practices (KAP) of general physicians and gynecologists in Amman, Jordan.

**Methodology:** In this cross-sectional study, a structured paper-based questionnaire was completed by 119 participants during 2016-2017.

**Results:** Only 4.2% of the physicians correctly addressed ZIKAV-complication questions. A misconception of considering direct contact between individuals and breastfeeding as modes of ZIKAV transmission was observed. Only one participant correctly recognized that isolation of infected or exposed persons is not recommended. Having at least five years of experience in medical practice was the only factor that was significantly associated with a high knowledge score ( $P$ -value = 0.011). Although prevention measures are the sole method to control ZIKAV spread, only 50% of participants believed in the efficacy of such measures. Despite a quarter of participants perceiving ZIKAV as a threat to their patients, none of them have counseled a patient in this regard before. The presence of an evidence of ZIKAV in Jordan and health authorities' recommendations were the most important predictors for adoption of counseling practice.

**Conclusions:** General physicians and gynecologists in Jordan had several gaps in knowledge of key aspects of ZIKAV disease, and there is a need for specific training programs of physicians and gynecologists.

**Key words:** *Aedes*; arboviruses; health personnel; Jordan; Middle East; Zika virus.

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### Introduction

Zika virus (ZIKAV) disease is an arboviral infection associated with several congenital abnormalities and poor pregnancy outcomes [1,2]. In 2016, the World Health Organization (WHO) declared ZIKAV disease a public health emergency [3]. The Zika virus is transmitted to humans through infected female *Aedes* species mosquitoes, namely, *A. albopictus* and *A. aegypti*, through sexual activity, blood transfusion, and from mother to fetus [2,4]. ZIKAV disease is usually associated with mild symptoms, though it is sometimes associated with neurological complications such as Guillain-Barré syndrome (GBS) [2].

According to the Centers for Disease control and Prevention (CDC), Jordan is considered as a country with no mosquitoes (*A. aegypti*) that spread Zika [5]. Yet, recent evidence revealed the presence of *A.*

*albopictus* in Jordan [6,7]. This species was also reported in other neighboring Middle Eastern countries such as Israel and Turkey [7]. *A. aegypti*, although not reported in Jordan, has a high probability of occurrence in northern Jordan. Northern Jordan resides in close proximity to Syria, Israel and Lebanon where this species has been detected [7]. Besides, other *Aedes*-transmitted infections (dengue and chikungunya fever) were reported in neighboring countries such as Saudi Arabia, Egypt, Yemen, and Oman [7]. In addition, sexual transmission of ZIKAV increases the possibility of the virus being transmitted to areas with no risk of ZIKAV, such as Jordan and other Middle Eastern countries [8].

There is currently no vaccine or treatment against ZIKAV available. Therefore, prevention is the single most effective method to limit the spread of this disease [9]. Accordingly, population awareness about this

disease and adherence to its prevention measures are critical to control the spread of this disease. Our previous study regarding the knowledge of the Jordanian population about ZIKAV and prevention measures revealed inadequate levels of knowledge and adherence to ZIKAV prevention measures in the study population [10]. Similar poor level of knowledge was also documented by another study in the Middle Eastern country Qatar [11]. We showed that the most important determinant of population adherence to ZIKAV prevention measures was physician's recommendation. However, none of the participants in our previous study had been counseled regarding ZIKAV by a physician [10]. Therefore, the aim of the current study was to explore the role of physicians in Jordan in this regard, through assessment of their ZIKAV knowledge, attitudes towards ZIKAV and its prevention measures, and to identify the determinants of their practices of counseling patients about ZIKAV and its prevention.

Physicians play a critical role in disseminating health messages, and are considered to be the most accurate source of health information [12]. Hence, their knowledge, attitudes and practices are of vital importance for improving public health awareness regarding alarming medical situations. Most of the available studies on ZIKAV only addressed the knowledge of health care providers (HCP) but not their practices of patient counseling with regard to ZIKAV. A study conducted in Roatán, Honduras, addressed the knowledge of HCP and their prevention practice towards the sexual transmission of ZIKAV. Despite being an area with risk of ZIKAV, only 14% of HCP knew that ZIKAV is sexually transmitted [13]. In Indonesia, one report addressed the knowledge of the surveyed HCP [14], whilst another has recently addressed the attitude of medical doctors [15]. In the Middle East, nurses' knowledge regarding ZIKAV screening in pregnant women was assessed in a study in Bahrain [16], while in Saudi Arabia, ZIKAV knowledge and attitude were assessed in a sample of medical students [17]. To the best of our knowledge, this is the first systematic report that addressed this issue specifically amongst general physicians and gynecologists, the two categories of physicians who are most probably encountering pregnant women that require counseling concerning ZIKAV. In this report, we addressed physicians' knowledge, attitudes and risk perception, and for the first time, their practices of patient counseling and the identification of the most important determinants of this practice.

