

**KNOWLEDGE LEVEL OF MEDICAL STUDENTS ABOUT ZIKA VIRUS DISEASE IN
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ABSTRACT

Objectives: The aim of this study is to determine the knowledge level of students at an university faculty of medicine regarding Zika Virus Disease (ZVD) as well as effective factors of the disease. **Materials and methods:** This study is a descriptive cross-sectional study that was conducted with students in an university faculty of medicine. The total number of students was 1380 at the time of the study. The sample size was calculated as 301 using the formula for a minimum sample size under the condition with a known-population size. Both stratified sampling and simple random sampling were used as sampling methods. Each correct answer was given 5 points, and 20 questions were about ZVD. Final scores were recognised as the ‘_ZVD knowledge score’. A Student *t*-test, one-way Anova and Bonferroni post-hoc test were used to compare the groups. **Results:** The mean age of individuals was 21.8 ± 2.3 (min–max: 18–36), and 55.8% of individuals who participated in our research were males. The ZVD score in the 6th class was 47.58 ± 21.86 and was 29.64 ± 26.04 in the 1st class, which was significant ($p < 0.05$). **Conclusions:** There was no significant difference between genders regarding ZVD scores. In the 6th class, ZVD scores were significantly higher than those in the 1st class. Students learned more about diseases as the educational year progressed. The knowledge level about ZVD is low according to our results.

KEYWORDS: Zika virus, Medical Students, Knowledge.**INTRODUCTION**

Zika virus disease (ZVD) is a disease caused by an arbovirus from the Flaviviridae family. Zika virus is a positive-sense single-stranded RNA virus enveloped within an icosahedral capsid structure.^[1] Zika virus was first found and identified in 1947 in rhesus monkeys near the Zika Forest of Uganda.^[2] In 1952, the first human case was determined, and later on, Zika epidemics were reported in Africa, Southeast Asia and the Pacific Islands. Before the year 2007, 14 cases of Zika virus were found. It is thought that there have been numerous unreported cases since both the symptoms and findings of ZVD are similar to those of several other diseases.^[2] The Pan American Health Organization examined some of the suspected cases that occurred in Brasil in May 2015 and announced a health emergency regarding this situation by confirming Zika virus infection in February 2016.^[2]

Transmission of ZVD to humans can be by infected mosquitos of the *Aedes* species. This mosquito species is known to infect humans with dengue fever, chikungunya fever and Zika virus. It has been shown that ZVD can be

transmitted sexually or through blood transfusion.^[3-4] Zika virus may be transmitted from a mother to her baby through perinatal transmission throughout the gestational period^[5]; however, research regarding viral transmission from mother to baby continues. It is important to note that potential transmission can still occur through close contact between a mother and her newborn baby during lactation (breastfeeding), which is one of the perinatal modes of transmission. In a recently conducted study, the replicative Zika virus causing infection could not be determined despite the identification of Zika virus RNA in breast milk samples.^[6] Necessary precautions must be taken to prevent non-infected mosquitos from becoming infected by biting infected patients during the first week of the disease when they are most likely to become viremic.^[6] Only 18% of cases infected by Zika virus show clinical symptoms.^[7] The most common clinical symptoms and findings are subfebrile fever, maculopapular rash, arthralgia (joint ache), myalgia (muscular pain), headache, conjunctivitis, sore throat, coughing, vomiting and more rarely hematospermia.^[8-9] Symptoms usually show spontaneous remission 3-7 days after disease onset^[10], but arthralgia may extend up to 1

month.^[11] Mortality is rare in ZVD.^[12] Recently, a correlation between Zika infection and Guillain-Barré Syndrome (GBS) has been suggested.^[12] In addition, although information about typical laboratory changes regarding ZVD is limited, leukopenia, thrombocytopenia, a mild escalation in LDH and an increase in inflammatory parameters (CRP, fibrinogen and ferritin) may occur.^[13] While Zika is an infectious disease that has mild clinical symptoms and is self-limiting, mosquito vectors in countries with mild climates must be recognised as potential threats. The possibility of the occurrence of a gene transfer between other arboviruses transmitted by *Aedes* is of great importance as between the Chikungunya virus and dengue virus in the Mediterranean.^[14]

A major pandemic of Zika virus is being experienced in Brasil. In recent months, the Brazilian authorities have reported an increase in the number of the babies born with microcephaly. Even though there is evidence for the connection between Zika and microcephaly, it has not yet become clear whether the diseases in these babies are the result of Zika virus infection developed in their mothers.^[15-16]

There is no specific treatment for Zika virus infection. Patients can be provided hydration, oxygenation and treatment for secondary infections as well as supportive care for other symptoms. Non-steroidal medications must not be used since they may increase haemorrhagic complications.^[2]

Today, vaccination studies for the disease continue, but an approved vaccination has not yet been developed. So far, only four import Zika virus cases have been identified.