## Methodology

### *Study design and data collection*

This cross-sectional study was carried out from October 2016 to April 2017. Consenting general physicians and gynecologists who worked in clinics and hospitals in Amman city, the capital of Jordan, were considered eligible. Eligible physicians completed a brief questionnaire through a 5-10-minute structured interview with a doctor of pharmacy who worked as a research assistant at the University of Jordan.

A target sample size of 138 participants was estimated according to the following equation:  $Z_{1-\alpha/2}^2 P(1-P)/d^2$ ; where Z: is a standard normal variate = 1.96 at 5% type I error ( $p$ -value < 0.05); P: expected proportion of population based on previous studies or pilot study (Based on the estimate that 10% of the respondents knew ZIKAV disease definition, sign and symptoms, risk groups and complications, according to pilot study results); d: absolute error or precision = one-half of the desired interval of confidence, in this study  $d = 5\%$  [18].

The questionnaire was designed after reviewing related literature [1,19] and was reviewed for content and face validity by other colleagues in the field and was then pre-tested to a sample of 10 randomly selected general physicians and gynecologists, after which it was adapted.

The questionnaire included the following four-section structure as modified from Abu-rish *et al.* 2016 [20]: demographics and general characteristics of the participating physicians; physicians' knowledge about ZIKAV, including mode of transmission, prevention measures, diagnosis and treatment; physicians' attitude towards ZIKAV and its prevention measures; and physicians' practices of counseling patients regarding ZIKAV prevention measures. The factors that would affect the adherence of physicians to counseling patients regarding ZIKAV prevention were also assessed. The Institutional Review Board at the University of Jordan hospital approved the study protocol and the questionnaire.

### *Statistical analysis*

Statistical analysis was carried out using SPSS version 20.0 (SPSS Inc., Chicago, IL). Categorical variables were described using absolute and relative frequencies, continuous variables were described using mean with standard deviation (SD). Valid percentages were used to account for missing data as indicated in the results section. A 42-item knowledge score was calculated by assigning either a score of 1 for correct answers or a score of 0 for incorrect or "I do not know"

answers. Participants having a knowledge score of 33 (median knowledge score) or more were considered knowledgeable.

Bivariate analysis was used to test the differences among the variables that are associated with the knowledge score. The parametric independent t-test was used to compare means of two independent groups. Nonparametric Kruskal-Wallis test was used to compare means of more than 2 independent groups. All hypotheses tested were two-sided. A *P*-value of < 0.05 was considered significant.

## Results

### *General characteristics of the participants*

A total of 500 physicians were approached, and 119 consented to participate (23.8% response rate). The most commonly reported reason of non-participating was time constraints. The mean age of participants was 45.2 ± 8.5 (29-71) years. Participants' sociodemographic characteristics are shown in Table 1. Participants were either gynecologists (44.1%, n = 52) or general physicians (55.9%, n = 66) with 97.5% (n = 116) of them had more than 5 years of experience. As presented in Table 1, having at least five years of experience was the only factor significantly associated with a higher total knowledge score.

### *Knowledge about ZIKAV infection*

The mean knowledge score for the study population was 32.4 ± 2.4 (out of the 42 knowledge questions). Participants who had a score higher than or equal the median knowledge score of 33 were considered knowledgeable, and thus 53.8% (n = 64) of participants were sufficiently knowledgeable. None of the physicians was able to correctly answer all of the 42 knowledge questions and the maximum score achieved was 37 (88%). Only 9.8% (n = 12) knew the general

information related to the definition of ZIKAV infection, its symptoms and the highest risk group for ZIKAV infection. In particular, only one physician (0.8%) knew that the symptoms of illness are generally relieved within 2–7 days, and 17.8% (n = 21) of physicians knew that the signs and symptoms of ZIKAV infection in children are similar to those in adults. Only 2.5 % (n = 3) knew that a person develops immunity following first exposure and does not develop the disease again in the future. The detailed frequencies for correct answers to individual questions are presented in Table 2.

The five ZIKAV complications were correctly identified by 4.2 % (n = 5) of physicians. Only 35% (n = 41) of the physicians identified GBS as one of the complications of ZIKAV infection. About 60% of the participants correctly identified that hospitalization and death are not common complications of ZIKAV infection. In addition, only 11.2% (n = 13) of physicians knew that ZIKAV infection in childhood has not currently been linked to developmental delay or impaired growth.

Regarding ZIKAV modes of transmission, most of the physicians correctly identified the major routes of ZIKAV transmission. However, only 44.1% (n = 52) and 4.2% (n = 5) of respondents correctly identified that casual direct contact between individuals and transmission from mother to fetus through breastfeeding were not modes of ZIKAV transmission, respectively.

Most of the prevention measures were correctly identified. However, only 55.5% (n = 66) correctly identified that wearing long-sleeved shirts and long pants can prevent transmission and only 42% (n = 50) of the physicians were aware of the need of returnees from affected to non-affected areas to continue to use insect repellent for an extra 14 days.

**Table 1.** Sociodemographic characteristics of participants (n = 119) and their association with knowledge score.

Variable	% # (n)	Knowledge score		p-value
		Mean	SD	
<b>Age †</b>				
< 45	47.7 (51)	32.2	± 2.8	0.507
≥ 45	52.3 (56)	32.5	± 2.1	
<b>Gender†</b>				
Females	43.1 (50)	32.6	± 2.0	0.652
Males	56.9 (66)	32.4	± 2.2	
<b>Years of experience †</b>				
< 5 years	2.5 (3)	28.3	± 3.8	0.011*
5-10	46.2 (55)	32.8	± 2.4	
> 10 years	51.3 (61)	32.2	± 2.1	
<b>Medical field specialty †</b>				
General physician	55.9 (66)	32.4	± 2.4	0.949
Gynecologist	44.1 (52)	32.4	± 2.4	

†Valid percent; †independent sample t-test; \*Significant at *p*-value < 0.05.

**Table 2.** Physicians' Knowledge about ZIKAV, its mode of transmission, prevention measures, diagnosis and treatment.

Question	Correctly answered % (n)
<b>Definition, sign and symptoms, risk groups and complications</b>	
ZIKA is a disease caused by a virus that is primarily spread to people through the bite of an infected mosquito.	88.2 (105)
Most persons infected with ZIKAV will have symptoms.	90.7 (107)
The most common signs and symptoms are fever, rash, joint pain, and conjunctivitis.	62.4 (73)
Symptoms of the illness are generally relieved within 2–7 days.	0.8 (1)
The highest risk group is pregnant ladies.	72.9 (86)
The signs and symptoms of ZIKAV infection in children are similar to those in adults.	17.8 (21)
Upon first exposure, a person develops immunity and does not develop the disease again in the future.	2.5 (3)
<b>Complications of ZIKAV infection</b>	
ZIKAV infection during pregnancy can cause severe birth defects, including microcephaly which is a sign of incomplete brain development.	93.3 (111)
Small proportion of people with recent ZIKAV infection get an uncommon sickness of the nervous system (Guillain-Barré syndrome, GBS)	35.0 (41)
Severe disease requiring hospitalization due to ZIKAV is common.*	59.8 (70)
Death from ZIKAV infection is common.*	59.8 (70)
ZIKAV infection in childhood has not currently been linked to developmental delays or impaired growth.	11.2 (13)
<b>Mode of transmission</b>	
ZIKAV is transmitted primarily through the bite of infected mosquitoes.	96.6 (115)
Direct human-to-human transmission of ZIKAV can occur through sexual contact.	81.5 (97)
Direct human-to-human transmission of ZIKAV can occur from a pregnant woman to her fetus.	100.0 (119)
There is a possible transmission through blood transfusion.	100.0 (119)
ZIKAV is transmitted directly from one person to another through casual contact.*	44.1 (52)
ZIKAV is transmitted from mother to fetus through breastfeeding.*	4.2 (5)
<b>Preventative measures</b>	
<i>Prevention of mosquito bites</i>	
The best way to prevent ZIKAV infection is to prevent mosquito bites.	98.3 (117)
Use Environmental Protection Agency (EPA)-registered insect repellents (special type of insect repellent).	98.3 (117)
Wearing long-sleeved shirts and long pants is not necessary.*	55.5 (66)
Staying in places with air conditioning or window and door screens.	94.1 (112)
If the room is not well screened, use a bed net when sleeping or resting.	95.8 (114)
Removing standing water and rubbish around your home.	100.0 (119)
The asymptotically infected individuals returning from affected areas to non-affected areas should continue the use of insect repellents for a minimum of extra 14 days to avoid the local mosquitoes (previously non-infected) to obtain the virus.	42.0 (50)
<i>Prevention of transmission through sex</i>	
Male partner should use condoms (or other barriers to prevent infection) to reduce the chance of getting Zika from sex.	97.5 (116)
<i>Prevention of transmission during pregnancy</i>	
Pregnant women should not travel to areas with ZIKAV.	99.2 (118)
Pregnant women and their partners living in or traveling to these areas should follow steps to prevent mosquito bites.	100.0 (119)
If you are pregnant and have a partner who lives in or has traveled to an area with ZIKAV, do not have sex, or use condoms the right way, every time, during your pregnancy	99.2 (118)
If you (or your wife) are not pregnant and not planning to get pregnant during ZIKAV outbreak you should consistently use the most effective method of birth control that you are able to use	112 (94.9)
<i>Other preventative measures</i>	
There is currently no vaccine to prevent ZIKAV infection.	50.4 (60)
There is currently no specific drug to prevent ZIKAV infection.	86.6 (103)
Isolation of persons with ZIKAV disease or quarantine of exposed persons is recommended.*	0.8 (1)
<b>Treatment of ZIKAV Infection</b>	
There is currently no specific drug to treat Zika virus infection.	73.1 (87)
Get plenty of rest.	100.0 (119)
Drink fluids to prevent dehydration	100.0 (119)
The pharmacological treatment is acetaminophen or non-steroidal anti-inflammatory drugs (NSAID) to reduce fever and pain.*	5.0 (6)
Do not take aspirin and other non-steroidal anti-inflammatory drugs (NSAIDs) until dengue can be ruled out to reduce the risk of bleeding.	94.1 (111)
Aspirin should not be used because of the risk of development of Reye's syndrome in children under 12 years of age	93.0 (107)
<b>Diagnosis</b>	
Diagnosis of ZIKAV is based on a person's recent travel history, symptoms, and test results.	99.2 (118)
A blood or urine test can confirm ZIKAV infection.	99.2 (118)
Real time RT-PCR of serum or urine is the only employed technique in the diagnosis.*	4.3 (5)