New imported Zika virus cases are likely to be detected in our country since they visit the regions where the disease is endemic or from our country. Therefore, there is the possibility of a rise in the incidence of ZVD cases in our country due to increased international travel.

The aim of this study is to determine the knowledge level of students at Inonu University, Medical Faculty regarding ZVD as well as effective factors of its symptoms, prevention and transmission.^[17]

MATERIALS AND METHODS

This study is a descriptive cross-sectional study that was conducted with students at Inonu University, Medical Faculty in April 2016. To be able to conduct the study, written approval was received from the Ethical Committee and the Dean's Office at Inonu University, Medical Faculty. There were 1380 students in the medical faculty of an university during the period when this study was conducted. The research sampling was calculated as 301 by using the calculation formula of the minimum sampling size $[Nt^2pq/d^2(N-1) + t^2pq]$ used in cases in which the number of individuals within a

population is known. Both simple random sampling and stratified sampling were used as sampling methods.

The questionnaire forms, each of which consisted of 28 questions, and were arranged by the researchers by reviewing the information in the literature, were handed out to and completed by students under the supervision of the researcher who collected them upon completion. Correct answers for each of the 20 questions were arranged with respect to characteristics of the causative agent of Zika virus, its symptoms, modes of transmission as well as its treatment were evaluated as 5 points. Points were summed, and the score was based on a scale of 100 points. Final scores were recognised as the 'ZVD knowledge score'.

Data were analysed on the computer using SPSS (version 22.0) package programme. Appropriate descriptive values were given for both qualitative and quantitative variables.

Qualitative variables were expressed as numbers (n), and percentages (%), quantitative variables that were normally distributed were expressed as the mean \pm standard deviation. Qualitative data were analysed with a Student *t*-test, a one-way ANOVA that were parametric tests, and a Bonferroni correction as a post-hoc test was used. In all statistical evaluations, $p < .05$ was considered significant.

RESULTS

The sociodemographic characteristics of students are shown in Table 1. As seen in Table 1, 44.2% of individuals who participated in our research were female, whereas 55.8% of them were male. Also, 98.3% of participants were single, while 1.7% of them were married. The mean age of individuals was 21.8 ± 2.3 (min-max: 18-36). As shown in Table 1, 20.3% of individuals were 1st Term students, whereas 19.2% were 2nd Term, 16.6% of them were 3rd Term, 18.3% were 4th Term, 16.6% were 5th Term and 9% were 6th Term students.

Table 1

The distribution of knowledge score questions to students who participated in the study regarding ZVD as well as its transmission to humans is shown in Table 2. Table 2 also shows that half the students know how Zika virus is transmitted to humans when some of the infected species of mosquitos found in both tropical and subtropical regions bite them, whereas one-fourth of them are aware that the main host is the monkey, while one-third of them understand that the disease causes pandemics. On the other hand, two out of five know that Zika virus is transmitted through the blood, while one-fourth of them realise that it is likely to be transmitted sexually, whereas one-third of them know that a non-infected mosquito that bites an infected individual will become infected.

Table 2

As shown in Table 2, 51.7% of students knew that microcephaly could be seen in babies of infected pregnant women, 39.2% of them knew that disease symptoms would not be seen in every individual infected with Zika virus, whereas 26.2% of them knew GBS could develop in some infected patients, and 12% of them knew that the mortality rate was low. In this study, 53.8%, of students knew fever as being one of the symptoms associated with ZVD, while 48.8% knew headache as a symptom, 42.2% knew arthralgia and backache, 32.3% knew maculopapular rash, and 29.1% knew conjunctivitis as a symptom. Table 2 shows the status of students knowing both the treatment for and protection from ZVD. Table 2 also presents the following findings: one-third of the students knew that there was no specific treatment for Zika virus, while one-half of them understood that immune-support treatment needed to be provided, and two out of five knew that symptomatic treatment like painkillers needed to be administered. In contrast, only 16.9% of participants were aware that there was no approved vaccine for ZVD in routine clinical use.

Table 3

The status of students who participated in the study on knowing the causative agent of ZVD and the regions it is seen throughout the world is shown in Table 3. Only 46.8% of students knew the identity of the causative agent of the disease. Similarly, 46.8% of them knew that it was seen in Africa, 39.5% of them knew it was seen in America, whereas 29.1% of them knew it was seen in Southeast Asia, and 14.8% of them knew it was seen in the Pacific Islands.