\*The correct answer to these questions is "No"; GBS: Guillain-Barré syndrome; NSAID: Non-steroidal anti-inflammatory drugs; RT-PCR: Reverse transcription-polymerase chain reaction.



**Table 3.** Attitudes and practices towards ZIKAV and its prevention measures.

Question	%# (n)
<b>Attitude of physicians towards ZIKAV and its preventative measures</b>	
Do you think that ZIKAV is a risk to your health?	23.5 (28)
Do you think that ZIKAV is a risk to your patient health?	23.5 (28)
Do you think that the preventative measures are effective?	50.0 (59)
<b>Practice of physicians towards ZIKAV prevention</b>	
Have you ever discussed the risk ZIKAV with your patient?	None
Have you ever discussed ZIKAV preventative measures with your patient?	None
Have you ever counseled a pregnant patient to cancel a trip to ZIKAV outbreak areas?	None

# Valid percent.

Only 50.4% (n = 60) of the physicians knew that there is no vaccine to prevent ZIKAV infection. In addition, only 0.8% (n = 1) of participants correctly identified that isolation of infected or exposed persons is not recommended.

Most of the physicians were able to correctly identify the main treatment lines and diagnostic methods. However, only 5.0% of physicians (n = 6) correctly disagreed on the use of acetaminophen or NSAIDs to reduce fever or pain (where CDC allowed the use of NSAIDs only if dengue can be ruled out to reduce the risk of bleeding, while acetaminophen can be safely used to reduce fever and pain) [21]. In addition, only 4.3% (n = 5) correctly identified that RT-PCR of serum or urine are not the only methods used for diagnosis of ZIKAV disease. Serological testing using ELISA for ZIKAV IgM antibodies is another diagnostic approach [22].

*Sources of information about ZIKAV infection*

The most common source of physicians' information about ZIKAV was television (66.7%, n = 78), followed by internet (15.4 %, n = 18). On the other hand, much lower proportions of physicians used CDC guidelines (2.6%, n = 3), scientific journals (6.0%, n = 7), or newspapers (9.4%, n = 11). The total knowledge score was not associated with using any of these sources of information (P-value = 0.799; Kruskal-Wallis test).

*Attitudes and practices of participants towards ZIKAV and prevention measures*

Our data showed that 23.5% (n = 28) of the physicians perceived ZIKAV as a threat to their health or the health of their patients. Only 50% (n = 59)

believed in the efficacy of ZIKAV prevention measures. None of participating physicians had ever discussed the risks of ZIKAV or its prevention measures with their patients, and they had never counseled a pregnant patient to cancel a trip to ZIKAV outbreak areas (Table 3).

*Factors affecting future practice of physicians towards ZIKAV counseling*

As presented in Table 4, the presence of ZIKAV cases in Jordan would be the most important determinant to encourage physicians to counsel patients about ZIKAV prevention measures (100%, n = 119), followed by CDC or WHO recommendations (92.4%, n = 110) and if the government strongly encouraged adherence to these measures (80.3%, n = 94).

**Discussion**

Despite the absence of evidence of ZIKAV in Jordan, the risk of ZIKAV transmission in this region might be appreciated by the presence of documented imported cases of ZIKAV disease to the Middle East, and the detection of the transmitting mosquitoes in this region [6,7,23]. HCP play a critical role in population awareness regarding public health problems. Therefore, in this report, ZIKAV knowledge, attitudes and risk perception amongst general physicians and gynecologists were assessed. Besides, this report addresses physicians' practice of counseling patients regarding ZIKAV and the determinants of this practice. Our data identified a number of gaps in physicians' knowledge, including in symptoms and signs of ZIKAV infection, complications, modes of virus transmission, and treatment of infection. None of the respondents had

**Table 4.** Factors that would affect the future practice of physicians towards ZIKAV counseling. \*

Reason/ Factor	%# (n)
If there is evidence of Zika cases in Jordan	100.0 (119)
If it is recommended by the CDC or the WHO.	92.4 (110)
If the government strongly encouraged adherence to these measures	80.3 (94 )

CDC: Centers for Disease Control and Prevention; WHO: World Health Organization; \* Participants were asked to select as many factors that applied to them;

# Valid percent.

ever discussed ZIKAV infection with their patients. The data presented in this report provide insights into the role of physicians in Jordan, in terms of public awareness regarding ZIKAV and the barriers to their role.

Several gaps of knowledge were identified in relation to the signs and symptoms of ZIKAV disease, its complications, mode of transmissions, preventions measures, treatment and diagnosis. In particular, we showed that only severe birth defect was identified as a complication of ZIKAV infection by 93% of the participants, while other aspects of complications were identified by 11-60% of the respondents. Only few participants identified that casual contact between persons, and breast feeding, are not routes of ZIKAV transmission, and that isolation of infected persons is not recommended. This is consistent with the results of previous report in Bahrain and Indonesia, where only 39% of the nurses and 35% of HCP, respectively, were considered knowledgeable [14,16]. Besides, in Roatán, Honduras, only 14% of HCP knew that ZIKAV is sexually transmitted [13].

In our study, having at least 5 years of experience was the only sociodemographic factor that was associated with a high knowledge score. In Indonesia, being a general physician and working in community health centers were associated with higher ZIKAV knowledge compared to being a specialist, and working in private clinics, respectively [14].

Television was the most common source of medical information by the participants in this study, followed by internet (15.4 %), whilst CDC guidelines and scientific journals were only used by 3-6% of the participants. Although the source of medical information was not statistically associated with the knowledge score, the limited knowledge could be attributed to their limited utilization of the guidelines and scientific journals as a source of medical information. This was consistent with the results in Indonesia where online media were the most common source of information for HCP while only 16.2% of them used medical articles [14].

Concerning physicians' attitudes and beliefs, only about a quarter of the participants perceived ZIKAV as a threat for their health, and only half of them believed in the efficacy of the prevention measures. Similarly, only 36% of medical doctor surveyed in Indonesia had a good attitude regarding ZIKAV [15] while 57% of the surveyed HCP in in Roatán, Honduras had concerns over ZIKAV [13]. Although 23.5% of the participating physicians perceived ZIKAV as a health threat to their patients, none of them had discussed or counseled a

patient before regarding ZIKAV and its complications. Of note, physicians practice assessed by the study in Roatán concerned prevention of ZIKAV-sexual transmission by the physicians themselves, but not patient counseling practice [13]. Our results revealed that the most important factors for the adoption of the practice of patient counseling were the presence of an evidence of ZIKAV in Jordan or a recommendation by the CDC, the WHO, or the government.

### *Limitations*

This study has some limitations. First, the sample size was limited due to the low response rate of the study population. Non-participation bias cannot be ruled out. Second, participants were only approached in Amman city. Therefore, the results of this study may not necessarily be generalized to all general physicians and gynecologists in Jordan.

### **Conclusions**

General physicians and gynecologists in Jordan had several gaps in knowledge of key aspects of ZIKAV disease. The presence of evidence of ZIKAV in Jordan and health authorities' recommendations were the most important factors for adoption of counseling practice. Therefore, the results of this study revealed various barriers that limit the effective role of physicians and gynecologists in Jordan in controlling ZIKAV disease spread, including limited knowledge regarding ZIKAV, the lack of evidence of ZIKAV in Jordan, and the absence local and global health authorities' recommendations. There is a need for specific training programs of physicians and gynecologists in Jordan.

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**Conflict of interests:** No conflict of interests is declared.