Table II: The Distribution of The Knowledge Score Questions of the Students who Participated in the Study in regard to Zika Virus Disease.

	The number of those with the Knowledge of it	
	n	%
Basic Characteristics of Zika Virus		
It is transmitted into the human body by an infected mosquito bite.	158	45.9
It is transmitted to humans by some mosquito species in the tropical and subtropical regions.	157	45.6
It is transmitted through blood.	142	41.3
It has caused pandemic.	122	35.5
A mosquito that bites an infected individual becomes infected.	102	29.7
It is transmitted sexually.	94	27.3
Its main host is the monkeys.	83	24.1
The Symptoms of Zika Virus		
Fever	185	53.8
Headache	168	48.8
Arthralgia (joint ache), backache	145	42.2
Maculopapular rash	111	32.3
Conjunctivitis	100	29.1
Clinical Conditions of Zika Virus Disease		
Microcephaly can be seen in the babies of infected pregnant women.	178	51.7
Disease symptoms are not seen in every individual infected with Zika Virus.	135	39.2

Table 4

In Table 4, knowledge scores of the students about ZVD are given according to gender and classes attended. When knowledge scores about ZVD are compared according to gender, the mean score of the women was 36.67 ± 28.18 , whereas the mean score of men was 35.62 ± 28.19 ; yet, this difference was statistically insignificant ($p > .05$). On the other hand, the mean knowledge scores pertaining to ZVD according to classes attended by students are as follows: 29.64 ± 26.04 in the 1st Term; 35.53 ± 27.47 in the 2nd Term; 37.01 ± 30.22 in the 3rd Term; 32.06 ± 25.94 in the 4th Term; 41.92 ± 32.38 in the 5th Term; and 47.58 ± 21.86 in the 5th Term. Knowledge scores of students who attended the 6th Class are significantly higher than knowledge scores of students who attended the 1st Class ($p < .05$).

Table I: Socio-demographic Characteristics of the Students who Participated in the Study.

Socio-demographic Characteristics	n	%
Gender		
Female	192	55.8
Male	152	44.2
Marital Status		
Single	338	98.3
Married	6	1.7
Class		
1	70	20.3
2	66	19.2
3	57	16.6
4	63	18.3
5	57	16.6
6	31	9.0
Total	344	100

Guillain-Barré Syndrome (GBS) may develop in some infected patients.	90	26.2
Mortality rate is low in infected individuals.	43	12.5
Treatment and Protection from Zika Virus Disease		
An immune support- treatment should be provided.	161	46.8
A symptomatic treatment like painkillers and antipyretics should be administered.	128	37.2
It has no specific treatment.	123	35.8
No vaccine has yet been produced to be protected from ZVD.	58	16.9

Table III: The Status of the Students that Participated in the Study on Knowing the Agent of Zika Virus Disease and the Regions it is seen in throughout the World.

	The number of those with the Knowledge of it	
	n	%
The agent of Zika Virus disease is a RNA virus from Flavoviridae family.	161	46.8
Zika Virus has been seen in Africa.	161	46.8
Zika Virus has been seen in America.	136	39.5
Zika Virus exponent has been seen in Southeast Asia.	100	29.1
Zika Virus has been seen in the Pasific Islands.	51	14.8

Table IV: The Comparison of The Knowledge Scores of the Students that Participated in the Study regarding Zika Virus According their Gender and Class.

	Mean Score \pm SD (Min:0, Max:100)	P
Gender		
Female	36.67 \pm 28.18	0.731
Male	35.62 \pm 28.19	
Class		
1*	29.64 \pm 26.04	
2	35.53 \pm 27.47	
3	37.01 \pm 30.22	0.026
4	32.06 \pm 25.94	
5	41.92 \pm 32.38	
6*	47.58 \pm 21.86	
Total Score	36,09 \pm 28,15	

*Different from each other.

DISCUSSION AND CONCLUSION

Although ZVD has not yet posed a serious threat to Turkey, it poses a major problem for public health that causes great concern worldwide, including our own country. This public health threat is due to both trips and international journeys involving business life and education, which are performed in countries where ZVD is seen. For example, in February 2015, Zika virus was reported in a healthy individual who returned to the United Kingdom after a trip to Venezuela.^[14]

The populations of regions where ZVD is seen, and the populations who are at risk for transmission of the virus to humans are as follows: 1,422.13 million people in Asia, 298.36 million people in America, 452.58 million people in Africa, and 2,173.27 million people in total throughout the world.^[15] In our study, 46% of the students knew that Zika virus was seen in Africa, while 39.5% of them knew it was seen in America, and 29.1% knew that it was seen in Asia. Although the rate of

populations at risk in the whole world is so high, the percentage of students who are aware of the risk is low.

The most commonly seen clinical symptoms of Zika virus are fever (96.6%), rash (93.3%), purulent conjunctivitis (88.8%), headache (85.4%) and myalgia (84.3%).^[16] Other less common clinical symptoms are moderate/mild arthralgia (71.9%), severe arthralgia (20.2%) and arthritis (16.9%).^[16] Among the students who participated in the study, the most-known symptom associated with ZVD is fever (53.8%), whereas the least-known symptom is conjunctivitis (29.1%). Students of the medical faculty, who are the physicians of the future, have to be knowledgeable about both specific and non-specific symptoms of diseases. However, only half of the students have knowledge of the most commonly seen symptom in this case.

The main mode of transmission in ZVD occurs when female mosquitos belonging to *Aedes* species (*Aedes aegypti* and *Aedes albopictus*) bite humans.^[2] Half of the students knew that Zika virus was transmitted when humans were bitten by some infected species of mosquitos found in tropical and sub-tropical regions. In addition, only one-third of students knew that if a mosquito bit an infected individual, it would become infected. To annihilate the main source, it is necessary to reduce the breeding sites of mosquitos as well as minimise contact between mosquitos and humans. Reducing sites of mosquito vectors can be possible by reducing the adult mosquito population around communities at risk and by using barriers, such as insect screens, closing doors and windows, wearing long clothing and using repellents. In addition, to avoid bites of mosquitos belonging to *Aedes* species, it is necessary for children, patients and seniors, in particular, to use mosquito nets during their sleep or to ensure their protection with the help of insecticides.^[18] It is required that health personnel must know both the source of infection as well as protective measures to announce

such precautions to the community and implement them, so they are effective. Zika virus RNA, which has caused infection so far, has been found in blood, urine, semen, saliva, cerebrospinal fluid, amniotic fluid and breast milk.^[19] Apart from the transmission of the virus from mother to baby during the gestational period, infection/transmission may also occur during a blood transfusion from human to human and through sexual contact.^[20-21] Only 40% of students knew that the disease is transmitted through the blood, whereas just 25% of them knew that it could be transmitted sexually.

In a conducted study, the presence of Zika RNA was present in the amniotic fluid of a pregnant woman infected with Zika virus, and microcephaly was detected on foetal ultrasonography performed on this pregnant woman's baby.^[22] This possible connection between brain anomalies like Zika and microcephaly is a serious condition that is avoidable.^[23] Almost half of the students who participated in our study know that microcephaly is likely to be seen in babies of infected pregnant women. This rate is rather low. All medical students need to know the modes of transmission that have a major role in the occurrence of the disease and in preventing disease transmission from infected individuals to healthy ones. For this reason, it is important to raise the consciousness of medical students throughout their educational period that protection from diseases is both easier and more cost-effective than treating them.

Although the mortality rate of ZVD is low, there are some complications associated with the infection.^[22] One of the complications that occur in individuals infected by Zika is Guillain-Barré Syndrome (GBS).^[24] Only 26.2% of the students know that GBS may develop in some patients. The most important method in eliminating such complications is to control the epidemic.

No vaccine or treatment has been produced yet to prevent the virus from propagating. Only symptomatic therapy is provided to alleviate patients' symptoms.^[25] Although 35.8% of students knew that there was no specific treatment for Zika virus, only 16.9% of the students were aware that there is no vaccine for ZVD approved by the FDA for routine clinical use.

In Table 4, the knowledge scores about ZVD are given according to classes attended by students. Mean knowledge scores of students pertaining to ZVD are, according to classes attended, as follows: 29.64 ± 26.04 in the 1st Term; 35.53 ± 27.47 in the 2nd Term; 37.01 ± 30.22 in the 3rd Term, 32.06 ± 25.94 in the 4th Term; 41.92 ± 32.38 in the 5th Term, and 47.58 ± 21.8 in the 6th Term. Knowledge scores of students attending the 6th Class are significantly higher than those of 1st Class students ($p < .05$). These results suggest that as knowledge increases with the progression of the educational period, students also increase their knowledge regarding the diagnosis and treatment as well as protection from the disease.

In conclusion, ZVD, which became a major health problem in some regions of the world, must be taught as a course in medical facilities due to the risk of spreading to all countries. Our study suggests that the mean knowledge scores of students included in the scope of this research as related to ZVD are very low. We recommend closing the gaps in knowledge about this subject by providing extracurricular training, courses, and seminars that will be included promptly in the faculty's curriculum in case of an epidemic.

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